ILLINOIS POLLUTION CONTROL BOARD
February 21, 2013

IN THE MATTER OF:	)	
	)	
WATER QUALITY STANDARDS AND	)	R08-9 (Subdocket C)
EFFLUENT LIMITATIONS FOR THE	)	(Rulemaking - Water)
CHICAGO AREA WATERWAY SYSTEM	)	
AND LOWER DES PLAINES RIVER:	)	
PROPOSED AMENDMENTS TO 35 ILL.	)	
ADM. CODE 301, 302, 303, and 304	)	

Proposed Rule. First Notice.

OPINION AND ORDER OF THE BOARD (by D. Glosser):

SUMMARY OF TODAY'S ACTION

The Board today proposes designations of aquatic life use for the Chicago Area Waterways System (CAWS) and Lower Des Plaines River (LDPR). After reviewing the record and examining the Clean Water Act (CWA) goal of "water quality which provides for the protection and propagation of fish, shellfish, and wildlife. . .." 33 U.S.C. § 1251(a)(2), the Board is proposing two aquatic life use designations and has developed definitions of those aquatic life use designations. The Board proposes a CAWS Aquatic Life Use (ALU) A and CAWS and Brandon Pool Aquatic Life Use (ALU) B. Generally CAWS ALU A waters are capable of supporting communities of native fish that are tolerant and moderately tolerant and may include sport fish species such as channel catfish, largemouth bass, bluegill, northern pike, and black crappie, and non-game fish species such as the tadpole madtom, spotfin shiner, and orangespotted sunfish. CAWS and Brandon Pool ALU B waters are capable of supporting primarily tolerant fish species, such as central mudminnow, golden shiner, bluntnose minnow, yellow bullhead and green sunfish.

The Board proposes as CAWS ALU A waters: Upper North Shore Channel, Lower North Shore Channel, North Branch of the Chicago River, South Branch of the Chicago River, Calumet-Saganashkee (Cal-Sag) Channel, Calumet River, Little Calumet River, Grand Calumet River, Lake Calumet, and Lake Calumet Connecting Channel. The Board proposes as ALU B waters the Chicago Sanitary and Ship Canal and Brandon Pool.

The Board does not propose an aquatic life use for the Upper Dresden Island Pool (UDIP) designation. Instead, the Board proposes that the UDIP be classified as General Use, based on its ability to meet the CWA goals. However, the Board will visit the issue of appropriate water quality standards for UDIP in Subdocket D.

The Board has determined that maintaining the General Use standard for the Chicago River is appropriate as the Chicago River can meet the CWA goals in the foreseeable future. Therefore no change is proposed for the Chicago River.

The Board also opens a Subdocket E to examine issues surrounding Bubbly Creek (the South Fork of the South Branch Chicago River) as requested by the Metropolitan Water Reclamation District of Greater Chicago (District) and Environmental Law and Policy Center, Friends of the Chicago River, Sierra Club Illinois Chapter, Natural Resources Defense Council and Openlands (Environmental Groups).

The Board is also proposing language to establish numeric water quality standards for fecal coliform bacteria applicable to Primary Contact Recreation Waters as the Board indicated it would in Subdocket B.

GUIDE TO THE BOARD'S OPINION

Numerous public hearings have been held, numerous comments received, and exhibits have been filed, in addition to the Illinois Environmental Protection Agency's (IEPA) original proposal. Thus, for the convenience of the reader, IEPA's statement of reasons is cited as "SR" and attachments to the proposal are cited as "Attach" while hearing exhibits are cited as "Exh.". Hearing transcript are cited by date 01/01/01 and "A" or "P" if there are separate morning or afternoon transcripts. Public comments are cited as "PC".

The Board's opinion begins by addressing the procedural background (page 2) followed by the statutory background (page 5). The Board next supplies the historical background and a description of the waterways at issue (page 5). The regulatory history is included next (page 7). The Board then summarizes the CWA requirements and the corresponding federal regulations (page 11).

The rulemaking detail begins with the Use Attainability Analysis for CAWS (page 14) followed by the User Attainability Analysis for LDPR (page 34). The regulatory proposal follows next (page 40). The Board summarizes the testimony (page 44) and then the public comments (page 125). Finally, the Board discusses the Board's decision (page 172).

PROCEDURAL BACKGROUND

On October 26, 2007, IEPA filed a proposal under the general rulemaking provisions of Sections 27 and 28 of the Environmental Protection Act (Act) (415 ILCS 5/27, 28 (2010)). Generally, the proposal amends the Board's rules for Secondary Contact and Indigenous Aquatic Life Use to update the designated uses and criteria necessary to protect the existing uses of CAWS and LDPR. On November 1, 2007, the Board accepted the proposal for hearing. On November 15, 2007, the Board granted a motion to hold hearings in Chicago and Joliet.

On June 12, 2008, the District filed a motion to stay the rulemaking proceeding, which was supported by: 1) Midwest Generation L.L.C (Midwest Generation), 2) Chemical Industry Council of Illinois (CICI), and 3) Stepan Company (Stepan). On June 25, 2008, the Environmental Groups filed a response in opposition to the motion. Joining in the opposition to the motion was Southeast Environmental Task Force (SETF), the People of the State of Illinois

(People), and IEPA. On July 21, 2008, the Board denied the motion to stay and directed the parties to proceed with additional hearings already scheduled.

On March 18, 2010, the Board granted a motion filed by Citgo/PDV for an additional hearing on Asian carp, but delayed that hearing until later in 2010. The Board also granted a motion filed by the Environmental Groups to sever the dockets. The Board severed the dockets as follows: 1) Subdocket A deals with the issues related to recreational use designations, 2) Subdocket B addresses issues relating to disinfection and whether or not disinfection may or may not be necessary to meet those use designations, 3) Subdocket C addresses the issues involving proposed aquatic life use, and 4) Subdocket D addresses the issues dealing with water quality standards and criteria that are necessary to meet the aquatic life use designations.

The Board held 39 days of hearing as of March 18, 2010, when the docket was divided, and additional hearings proceeded in the Subdockets. Hearings were held in Chicago: January 28, 2008 through February 1, 2008, June 16, 2008, September 8, 2008 through September 10, 2008, September 23, 2008 through September 25, 2008, February 17 and 18, 2009, March 3 and 4, 2009, April 15, 2009, May 5, 6, and 20, 2009, July 28 and 29, 2009, August 13 and 14, 2009, October 5, 2009, November 9 and 10, 2009, and January 13 and 14, 2010. Hearings were held in Joliet: March 10, 2008 through March 12, 2008, October 27 and 28, 2008 and November 17, 2008. Hearings were held in Des Plaines: April 23 and 24, 2008, and December 2 and 3, 2008.

Not all the testimony received during the 39 days of hearing held prior to March 18, 2010 is relevant to this Subdocket. Those whose testimony is relevant are the following:

Rob Sulski of IEPA (Exhibit 1)
Roy Smogor of IEPA (Exhibit 3)
Charles S. Melching on behalf of District (Exhibit 169)
Jennifer Wasik on behalf of District (Exhibit 187, 230)
Samuel G. Dennison on behalf of District (Exhibit 191, 192, 209)
Marcelo H. Garcia on behalf of District (Exhibit 193)
Paul L. Freedman on behalf of District (Exhibit 204)
John Mastracchio on behalf of the District (Exhibit 223)
Alan L. Jirik on behalf of Corn Products (Exhibit 303)
James E. Huff, P.E. on behalf of Citgo/PDV (Exh. 285) and Corn Products (Exhibit 304)
Joseph V. Idaszak on behalf of Corn Products (Exhibit 305)
Dr. David Thomas on behalf of the Environmental Groups (Exhibit 327)
Laura Barghusen on behalf of the Environmental Groups (Exhibit 338)
Julia Wozniak on behalf of Midwest Generation (Exhibit 364)
Greg Seegert on behalf of Midwest Generation (Exhibit 366)
Dr. G. Allen Burton on behalf of Midwest Generation (Exhibit 369)

In addition to hearing testimony, the Board received over 381 exhibits and over 500 public comments, prior to the dockets being divided on March 18, 2010. Many of the comments and exhibits are not relevant to a determination of aquatic life use, and therefore will not be listed. The comments from participants received prior to March 18, 2010 relevant to aquatic life use are:

The District PC 284
Midwest Generation PC 285
USEPA PC 286

Proceedings Since March 18, 2010

The Board has held an additional ten days of hearings all in Chicago in Subdocket C. The first of those on November 9 and 10, 2010, were devoted to the issue of the impact of Asian carp prevention measures on the CAWS aquatic life use. The Board held hearings on additional issues regarding aquatic life use designations in 2011 on: March 9 and 10, May 15, 16, and 17, June 27, and August 15 and 16.

By hearing officer order, the pre-first notice comment period was closed on October 3, 2011 with responsive comments to be filed by October 17, 2011. However, on September 22, 2011, the hearing officer received a "Joint Emergency Motion to Vacate Deadlines in Subdocket C and Set Date for Filing of Joint Status Report", which was granted. After receiving status reports on November 21, 2011, and January 3, 2012, a new comment deadline was established. Final comments were due on March 5, 2012, and responsive comments were due by March 19, 2012.

The following individuals representing industry, environmental organizations, and state agencies testified at the ten days of hearings held on Subdocket C:

Robin L. Garibay on behalf of Midwest Generation (Exhibit 420)
Julia Wozniak on behalf of Midwest Generation (Exhibit 425)
Greg Seegert on behalf of Midwest Generation (Exhibit 428)
Darren Melvin on behalf of American Waterway Operators (AWO) (Exhibit 434)
John Kindra on behalf of AWO (Exhibit 435)
Delbert Wilkins on behalf of AWO (Exhibit 436)
James E. Huff on behalf of Citgo/PDV (Exhibit 437)
Ray E. Henry on behalf of Midwest Generation (Exhibit 440)
Scott B. Bell on behalf of the District (Exhibit 447)
Jennifer Wasik on behalf of District (Exhibit 431, 461)
Scudder D. Mackey on behalf of District (Exhibit 457)
Adrienne D. Nemura on behalf of the District (Exhibit 465)
Paul Botts on behalf of Wetlands Initiative (Exhibit 473)
Dr. David Thomas on behalf of the Environmental Groups (Exhibit 474)
Kimberly Rice of the Friends of the Chicago River (Exhibit 475)
Roy Smogor on behalf of IEPA (Exhibit 476)

In addition to hearing testimony, the Board received 469 exhibits and over 1300 public comments. Not all comments and exhibits are relevant to a determination of aquatic life use, and therefore will not be listed. Further, many public comments consist of one page or less from numerous individuals. Those comments are: PC 397, 307-483, 485-494, 501-504, 507-510,

1258-1274, 1294-1329, 1330-1336, and 1339-1354. Those comments express support for cleaning up the waters. The public comments from participants are:

IEPA PC 286, 495, 1275, 1289
Illinois Department of Natural Resources (IDNR) PC 505
American Waterway Operators PC 552
David L. Thomas, PhD PC 560
The Environmental Groups PC 1283 1293
The District PC 1031, 1276, 1292, 1366
Citgo/PDV PC 1278, 1287
Stepan Company PC 1279, 1291
Illinois Environmental Regulatory Group (IERG) PC 1280, 1284
Corn Products International, Inc. PC 1281, 1288
ExxonMobil Oil Corporation PC 1282, 1290
Midwest Generation PC 1277, 1285, 1286

STATUTORY BACKGROUND

This proposal was filed as a regulatory proposal of general applicability pursuant to Sections 27 and 28 of the Act (415 ILCS 5/27, 28 (2010)) and as a general rulemaking pursuant to Section 5-40 of the Illinois Administrative Procedure Act (5 ILCS 100/5-40 (2010). SR at 2. Pursuant to Section 27(a) of the Act (415 ILCS 5/27(a) (2010)), the Board is required to take into account "the existing physical conditions, the character of the area involved, including the character of surrounding land uses, zoning classifications, the nature of the existing air quality or receiving body of water, as the case may be, and the technical feasibility and economic reasonableness of measuring or reducing the particular type of pollution." 415 ILCS 5/27(a) (2010).

DESCRIPTION AND ENGINEERING HISTORY OF THE WATERWAYS

The Board will begin with a description of CAWS and then LDPR. The Board will then discuss the engineering history of the CAWS and LDPR.

CAWS Description

The Chicago area is drained by a series of waterways, including many that were manmade, to direct water flow away from Lake Michigan to protect drinking water. SR at 18. CAWS consists of 78 miles of manmade channels that allow for commercial navigation, and that provide an outlet for urban stormwater runoff and treated municipal wastewater effluent. *Id*. CAWS also supports recreational boating, fishing, streamside recreation, and aquatic life and wildlife. *Id*. Approximately 75 percent of the waterway consists of manmade canals while the other 25 percent is formerly natural stream channels which have been deepened, straightened or widened. *Id*. The flow is artificially controlled by four hydraulic structures managed by the District allowing the water levels to be lowered in anticipation of a storm event. Wastewater treatment plant effluent makes up approximately 70 percent of the annual flow through the Lockport Powerhouse and Lock and Powerhouse facility. *Id*.

The CAWS drainage area is approximately 740 square miles and comprises the Chicago River and Calumet River drainages. SR at 18. The Chicago River System consists of 55 miles of waterways, including the Chicago River, Chicago Sanitary and Ship Canal (CSSC), North Branch Chicago River (including the North Branch Canal), North Shore Channel, South Branch Chicago River, and South Fork of South Branch Chicago River (Bubbly Creek). *Id*. The Calumet River System, 23 miles in length, includes Cal-Sag Channel, portions of Little Calumet River, portions Grand Calumet River, Calumet River, Lake Calumet Connecting Channel and Lake Calumet. *Id*.

LDPR Description

The Des Plaines River originates in Wisconsin and flows into Illinois through Lake and Cook counties. SR at 16. Near Lyons, the Des Plaines River turns southwest and parallels the CSSC and then joins the CSSC. *Id*. The Des Plaines River, without the CSSC, has a drainage area of 13,371 square miles, and the CSSC's drainage area is 740 square miles. *Id*. The length of the Des Plaines River from the Wisconsin state border to the confluence with the Kankakee River is 110.7 miles. *Id*.

The LDPR is the section of the Des Plaines River currently designated as Secondary Contact and Indigenous Aquatic life use and extends from the confluence with the CSSC to the Interstate 55 Bridge at River Mile 277.9. *Id*. The LDPR's reach is almost entirely impounded and has two geomorphologically different segments in the Brandon Pool above the Brandon Road Lock and Dam and the portion of the Dresden Island Pool upstream of the Interstate 55 Bridge known as the Upper Dresden Island Pool. *Id*.

The Brandon Pool is four miles in length and approximately 300 feet wide with depths of 12 to 15 feet. SR at 16. The Brandon Pool is a highly modified stream channel and the CSSC contributes approximately 80 percent of the flow to the Brandon Pool downstream of the confluence. SR at 17.

The entire Dresden Island Pool is 14 miles long and approximately 800 feet wide. SR at 17. The Upper Dresden Island Pool (UDIP)is defined as the 8.1 mile reach of the impoundment that is upstream of the Interstate 55 Bridge. *Id*. UDIP is more natural than Brandon Pool and has natural shoreline and side channels. *Id*.

The LDPR is a part of the Upper Illinois Waterway which is one of the busiest inland commercial navigation systems in the United Stated. SR at 17. The Illinois Waterway provides a link between the Great Lakes/St. Lawrence Seaway navigation system and the Mississippi River navigation system. The entire Illinois Waterway is channelized to maintain a minimum depth of nine feet. *Id*.

Engineering History of the CAWS and LDPR

The CAWS and LDPR consist of portions of the Chicago River, Calumet River and LDPR drainages that were altered by human engineering from the mid 1800s into the mid 1900s.

SR at 14. These rivers were altered to promote commercial navigation and to eliminate the flow of untreated sewage into Lake Michigan. *Id*. Canals and dams were added during that time to redirect the flow of CAWS to the Des Plaines River. Four canals were dug where no major waterways existed before, and five dams were installed. *Id*. The existing channels were enhanced and stream flow was altered by deepening, widening and channelizing various reaches, and by augmenting existing flow with navigational makeup and "discretionary diversion" from Lake Michigan. *Id*. Upon completion of these alterations, flows in several of the major reaches were in a reverse direction of their original paths. *Id*. With urban development, CAWS and LDPR grew in importance as storm water management systems. *Id*.

Prior to the human alterations that began in the mid-1800s, the Chicago River flow originated from the north and south branches. SR at 15. The North Branch Chicago River flowed south and converged with north flowing South Branch Chicago River to form the Chicago River. *Id*. The Chicago River then meandered east and emptied into Lake Michigan. *Id*. The North Branch Chicago River received most of the flow from two forks (east and middle), and from a wetland system known as the Skokie Marsh. *Id*. The South Branch Chicago River headwaters included the southern and western forks of the Chicago River. *Id*. The entire drainage for the Chicago River consisted of relatively small, sluggishly flowing prairie streams. *Id*.

The Calumet River System consisted of Little Calumet River, Grand Calumet River and, a network of wetlands. SR at 15. The Little Calumet River began in La Porte County, Indiana, flowed west into Illinois, made a hairpin curve north and then back east. *Id*. The Little Calumet River then joined numerous wetland flows to form the Grand Calumet River, which flowed east and emptied into Lake Michigan in Miller, Indiana. *Id*. During this period, Lake Calumet and the Calumet River had fairly undefined boundaries. *Id*. There existed a complex system of marshes, dunes and swales surrounding an area of open water. Depending on rain events and Lake Michigan levels, the system sometimes flowed into Grand Calumet River and the tributary, Little Calumet River, while at other times the system flowed into Lake Michigan or remained stagnant and isolated. *Id*.

Prior to urbanization and the reversal of the Chicago River system, the LDPR had a much smaller amount of water flowing through the system. SR at 15. The LDPR was modified from the original configuration to accommodate shipping traffic and the increased flow from CAWS. SR 16. Specifically, the LDPR was deepened and channelized, and the Lockport Lock and Power House and the Brandon Road Lock and Dam were added. *Id*.

The LDPR has historically received flows from the CSSC, which was created during the alterations of CAWS. SR at 17. The flow in the CSSC is predominantly treated and partially treated effluents from the District's wastewater reclamation plants and combined sewer overflows (CSOs). *Id*. The population equivalent of the effluent carried by the CSSC to the LDPR is about 9.5 million. *Id*. The CSO discharges have been reduced with partial completion of the Tunnel and Reservoir Project (TARP) and will be further reduced with the completion of TARP. *Id*.

REGULATORY HISTORY

Prior to adoption of the Act in 1970, the Illinois Sanitary Water Board had jurisdiction over water quality management activities, including establishment of water quality standards. SR at 7. The Sanitary Water Board initially designated the LDPR as an "Industrial Water Supply Sector" with numeric and narrative criteria appropriate to such use category pursuant to the Federal Water Quality Act of 1965 (PL89-235). *Id.*, citing SWB-8 (Adopted December 1, 1966, approved by U.S. Department of Interior January 27, 1968, reapproved by Sanitary Water Board March 5, 1968). Sanitary Water Board Regulation SWB-15 established the uses and numeric and narrative water quality standards applicable to CAWS. *Id.*, citing SWB-15 (Adopted June 28, 1967, approved by U.S. Department of Interior January 27, 1968 and reapproved by Sanitary Water Board on March 5, 1968).

The uses specified within the Industrial Water Supply Sector and CAWS included "commercial vessel and barge shipping, recreational boating transit, withdrawal and return of industrial cooling and process water, and to receive effluents from industrial and domestic waste treatment facilities." SR at 8. The narrative standards included freedom from unnatural bottom deposits, floating debris and nuisance or toxic conditions. *Id.* Water quality standards for dissolved oxygen (DO), pH, temperature, dissolved solids, and bacteria were also included in Rule 1.07 of SWB-8 and Rule 1.03 of SWB-15. *Id.* In addition, the North Shore Channel and Chicago River were used for recreational activities, and the Calumet Harbor was used a**s** a public water supply and for fish and aquatic life. *Id.*, citing SWB-15, Rule 1.02.

Following adoption of the initial water quality criteria, the Sanitary Water Board submitted a plan for implementation of the standards applicable to the LDPR and CAWS to the federal government on August 10, 1967. SR at 8. The U.S. Department of Interior approved these plans on January 27, 1968. *Id.*

The Sanitary Water Board was superseded by the creation of the Illinois Pollution Control Board and IEPA upon enactment of the Act in 1970. *Id.* The Board and IEPA almost immediately focused attention on the development of new water quality standards. *Id.* Draft proposed rules were published for public comment on May 12, 1971, (docketed as Water Quality Standards Revisions, R71-14), and public hearings were conducted shortly thereafter. *Id.*

The Secondary Contact and Indigenous Aquatic Life Use designations were developed during the R71-14 proceedings. SR at 8-9. In developing the draft proposed rules, the Board considered classifying the CSSC as "Restricted Use" upstream of the confluence with the Des Plaines River (at Lockport), and considered placing the LDPR downstream from Lockport within the higher General Use designation. *Id.* Restricted Use was later changed to Secondary Contact and Indigenous Aquatic Life Use as currently understood. SR at 9. During the R71-14 proceedings, the Board spent a great deal of time debating where the Secondary Contact and Indigenous Aquatic Life Use designations should end and the General Use designation should begin. *Id.*

Commonwealth Edison Company (ComEd), the City of Joliet, and the United States Steel Corporation of Joliet (U.S. Steel) voiced concerns during the R71-14 proceedings regarding the

Restricted Use designation for the Des Plaines River upstream from the Interstate 55 Bridge. The City of Joliet suggested that the point of changeover be made at the confluence of the Des Plaines and Kankakee rivers because being directly downstream of the proposed use change at Lockport would force the City of Joliet to comply with the General Use standards even though the waters had not come to a point of dilution. *Id.* U.S. Steel suggested that the Restricted Use designation be extended to the area near Brandon Locks because that area was industrial. *Id.*

ComEd argued against applying the General Use standards to the LDPR upstream of its confluence with the Kankakee River. SR at 9-10. ComEd noted that the costs of imposing the higher water quality standards on the LDPR would outweigh any benefits and that, even if the standards were met, the river would not be suitable for aquatic life due to heavy industrialization, barge traffic, diking of the shoreline and dredging. SR at 10. IEPA stated that ComEd did not believe that the General Use standards for temperature could be met in the LDPR upstream of its confluence with the Kankakee River, and that meeting the temperature standard was not important due to the small possibility that General Use water quality standards would be met in other respects. *Id.* Because the waterway would be incapable of supporting aquatic life anyway and use of the river for recreation up to the Interstate 55 Bridge was nonexistent due to industrialization, there would be no advantage to adopting the General Use standards. *Id.*

The Board ultimately classified CAWS and the LDPR from Lockport to the Interstate 55 Bridge as Restricted Use waters. SR at 10, citing R71-14 (March 7, 1972). Restricted Use was later changed to the -Secondary Contact and Indigenous Aquatic Life Use, contained in the current Board regulations. SR at 10. The term "Secondary Contact", means any recreational or other water use in which contact with the water is incidental or accidental and the probability of ingesting water is minimal. SR at 19. Activities such as fishing, commercial and recreational boating and other shoreline activities where contact is minimal are considered secondary contacts. *Id*. One common characteristic of the waterbodies designated as Secondary Contact and Indigenous Aquatic Life Use in Northeastern Illinois is that the waterbodies were engineered to reverse the flow of the Chicago River. *Id*.

When the Board adopted the Secondary Contact and Indigenous Aquatic Life Use category in R 71-14, the waters designated as secondary contact had the following characteristics:

1) Routinely dredged and maintained channels, including steep-sided cross-sections designed to accommodate barge traffic and optimize flow.

2) Significant sludge deposition, as a result of combined sewer overflows, industrial waste discharges and urban runoff. Sludge depth in the channel system can reach five feet or more despite dredging.

3) Flow reversal projects, such as this one, place a premium on head differential. The entire system has minimum slope and, consequently, low velocity, stagnant flow conditions. Because of international agreements on the use of Lake Michigan water, diversion to maintain flow in the system is kept as low as possible.

4) Urban stress is significant within the entire drainage area. There was essentially no recreation potential with most adjacent property commercially owned and access limited.

5) Good physical habitat for aquatic communities in the main channel was nonexistent due to the impact of commercial and recreational watercraft use of the system as well as sludge deposition. Watercraft lockage through the Chicago River Control Works averages 25,000 vessels annually; most activity occurs during the summer months.

6) In addition to the above human-made and irretrievable modifications, the CAWS also carries a massive wastewater load including combined sewer overflows during wet weather. During the summer periods, a small "discretionary diversion" of Lake Michigan water is permitted to minimize the combined effects of waste load from the municipal and industrial discharges to the system and poor assimilative capacity. SR at 19-20

In developing water quality standards in the 1970s, the Board declined to act on amendments proposed by ComEd to move the General Use boundary to the confluence with the Kankakee River in In the Matter of: Water Quality Standards Revisions, R72-4 (Dec. 4, 1975). SR at 10. The Board reasoned that the location of the bridge corresponded to changes in the physical environment characteristics of the area. SR at 10-11, citing R72-4, slip op. at 5 (Nov. 8, 1973). IEPA stated that the industrial characteristics described by ComEd's witnesses could not be applied to the area below the bridge. SR at 11. The Board also noted that the five-mile stretch downstream of the bridge was capable of providing recreation important to the area and supporting desirable aquatic biota. *Id.*, citing R72-4 at 8.

IEPA noted that few regulatory changes have been made to the use designations or water quality standards applicable to CAWS and the LDPR since 1972. SR at 11. The stretch of the North Shore Channel from the North Side Sewage Treatment Works to Lake Michigan and the stretch of the Calumet River from the O'Brien Locks and Dam to Lake Michigan were upgraded from Secondary Contact and Indigenous Aquatic Life Use to General Use in Amendments to Water Quality and Effluent Standards Applicable to the Chicago River System and Calumet River System, R87-27 (May 19, 1988). *Id.*, citing R87-27. The main branch of the Chicago River was not included in the Secondary Contact and Indigenous Aquatic Life Use in R71-14 but was included in a list of waters exempt from the Public and Food Processing Water Supply Use designation in Rule 303. *Id.*, citing 35 Ill. Adm. Code 303.

One other area where there have been changes in the water quality standards since 1972 is the thermal standards. SR at 11. The thermal standards for Secondary Contact and Indigenous Aquatic Life Use waters require that the temperature not exceed 34°C (93°F) more than five percent of the time, or 37.8°C (100°F) at any time. SR at 11-12. The General Use thermal standard requires that the temperature be no higher than 32°C (90°F) during April through November and no higher than 16°C (60°F) for the remainder of the year. SR at 12. The

maximum temperature for General Use waters in the summer months is 33.7°C (93°F) and 17.7°C (63°F) for the remainder of the year. *Id*. ComEd (and later Midwest Generation) has requested regulatory relief from these standards several times over the years. *Id*.

ComEd sought regulatory relief for the General Use thermal standards for a "five mile stretch" of the Des Plaines River below the Interstate 55 Bridge. SR at 12, citing Water Quality Standards Revisions, R72-4 (Nov. 8, 1973). The Board granted relief that had a sunset provision of July 1, 1978. *Id*. The Board then granted a variance to ComEd and required it to provide a thermal demonstration that the discharges were not causing ecological damage. That variance expired on July 1, 1981. SR at 12-13, citing Commonwealth Edison Company v. IEPA, PCB 78-79 (May 25, 1978). Additional variances were granted allowing ComEd to continue the discharge, while developing its thermal demonstration. *See* Commonwealth Edison Company v. IEPA, PCB 81-34 (June 10, 1981); Commonwealth Edison Company v. IEPA, PCB 84-33 (Dec. 20, 1984. On August 1, 1988, after receiving ComEd's thermal demonstration the Board granted a variance from the thermal standards. SR at 12-13, citing Commonwealth Edison Company v. IEPA, PCB 87-93 (Nov. 15, 1989). On November 21, 1991, another variance to the General Use water quality standard was granted for ComEd's two Joliet facilities and the relief expired on November 21, 1996. SR at 13, citing Commonwealth Edison Company v. IEPA, PCB 91-29 (Nov. 21, 1991). On October 3, 1996 the Board granted an adjusted standard applicable to all five of the ComEd's facilities at the Interstate 55 Bridge. SR at 13, citing Petition of Commonwealth Edison Company for Adjusted Standard from 35 Ill. Adm. Code 302.211(d) and (e), AS 96-10 (Oct. 3, 1996). In AS 96-10 the Board set monthly temperature limits ranging from 60°F in January and February to 91°F from June 16 through August 31. SR at 13-14. The standards may be exceeded by no more than 3°F two percent of the time. SR at 14.

CLEAN WATER ACT AND FEDERAL REGULATIONS

The proposed rulemaking is intended to meet certain obligations of the State of Illinois under the Federal Water Pollution Control Act (Clean Water Act or CWA) (33 U.S.C. § 1313). SR at 3. Section 303 of the CWA requires that a state periodically (at least once each three year period beginning with October 18, 1972) hold public hearings for the purpose of reviewing applicable water quality standards, and to modify the standards as necessary (33 U.S.C. § 1313(c)(1)). *Id*. The national goal of the CWA is to attain "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for the recreation in and on the water. . .." 33 U.S.C. § 1251(a)(2). *Id*. This is commonly known as the "fishable and swimmable" goal. SR at 3.

Under the federal regulations, the phrase "water quality standards" includes both the establishment of designated uses for intrastate waters and the promulgation of necessary criteria to protect these uses. SR at 3-4. Therefore, IEPA's triennial review includes the designation of uses for specified waters and the establishment of numeric and narrative criteria intended to protect these designated uses. SR at 4. Through the federal regulations, the United States Environmental Protection Agency (USEPA) has provided six minimum requirements for State water quality standards under 40 C.F.R. § 131.6. The six requirements are:

(a) Use designations consistent with the provisions of sections 101(a)(2) and 303(c)(2) of the [Clean Water] Act.

(b) Methods used and analyses conducted to support water quality standards revisions.

(c) Water quality criteria sufficient to protect the designated uses.

(d) An antidegradation policy consistent with [40 C.F.R.] §131.12.

(e) Certification by the State Attorney General . . . that the water quality standards were duly adopted pursuant to State law.

(f) General information which will aid [USEPA] in determining the adequacy of the scientific basis of the standards which do not include the uses specified in section 101(a)(2) of the [Clean Water] Act as well as information on general policies applicable to State standards which may affect their application and implementation. 40 C.F.R. § 131.6.

In addition, USEPA has outlined procedures for designating uses and conducting use attainability analyses, permitting states to adopt sub-categories of a use with appropriate criteria as well as seasonal uses. SR at 5, citing 40 C.F.R § 131.10. To remove a designated use or establish a use other than the CWA aquatic life and recreational goals, States must consider six Use Attainability Analysis (UAA) factors to adopt such a use. SR at 5, citing 40 C.F.R § 131.10(g). The six UAA factors are:

1) Naturally occurring pollutant concentrations prevent the attainment of the use; or

2) Natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the use . . .; or

3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

6) Controls more stringent than those required by sections 301(b) and 306 of the Act [CWA effluent standards] would result in widespread economic and social impact. 40 C.F.R § 131.10(g).

In addition to the six UAA factors, States are prohibited from removing or downgrading uses that are existing uses (as of November 28, 1975) currently being attained or that could be attained by implementing the CWA effluent limits. SR at 6, citing 40 C.F.R. § 131.10. IEPA describes the UAA as a federal model for conducting a structured scientific assessment of the factors affecting the attainability of uses by taking into consideration physical, chemical, biological, and economic factors. Exh. 1 at 5-6.

After designating uses, States establish criteria sufficient to protect these uses pursuant to 40 C.F.R. § 131.11. SR at 6. States must establish criteria, for the relevant parameter, that protect the most sensitive use and must address all parameters necessary to protect the use. *Id.*, citing 40 C.F.R. § 131.11(a). States must also specifically address toxic pollutants through numeric or narrative criteria as well as adopt a statewide antidegradation policy and methods for implementing that policy. SR at 6, citing 40 C.F.R. § 131.11(b), 131.12. Illinois' statewide antidegradation policy can be found in the Board's regulations at 35 Ill. Adm. Code 302.105.

In addition to reviewing the numeric criteria or standards for particular pollutants, States are also obligated to review the designated uses portion of water quality standards every three years where a use has been established that does not meet the CWA aquatic life goal or recreational goal. SR at 7, citing 33 USC § 1251(a)(2).

According to IEPA, waters in Illinois designated for General Use can attain the CWA goals, and the waters designated for Secondary Contact and Indigenous Aquatic life use are incapable of attaining CWA aquatic life and recreational goals. SR at 7. IEPA noted that this proposal includes rulemaking changes to update the designated uses and criteria necessary to protect such uses for the waters currently designated as Secondary Contact and Indigenous Aquatic life use in 35 Ill. Adm. Code 303. *Id*. The standards adopted by the Board to protect these uses are currently found in 35 Ill. Adm. Code 302. Subpart D. *Id*.

USE ATTAINABILITY ANALYSIS FOR CAWS AND LDPR

The Board will begin with a discussion of the Use Attainability Analysis (UAA) process and follow with a summary of the CAWS UAA. The Board will conclude this section with a summary of the LDPR UAA.

Use Attainability Analysis Process

IEPA conducted separate UAA for CAWS and LDPR to examine the current Secondary Contact and Indigenous Aquatic Life Use designated waterway reaches and determine whether a use upgrade for balanced aquatic life and contact recreation are attainable. Attach. B at 2-2. Secondary contact means any recreational or other water use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal. Secondary contact activities include fishing, commercial and recreational

boating (*e.g.* canoeing and hand-powered boating activity), and any limited contact incident to shoreline activity. IEPA describes the Secondary Contact and Indigenous Aquatic Life Use waters as "those waters not suited for General Use activities (fishable & swimmable), but which are appropriate for all secondary contact uses and are capable of supporting indigenous aquatic life limited only by physical configuration of the body of water, characteristics and origin of the water and the presence of contaminants in the amount that do not exceed the water quality standards in 35 Ill. Adm. Code Subpart D." SR at 19.

The UAA also examined whether a downgrade of the General Use reaches is appropriate. IEPA started the UAA process for the LDPR in March 2000 and for CAWS in September 2002. SR at 21-22. The following waterway segments are currently designated as General Use: the North Shore Channel upstream of District's North Side water reclamation plant (WRP); the main branch of Chicago River; and the Calumet River upstream of O'Brien Lock and Dam. The UAA for LDPR was completed in December 2003 and the CAWS UAA was completed in August 2007. In the following sections, the Board will summarize the UAA findings for CAWS and LDPR, as those findings pertain to IEPA's proposed aquatic life use designations for CAWS and LDPR.

CAWS UAA

The CAWS UAA was performed by the consulting firm Camp, Dresser and McKee (CDM) over a five-year period. The process started in September 2002 when IEPA convened a Stakeholder Advisory Committee (SAC). This committee was comprised of a cross-section of the community likely to be impacted by any changes to the CAWS regulatory regime including environmental groups, local governments, specific industries, industry trade associations, and regulatory agencies. SR at 22 citing Attach. E & G. The UAA report noted that the stakeholders have "a vested interest in the future of the Chicago area waterways and have participated as valuable stakeholders in the UAA. Their wisdom, vision, dreams, and aspirations for CAWS have been taken into consideration in this UAA." Attach. B at 2-1. In the following sections, the Board will provide a summary of the UAA objectives, existing conditions of CAWS, characterization of the waterway reaches, proposed use classification, and long-term goals. As noted above, the following summary of the UAA will be limited to aquatic life use.

CAWS UAA Objective

The CAWS UAA focused on the Calumet and Chicago River basin waterway reaches currently designated by the Board as the Secondary Contact and Indigenous Aquatic life Use and selected General Use waterways. Attach. B at 3-1. The primary purpose of the UAA was to evaluate the existing conditions and uses and anticipated future uses to determine if revisions to use designations are warranted, particularly to protect the anticipated expansion of recreational activity occurring in the waterways. Attach. B at 2-5. The UAA also evaluated whether an upgrade of Secondary Contact and Indigenous Aquatic Life Use is achievable, and the downgrade of the General Use reaches is appropriate. *Id.* at 2-5. Further, IEPA noted that the UAA was intended to assess the factors limiting the potential uses and evaluate whether or not those factors can be controlled through appropriate technology and regulations. SR at 23.

Specifically, the CAWS UAA study included the review and evaluation of five to ten years of environmental data to determine the physical, chemical and biological conditions of the waterway, identification and characterization of major stressors on the system, assessment of options for reducing or eliminating system stressors, and development of recommended use designations and associated water quality criteria. Attach. B at 2-5 – 2-6.

Existing Conditions Described in CAWS UAA

The CAWS UAA noted that CAWS consists of 78 miles of man-made canals and modified river channels, which provide drainage for urban storm runoff and treated municipal wastewater effluent, and supports commercial navigation, recreational boating, fishing, streamside recreation, and aquatic life habitat for wildlife. Attach. B at 3-2. The CAWS watershed is comprised of the Chicago River and Calumet River sub-watersheds that cover approximately 740 square miles. *Id.* The UAA describes the existing conditions of CAWS for selected reach segments. The reach segments along with their current use designation are listed in Table 1 that begins on the following page. *Id.* at 3-1. The description of the CAWS UAA reaches along with riparian land uses are summarized in Table 2. Finally, the water quality impairments for the various reach segments along with potential sources of impairments are summarized in Table 3. *Id.* at 3-2 thru 3-12.

Table 1
CAWS UAA Study Waterway Reaches

Waterway Reaches	Description	River System	Current Use Designation
Upper North Shore Channel (NSC)	Wilmette Pumping Station to North Side Water Reclamation Plant (WRP)	Chicago	General Use
Lower NSC	North Side WRP to confluence with NBCR	Chicago	Secondary Contact & Indigenous Aquatic Life
Upper North Branch Chicago River (NBCR)	confluence with NSC to North Avenue	Chicago	Secondary Contact & Indigenous Aquatic Life
Lower NBCR	North Avenue to confluence with Chicago River	Chicago	Secondary Contact & Indigenous Aquatic Life
Chicago River	Chicago River Lock and Controlling Works (CRCW) to confluence with NBCR and SBCR	Chicago	General Use
South Branch Chicago River (SBCR)	Confluence with Chicago River to confluence with CSSC at Damen Ave. Bridge	Chicago	Secondary Contact & Indigenous Aquatic Life
South Fork of SBCR	Racine Avenue pumping station to confluence with SBCR	Chicago	Secondary Contact & Indigenous Aquatic Life
Chicago Sanitary & Shipping Canal (CSSC)	confluence with SBCR at Damen Ave. Bridge to Lockport Powerhouse and Lock (LPL)	Chicago	Secondary Contact & Indigenous Aquatic Life
Cal-Sag Channel	Confluence with Little Calumet to confluence with CSSC	Calumet	Secondary Contact & Indigenous Aquatic Life
Little Calumet River (west)	Calumet WRP to confluence with Cal-Sag Channel	Calumet	Secondary Contact & Indigenous Aquatic Life
Little Calumet River (east)	O'Brien Lock and Dam to Calumet WRP	Calumet	Secondary Contact & Indigenous Aquatic Life
Grand Calumet River	Illinois State Line to confluence with Little Calumet River	Calumet	Secondary Contact
Lake Calumet	Lake Calumet	Calumet	Secondary Contact & Indigenous Aquatic Life
Calumet River	Lake Michigan to the confluence with the Little Calumet River	Calumet	General Use up to O'Brien Lock and Dam, and the remaining portion is Secondary Contact & Indigenous Aquatic Life

Table 2
CAWS UAA Waterway Segments

Waterway Segment	River System	Length (miles)	Depth (feet)	Width (feet)	Stream banks	Riparian Land Use
North Shore Channel (Upper & Lower)	Chicago	7.7	5-10	90	Submerged shelf transitions to steep earthen side slope	Narrow park land corridor
North Branch Chicago River	Chicago	7.7	10-15	150-300	Vertical dock walls, steep earthen side slopes	Commercial, industrial, recreational, parks, open lands
SBCR	Chicago	4.5	15-20	200-250	Vertical dock walls	Industrial, commercial
South Fork of SBCR	Chicago	1.3	3-13	100-200	Steeply sloped earth/rock materials	Industrial, commercial, residential
Chicago River	Chicago	1.5	20-26	200-250	Primarily vertical walls	Commercial, residential
CSSC	Chicago	31.1	10 - 27	160-300	Vertical wall/steep embankments	Industrial, commercial
Cal-Sag Channel	Calumet	16.2	10	225	Vertical wall in some sections on north bank	Forest preserves, continuous band of trees on both banks
Little Calumet River	Calumet	6.9	12	250-350	Earthen side slope with few sections of vertical walls	Heavy industry with some open space and forest preserve areas
Grand Calumet River	Calumet	3	2	-	-	Natural vegetation
Calumet River upstream of O'Brien Lock and Dam	Calumet	8	27	450	Sheet pile , concrete walls and rip-rap	Hazardous and nonhazardous landfills with little vegetation
Lake Calumet	Calumet	-	-	-	-	Heavy industry, landfills, wetlands

Table 3
CAWS UAA Waterway Segments

Waterway Segment	Water Quality Impairments	Potential Cause/Source of Impairments
North Shore Channel (Upper & Lower)	Zinc, nickel, total nitrogen, DO, total phosphorus, Polychlorinated biphenyls (PCBs), fecal coliforms, flow alterations, physical habitat limitations and excess algal growth.	CSOs, municipal point sources, stormwater runoff, flow regulation at Wilmette, hydro-modification of the waterway and channelization.
North Branch Chicago River	Silver, total nitrogen, DO, total dissolved solids, chlorides, physical habitat alterations, total suspended solids, aldrin, iron, flow alterations, oil and grease, PCBs, and hexachlorobenzene.	Municipal point sources, CSOs, urban runoff/stormwater, hydro-modification, channelization, habitat modification, bank or shoreline modification, highway maintenance and runoff, contaminated sediments and flow regulation
SBCR	PCBs	Unknown
South Fork of SBCR	High pH, low DO and total phosphorus.	CSOs
Chicago River	Bacteria	Flow from NBCR
CSSC	PCBs in fish tissue, ammonia (unionized), low DO, total nitrogen, oil and grease, total phosphorus and iron.	Flow regulation/modification, municipal point sources, CSO, urban runoff during storm events, channelization and hydro-modification
Cal-Sag Channel	Low DO, PCBs, and physical habitat impairment.	CSOs, industrial sources, municipal point sources, urban stormwater runoff, hydro-modification, channelization, habitat modification, removal of riparian vegetation, and contaminated sediments
Little Calumet River	PCBs and mercury, which result in a fish consumption advisory for this reach. The reach is also impaired by iron, DO, flow alterations and physical habitat alterations	Not known.
Grand Calumet River	Heavily contaminated sediments.	Industrial complexes and CSOs in Indiana.
Calumet River upstream of O'Brien Lock and Dam	PCBs, silver, high pH, total phosphorus, and fecal coliform bacteria.	Industrial point sources, CSOs, and urban runoff during storm events.
Lake Calumet	Residual contamination.	Municipal and industrial wastes

CAWS UAA Characterization of Waterway Reaches

The characterization of CAWS involved the evaluation of the existing and potential conditions to determine the most appropriate use classifications for the waterways. The evaluation was done by dividing CAWS into 14 reach segments. Attach. B at 4-1. CDM noted that the reach segments were "defined to have break points at critical locations that contribute to their unique characteristics so that each reach was fairly homogeneous with regard to its physical, chemical, and biological properties." *Id.* The reach segments along with their current use designation are listed in Table 1, above. *Id.* at 4-2.

The existing conditions of CAWS were characterized in the UAA process by evaluating the physical, chemical, biological, habitat, hydrological and meteorological, and waterway use data. In this regard, CDM relied on available data collected by various agencies[1] over a five-year period from January 1, 1998 to December 31, 2002. Attach. B at 4-2. Because the primary objective of the UAA was the determination of attainable uses in CAWS, the UAA focused on developing a comprehensive dataset on bacteria and DO, and related parameters, including nutrients, solids, oxygen demand, water temperature, and photosynthesis related measures. *Id.* at 4-3. Water quality data characterizing priority and 303(d) listed pollutants were also a consideration. CDM collected sediment chemistry and volume data to evaluate sediment bound pollutants and their potential impact on in-stream water quality and aquatic life populations. *Id.*

The UAA relied on biological and habitat data for the assessment of the aquatic life use designations. CDM collected fish survey, benthic/macro-invertebrate, habitat, aesthetics, and toxicity data in the CAWS study area over a ten-year period from 1993 through 2002. Attach. B at 4. The study used hydrologic and meteorological data to assess the impact of wet weather and CSO discharges on DO and bacteria conditions in the waterway. In addition, waterway use data were collected to characterize existing and projected uses of the waterways. Finally, the UAA study relied on GIS data for mapping the results of sampling, waterway characterization, and use classification. *Id.*

CAWS UAA Data Collection

CDM noted that an assessment of existing CAWS data identified critical gaps pertaining to waterway uses, habitat, sediment toxicity, Lake Calumet, and *E.Coli* bacteria, particularly pertaining to wet weather, non-point sources and CSO loadings. Attach. B at 4-5. Additional field data were collected only when necessary to "fill significant and high priority data gaps." *Id.* at 4-2. The data acquisition pertained to: water quality data; sediment quality data; biological, habitat and aesthetics data; hydrologic and meteorological data; waterway use data; and geographical information system data. *Id.* at 4-3 – 4-4. While additional data were collected to address the informational deficiencies, the Board will focus on data associated with aquatic life use of CAWS.

[1] The agencies solicited for data included the District, IEPA, USEPA, USACE, USGS, Illinois State Water Survey, Friends of Chicago River, Lake Michigan Federation, City of Chicago, NIPC, Illinois Department of Natural Resources, Midwest Generation, Fish and Wildlife Service, Illinois State Geological Survey, National Weather Service and local marinas.

Once the data were compiled and logged into the database management system, CDM performed an assessment of data gaps. This assessment found that waterway use, habitat, sediment toxicity, Lake Calumet water quality, and *E. Coli* bacteria data were lacking and important to the development of the UAA. Attach. B at 4-5. The UAA noted that USEPA and IEPA conducted habitat assessment of critical locations to fill the habitat data gaps. Also, IEPA conducted water quality sampling in Lake Calumet. However, additional sediment toxicity data was not collected during the assessment. *Id.*

The UAA stated that data from 1998 to 2002 "were used for characterizing existing conditions and the next ten years was set as the time frame for consideration of future uses and potential changes with regard to physical, biological and chemical conditions in the waterways." The UAA noted that newer critical data were acquired and included as necessary. Attach. B at 4-5. Also, data collected prior to 1998 were included in data assessments when limited data were available or where it was important to evaluate historical trends, as with fish community data.

CAWS UAA Data Assessment

Water Quality Data. The water quality data were evaluated using a use attainment screening approach by comparing instream water quality data to General Use and Secondary Contact and Indigenous Aquatic Life Use water quality standards to determine if recent water quality conditions justified a use upgrade. Attach. B at 4-7. The screening approach identified constituents of concern that were limiting the attainment of the CWA goals or potential use designations. The UAA noted that the most comprehensive water quality dataset for CAWS came from the District's continuous DO and temperature monitoring (36 locations) and monthly grab sampling (25 locations) programs. *Id.* at 4-8.

Sediment Quality Data. Sediment quality was evaluated by using two sediment quality criteria guidelines[2] since there were no regulatory criteria. Attach. B at 4-11. These guidelines established two concentration thresholds that predict the likelihood of toxicity to benthic organisms. The UAA noted that the guidelines were used as a screening tool to identify potential problem areas and constituents. Further, the UAA stated that accurate reach by reach characterizations were not possible because of the limited sediment toxicity data available for CAWS. *Id.*

The CAWS UAA stated that while contaminated sediments were not a significant factor for the assessment of recreational use designations, they can constrain the attainment of aquatic life use designations. Contaminated sediments can limit the diversity of benthic organisms as well as influence the risk associated with fish consumption. Attach. B at 4-12. However,

[2] Long, E.R., and L. G. Morgan. 1990. The potential for biological effects of sediment-sorbed contaminants tested In the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52. National Oceanic and Atmospheric Administration. Seattle, Washington. MacDonald, D.D., C.G. Ingersoll and T.A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. *Arch. Environ. Contam. Toxicol.* 39: 20-31.

biological data characterizing macro-invertebrate and fish populations in CAWS were given precedence in evaluating aquatic life use attainment because of the availability of data. The UAA noted that sediment chemistry data were "used to help understand cause and effect relationships that may be driving biological and/or water quality conditions in a given reach." *Id.* The UAA relied on sediment data collected from 1990 to 2002 to obtain a more complete assessment of all reaches.

Biological Conditions. The CAWS UAA noted that the biological health of the fish and macroinvertebrate communities were measured by indices that consider factors such as the number of native species and number of sensitive species. USEPA Region V states, including Illinois, have relied on biological indices to develop both narrative and numerical biological criteria to protect aquatic life use designations. Attach. B at 4-14. The UAA relied on numeric biological criteria for screening purposes. The criteria are defined as the index of biological integrity (IBI) score for fish. Further, the UAA noted that macroinvertebrate communities are included in the aquatic life use designations using the macroinvertebrate biotic index (MBI). *Id.* at 4-15.

The CAWS UAA stated that the IBI was first developed "to assess small warm water streams in Illinois and consists of 12 metrics that reflect fish species richness and composition, number and abundance of key species, trophic structure and function, and the condition of the fish. Each metric either receives a score of 1, 3 or 5 depending upon how it relates to a similar waterbody (reference stream) that has little human influence. A score of 5 means a particular metric is very similar to that of a reference water, and a metric score of 1 means that metric departs significantly from the reference condition". Attach. B at 4-14. Because Illinois does not have an approved approach to evaluate fish communities in large, deep, man-made channels, the CAAWS UAA relied on the Ohio Boatable IBI metrics to define the use designations for a waterway reach.

The biological dataset used in the CAWS UAA included fish and macroinvertebrate data collected at selected locations in CAWS between 1993 and 2002. While the biological data came primarily from the District's sampling program, the UAA also relied on data collected by IEPA and habitat analysis conducted by USEPA in April 2004. While the fish data were analyzed by using a variety of metrics, the primary metric was the Ohio Boatable IBI. Attach. B at 4-16 – 4-17. The UAA relied on the following IBI scores to indicate water quality conditions (Yoder, et. al. 2003):

50-60 Exceptional
40-49 Good
30-39 Fair
20-29 Poor
12- 20 Very Poor

Regarding macroinvertebrates, the UAA relied on data collected through the District's benthic sampling program at stations established in CAWS. Attach. B at 4-17. In addition, data collected by IEPA at selected locations in CAWS were also used in the study. While a variety of metrics such as relative abundance and total species richness were used to evaluate the

health of the macroinvertebrate community, the UAA relied on the MBI, which is used in Illinois, as a method to rapidly assess the biological condition of a stream. The UAA noted that the MBI scores range from 0 to 11, with the lower scores being reflective of higher quality water (*i.e.* <6.0=good, 6.1 - 7.5=fair, 7.6 - 8.9=poor, >9.0=very poor). *Id.* at 4-19.

The CAWS UAA stated that "good quality habitat is fundamental to the existence of a diverse aquatic community as it provides feeding, breeding and rearing areas for resident and migratory fish and macroinvertebrate species." Attach. B at 4-20. The UAA noted that a survey of the aquatic habitat at 20 of the District's fish sampling locations was performed. Further, to address the lack of physical habitat data and to understand other stressors affecting the full attainment of the fish community in CAWS, the USEPA contracted with the Center for Applied Bioassessment and Biocriteria (CABB) to conduct habitat analysis using the Ohio Qualitative Habitat Evaluation *Index* (QHEI) procedures. The State of Ohio uses a tiered approach to defining aquatic life use in its water quality criteria developed by Rankin (Attach. R at 1).

CABB collected habitat data at 23 sites in the CAWS, with a focus on the District's 20 fish sampling locations. *Id.* at 21 citing Rankin (2004). The habitat metrics along with the QHEI range of values describing the general ability of the habitat to support aquatic life were: substrate (0-20), instream cover (0-20), channel quality (0-20), riparian/erosion (0-10), pool/riffle (0-20) and gradient (0-10). The total QHEI score ranged from 0-100. *Id.* A QHEI score of 75 or greater is excellent, 60 to 74 good, 46 to 73 is fair, 30 to 45 poor and less than 30 very poor. *Id*., referring to Attach R.

CAWS UAA Waterway Characterization

In this section, the Board summarizes the findings of the CAWS UAA as they pertain to water quality, sediment quality, biologic conditions, and habitat quality. The Board noted that the bacterial water quality is not addressed in this section, since that parameter was discussed in detail in the context of recreational use designations and disinfection under Subdockets A and B.

North Shore Channel System (Upper & Lower). The CAWS UAA evaluated water quality conditions, using the use attainment screening approach with the General Use standards as a benchmark for achieving CWA goals. The study found low DO levels most of the time in the Upper NSC. Attach. B at 4-25. The UAA attributed low DO levels to "frequent low flow conditions coupled with periodic surges of CSO and stormwater discharges". *Id*. at 4-25. The study also noted that discretionary diversion at the Wilmette Pumping Station also reduced DO levels in Upper NSC. The DO levels in Lower NSC measured at a monitoring station at Devon Avenue stayed above 5 mg/L over a 5-year period. The UAA noted that the effluent from the North Side WRP dampens the impact of CSOs in this portion of the NSC. *Id.* at 4-26.

The temperature data indicated that the screening criteria were exceeded only once in the 5-year sampling period considered in the study. Thus, the UAA concludes that water temperature is not a significant concern in the NSC. Attach. B at 4-26. Regarding other monitored parameters, the UAA established a list of constituents of concern for the NSC based on maximum percent exceedance of screening criteria at sampling locations. *Id.* at 4-34. The constituents of concern for NSC include: DO, temperature, total silver, dissolved copper chronic,

dissolved nickel chronic, dissolved zinc chronic, ammonia (chronic, subchronic and acute), TDS and pH. *Id.* at 4-35.

The CAWS UAA noted that while limited sediment quality data were available for the NSC, a 2001 study of surface sediments conducted by IEPA at five locations provides an overview of the existing conditions. Attach. B at 4-34. The sediment analyses results were compared to the thresholds developed by MacDonald (TEC and PEC)[3], and Long and Morgan [Effects Range Low (ER-L) and Effects Range Median (ER-M). *Id*. The constituents exceeding the sediment quality thresholds in the NSC include cadmium, copper, lead, mercury, nickel and zinc. *Id.* at 4-35.

The biological assessment included sampling of fish and macroinvertebrates. The UAA noted that thirty-two fish species were captured at four District locations in the NSC from 1993 to 2002. While the most dominant non-game fish were gizzard shad and the common carp, the dominant game fish included largemouth bass and bluegill. Attach. B at 4-36. The UAA noted that diversity fluctuated on a yearly basis with the greatest diversity observed at the Sheridan Road station. The UAA also noted that species diversity decreased significantly from 1993 to 2002. The IBI score for the NSC indicated fair to very poor quality. *Id.* The macroinvertebrate data from the District and IEPA indicated 31 taxa of macroinvertebrates at five sampling locations in the NSC. *Id.* at 4-38. The most dominant sediment-dwelling organism in the NSC was Oligochaeta, a tubificid worm. The next most dominant group was the dipterans (flies) *Id.* at 4-39. These macroinvertebrates, the UAA noted, are generally indicative of degraded water quality conditions. Further, the UAA stated that the MBI scores for the NSC are reflective of fair to poor quality.

The CAWS UAA noted that the CABB habitat survey results indicated that the NSC had fair to poor habitat conditions. Attach. B at 4-39. The limiting factors for this segment included predominance of silty-muck and sand substrate, severe embeddedness, limited flow in Upper NSC, channelized waterway and limited instream cover. The survey concluded "the NSC could potentially support an assemblage of tolerant organisms and those species reflective of high quality substrates and structure would be absent or in limited numbers." *Id.*

The Chicago River System. The Chicago River system includes the waterways that flow through the downtown Chicago area. The significant influences on water quality in the Chicago River reaches include diversion from Lake Michigan to the Chicago River, instream aeration at North Branch pumping stations (North and Lawrence Avenues), Midwest Generation's Fisk electric generating facility on the South Branch, and numerous CSOs along all reaches. Attach. B at 4-48. Again, the water quality conditions were evaluated using the use attainment screening approach with the General Use standards as a benchmark for achieving CWA goals.

[3] TEC represents the concentration level where toxic effects may start occurring, particularly for sensitive benthic organisms and the PEC represents the concentration level where toxic effects are probable for both sensitive and tolerant benthic organisms.

The DO levels in the Chicago River system were measured using twelve continuous DO monitoring stations located across the various reaches of the system. Attach. B at 4-49. The UAA noted that while the Chicago River contributes water with higher DO content to the system, the DO levels in water from the South Fork of the South Branch (Bubbly Creek) typically is depressed below screening criteria. Also, the UAA noted that it is difficult to maintain the 6 mg/L screening criterion for at least 16 hours after a CSO event along the North Branch. *Id.* The study found that the CSOs significantly impacted DO levels in both North Branch and South Branch. Further, the UAA noted that the impact of wet weather on instream DO levels was affected by the available storage capacity of the TARP system. A study done by the District found that the severity of wet weather impact on DO is generally more a function of the available storage capacity of the TARP at the beginning of the storm rather than the amount of rainfall. *Id.*

Next, the CAWS UAA noted that the water temperature was recorded continuously at the same twelve locations as DO. The data collected over a five-year period demonstrated that temperature exceeded the screening criteria less than one percent of the time in North Branch at Lawrence Avenue and Division Street, Chicago River at Clark Street, and South Fork at Interstate 55. Attach. B at 4-50. Also in the South Branch, downstream of the Midwest Generation's Fisk power generating facility, the screening criteria were exceeded an average of 2.2% of the time. The UAA noted temperature never exceeded criteria in all other locations over the five-year period. *Id.* In addition to DO and temperature, the UAA established a list of constituents of concern for the Chicago River system based on maximum percent exceedance of screening criteria at sampling locations. The constituents of concern for the Chicago River system include: DO, temperature, total silver, dissolved nickel chronic, dissolved zinc chronic, ammonia (total, chronic, subchronic and acute), TDS, cyanide (weak acid dissociable or WAD) chronic, and pH. *Id.* at 4-53.

Regarding sediment quality, the CAWS UAA noted data collected by several entities over a period of 12 years indicating that the sediment quality worsens in the Upper North Branch from upstream to downstream. Some metals exceeded the sediment quality thresholds, including cadmium, chromium, copper, lead, zinc, mercury, nickel, silver, PCBs, and polynuclear aromatic hydrocarbons (PAHs). Attach. B at 4-53. The UAA also noted that the sediment oxygen demand (SOD) data collected by the District decreased from 3.1 g/m^2/day in the upper North Branch to 1.8 g/m^2/day in the lower North Branch. The lowest SOD level of 0.77 g/m^2/day in the Chicago River was measured at LaSalle Street. In the South Branch, the SOD increased from 1.93 g/m^2/day at Congress to 3.32 g/m^2/day downstream at Halsted Street. *Id.* at 4-54.

Fish sampling at two District locations in the North Branch (Wilson Avenue and Grand Avenue) indicated twenty-five species of fish (excluding hybrids) were present. While the dominant non-game fish included common carp, gizzard shad, and goldfish, the dominant game fish species included largemouth bass, green sunfish, and bluegill. Attach. B at 4-54. The IBI scores at Wilson and Grand Avenues ranged from 14-32 and 16-28, respectively. These scores indicate fair to very poor conditions in the reach. *Id.* Fish sampling at four sampling sites in the Chicago River indicated that the dominant game species include rock bass, largemouth bass, and bluegill. The dominant non-game species consisted of gizzard shad, common carp, bluntnose minnow, and goldfish. *Id.* at 4-57. The IBI scores in the Inner Harbor area were higher (14-36)

indicating better water quality and habitat, while the IBI scores the Loop Area were lower (12-24), suggesting poor conditions. Fish sampling was conducted at the junction of the North Branch and the South Branch, and at Archer Avenue in the South Fork. The UAA noted that the dominant game species included largemouth bass and bluegill, while the dominant non-game species were common carp and goldfish. *Id.* The IBI scores in the South Branch ranged from 18 to 26. The conditions in South Branch and South Fork are similar to lower North Branch with limited instream and riparian habitat.

Macroinvertebrate sampling was conducted by the District and IEPA at five locations in the North Branch: Argyle Street; Wilson Avenue; Lawrence Avenue; Diversey Parkway; and Grand Avenue. The dominant species included Oligochaeta, *Turbellaria,* the isopod *Caecidotea,* and chironomids. The UAA noted that the dominant dipteran was *Dicrotendipes simpsoni.* While the MBI scores for the North Branch indicated good water quality at Lawrence Avenue and Argyle Street, the scores reflected poor water quality at Wilson Avenue, Grand Avenue, and Diversey Parkway. Attach. B at 4-62.

The Chicago River was sampled for macroinvertebrates by the District at Lake Shore Drive and Wells Street. Species richness was higher at Lake Shore Drive (18 species) compared to Wells Street (12 species). Attach. B at 4-62. The dominant taxa included Oligochaeta, the amphipod *Gammarus fasciatus,* dipterans including *Cricotopus bicinctus, Dicrotendipes simpsoni, Parachironomus sp.* and *Polypedilum halterale.* The sampling results also show that zebra mussels *(Dressiena polymorpha)* were dominant in the Chicago River. The UAA noted that the MBI scores are indicative of good water quality at the Lake Shore Drive site and very poor at the Wells Street sampling location. *Id.*

Macroinvertebrates were sampled in the South Branch at Madison Street and Loomis Street, and South Fork at Archer Avenue. Attach. B at 4.65. Twenty-three species of macroinvertebrates were collected in the South Branch with the highest species richness at Madison Street (19 species). *Id.* at 4-67. Dominant taxa included Oligochaeta, the amphipod *Gammarus fasciatus,* dipterans including *Dicrotendipes simpsoni* and *Nanocladius distinctus.* Zebra mussels *(Dressiena polymorpha)* were also dominant in the South Branch. Only ten species were collected in the South Fork. *Id.* at 4-68. MBI scores were indicative of fair water quality in the South Branch and poor water quality in the South Fork.

The Chicago Sanitary Ship Canal. The CSSC begins at the confluence with the Des Plaines River and ends at the Damen Avenue Bridge, with a total length of 31.1 miles. The CSSC is characterized by vertical concrete walls and steep embankments, with an average width of 200-300 feet and depth of 27-50 feet. The riparian land use is primarily industrial and commercial, with aquatic habitat existing mostly under bridges and piers. Attach. B at 4-69.

Flow in the CSSC is primarily from the upstream flow of the Chicago River System and effluent from the Stickney WRP. The CSSC has two major thermal inputs, one from Midwest Generation's Crawford power plant and a second from their Will County power plant near Romeoville. The water quality conditions were evaluated using the use attainment screening approach with the General Use standards as a benchmark for achieving CWA goals. Attach. B at 4-70.

The DO levels in the CSSC were measured using seven continuous DO monitors located along the CSSC. The UAA reported DO levels being fairly consistent in this reach, with the exception of relatively higher concentrations downstream of the Stickney WRP of 8.6 mg/l. At the seven monitoring stations, DO levels were less than 4 mg/l with 3 to 19% of the samples. While thermal inputs decrease the amount of oxygen available downstream of the two power plants, the UAA reported that wet weather impacts due to discharges from the Racine Avenue Pumping Station and many upstream CSOs are the primary factors contributing to lower DO levels. Attach. B at 4-71.

The UAA noted that water temperature was recorded continuously at the same seven locations as DO. The data collected over a five-year period showed that temperature exceeded water quality screening criteria less than one percent of the time for four of the monitoring stations. The Cicero Avenue monitoring station, however, exceeded criteria an average of 15% of the time. This station is one mile downstream from the Midwest Generation's Crawford power plant. In the winter, temperatures at the Cicero Avenue monitoring station exceeded 16°C (60°F) more than 25% of the time, whereas the water quality standard allows for a 10% exceedance. Attach. B at 4-73.

The UAA reported the results of testing for metals and other pollutants at the seven grab sampling locations along the CSSC. Total silver at the Stickney WRP effluent exceeded water quality screening criteria 13% of the time, and pH 15%, whereas the Lemont WRP discharges exceeded water quality screening criteria for pH in only 0.17% of the samples and for total silver 1%. Attach. B at 4-75. The UAA noted that metal concentrations in surface sediments generally increase going downstream on the CSCC, with the exception of lead. *Id.* at 4-76.

Fish sampling was conducted at five District locations where twenty-seven species of fish (excluding hybrids) were captured in the time period of 1993 to 2002. The dominant fish species captured included common carp, gizzard shad, goldfish, and bluntnose minnow. Dominant game fish species included largemouth bass, pumpkin seed, and bluegill. The greatest fish species diversity was found at the Cicero Avenue sampling station and the lowest at Damen Avenue. Species diversity generally declined in the 1990s but rebounded in 2001. The IBI scores ranged from 12 to 24, reflecting poor to very poor water quality conditions in the CSSC. Attach. B at 4-77.

The UAA noted that the District sampled macroinvertebrates at six locations in the CSSC during 2001 and 2002, with thirty-one species being collected. Attach. B at 4-77 and 4-79. Dominant taxa in the CSSC were Oligochaeta (82%), followed by Turbellaria and *Dicrotendipes simpsoni*. The MBI scores from the Hester-Dendy (HD) substrate sampling data ranged from 6.4 at Damen Avenue to 9.6 at Cicero Avenue. The MBI scores are reflective of poor to very poor water quality conditions in the CSSC. The UAA also noted that Rankin's habitat evaluation showed that the CSSC instream habitat ranged from poor to very poor. The limiting factors identified include silty substrates, poor substrate material, little instream cover, channelization, and no sinuosity. *Id.* at 4-80.

The Calumet System. The Calumet System consists of the Cal-Sag Channel, the east and west segments of the Little Calumet River, North Leg, the Grand Calumet River (GCR), the Calumet River, and Lake Calumet, with a total length of 26.2 miles. Attach. B at 4-80. The Cal-Sag Channel extends upstream from the junction of the Cal-Sag and the CSSC and ends at the Little Calumet River. It is 16.2 miles in length, and the channel is characterized as having trapezoidal rock banks, with an average width of 225 feet and depth of 10 feet. The riparian zone is lined with dense trees, and a small portion is used for commercial and industrial purposes. The Little Calumet River begins at Ashland Avenue and ends at the GCR, and for the purposes of the UAA is divided into two sections, the east reach that is upstream of the Calumet WRP effluent, and the west reach, which is downstream of this effluent. It is characterized as having earthen side slopes with a few reaches having dock walls. The Little Calumet River has an average width of 250 to 350 feet and an average depth of 12 feet. There is a semi-continuous band of shoreline vegetation that provides habitat near the channel side. The riparian land use includes heavy industry, commercial uses, forest preserves, and limited open space. The current use designation for the Cal-Sag Channel and the Little Calumet River is Secondary Contact and Indigenous Aquatic Life Use. *Id.* at 4-83.

According to the CAWS UAA, the influences on the Calumet System's water quality are diverse, ranging from the fresh water that enters from Lake Michigan at the O'Brien Lock and Dam, the various tributaries entering the Cal-Sag Channel, the CSOs, and five sidestream elevated pool aeration (SEPA) stations. The water quality conditions were evaluated using the use attainment screening approach with the General Use standards as a benchmark for achieving CWA goals. Attach. B at 4-86.

The CAWS UAA noted that there are twelve continuous DO monitoring locations in the Calumet system. The Calumet River contributes water with higher DO levels, whereas the GCR does not meet the 6 mg/l level for at 16 hours per day almost half the time. Both of these segments contribute to the Little Calumet East reach, which shows few deviations from water quality criteria. Conditions worsen in the Little Calumet West reach, which is downstream of the Calumet WRP, and deteriorate even further downstream at Division Street, which is downstream of the confluence with the Little Calumet South Leg, where the 6 mg/l level for at 16 hours per day is not met 51% of the time. Attach. B at 4-87. The UAA reported that none of the twelve continuous temperature monitoring locations in the Calumet System have recorded levels above screening criteria over the past five years. *Id.* at 4-88.

The District operates seven grab sample locations in the Calumet System where monthly samples are taken to analyze metals and other pollutants. Silver concentrations on the Grand Calumet River and the Cal-Sag Channel exceeded water quality screening criteria 17% and 15% of the time respectively. Attach. B at 4-89.

The CAWS UAA provided the results of sediment quality data collected over the past five to ten years. Constituents identified in the sediment include mercury, cadmium, chromium, copper, lead, nickel, zinc, and PCBs. The concentration of contaminants was higher in the GCR than in the rest of the Calumet System. Within the GCR, concentrations were generally lower in the downstream end as compared to further upstream. In general, the UAA noted that Cal-Sag sediment quality is better than that of the Little Calumet. Attach. B at 4-90.

The District collected fish from the Cal-Sag Channel, Calumet River, and Little Calumet River from 1993 to 2002, and IEPA collected fish from Lake Calumet from 1990 to 1996. Twenty-six fish species were collected in the Cal-Sag Channel, with the dominant species being the gizzard shad, common carp, emerald shiner, and bluntnose minnow. Common game fish included green sunfish, bluegill, pumpkinseed, and largemouth bass. The fish assemblage in this reach was very similar to that of the rest of the Chicago River System, except that more emerald shiners were captured. Species richness ranged from 9 to 18 during this period. Water quality based on the IBI would rate poor to very poor in the Cal-Sag Channel. Attach. B at 4-92.

Thirty-two species of fish were collected from the Calumet River, with the same dominant species as found in the Cal-Sag Channel, gizzard shad, common carp, emerald shiner, and bluntnose minnow. Common game species were also similar to the Cal-Sag Channel, with green sunfish, bluegill, pumpkinseed, and largemouth bass being collected; however, smallmouth bass were also found in the Calumet River. Species richness decreased from 21 to 12 from 1993 to 2002, although IBI scores increased from 22 to 32 at one sample station from 1993 to 1996, and ranged from 24 to 28 in 1994 and 1998 at the O'Brien Lock and Dam location, these scores are indicative of fair to poor water quality. Attach. B at 4-95.

Twenty-nine species of fish were collected in the Little Calumet River, with the same dominant species as discussed above: gizzard shad, common carp, emerald shiner, and bluntnose minnow. Common game species collected were pumpkinseed, bluegill, and largemouth bass. The UAA reported that more golden shiners were collected in the Little Calumet than in any other branches of the Chicago River System. Species richness rose between 1993 and 2000 from 16 to 24, but then declined between 2000 and 2002 from 24 to 17. IBI scores fluctuated at various sampling locations, ranging from 12 to 28, indicating poor to very poor water quality. Attach. B at 4-97.

The number of fish species collected in Lake Calumet ranged from eight to twelve, with dominant species being only gizzard shad and carp. Dominant game species included pumpkinseed, bluegill, and largemouth bass. Attach. B at 4-99.

The District and IEPA collected macroinvertebrates at six locations in the Calumet River System, with over 65 taxa present. The highest species diversity was at Ashland Avenue in the Little Calumet River with forty taxa, and lowest in the Little Calumet River at Indiana Avenue with nine taxa. Oligochaetes and dipterans were the dominant macroinvertebrates in the IEPA data set. In the data collected by the District, Oligochaetes, *Gammarus*, and *Dicrotendipes* dominated at two sampling locations. Zebra mussels were very common at all District sampling sites. MBI scores for District's HD substrate sampling data ranged from 5.8 to 8.0, and IEPA's HD MBI values ranged from 5.2 to 6.3. Based on these MBI scores, the water quality in the Little Calumet River and the Cal-Sag Channel was good to fair. In CAWS, the Cal-Sag Channel had the best diversity of macroinvertebrates, which is likely due to the diversity of habitat types within this waterway. Attach. B at 4-100.

The CAWS UAA reported on the results of the habitat survey conducted by Rankin in 2004. The Cal-Sag Channel had fair habitat conditions, with rubble and coarse materials having

been left behind along the littoral zones during channel construction. Important positive attributes include substrates, shoreline structure, and maximum depth. Limiting factors for the Channel include predominance of silty-muck and sand substrate, channelization, no sinuosity, little instream cover, deep center region, and lack of flow. Attach. B at 4-100.

According to the CAWS UAA, Rankin's habitat evaluation classified two sites of the Calumet River as fair and poor. Positive habitat characteristics include riffle development, moderate cover, depth, and boulder and cobble substrates. Limiting factors include silty substrates, little instream cover, no sinuosity, and no fast current. Attach. B at 4-104 and 105.

The two Little Calumet River sites were classified by Rankin as fair. Attach. B at 4-104. Limiting habitat factors cited are silty substrates, little sinuosity, and no fast current, while positive factors include riffle development, moderate cover, and maximum depth. *Id.* at 4-105.

Lake Calumet is the only inland lake in Illinois that is hydrologically connected to Lake Michigan. It provides migratory bird habitat, as well as feeding and spawning fish habitat. Portions of the shoreline have limited wetland systems that are dominated by cattails and reed canary grass. Despite this, according to the UAA, limited habitat studies have been conducted in Lake Calumet. The lake has little instream structure and emergent aquatic plants for fish habitat. The UAA reported that while Lake Calumet has limited fish habitat, it has the potential to provide diverse aquatic fish and wildlife habitat if restoration efforts are undertaken. Attach. B at 4-105.

CAWS UAA – Analysis of UAA Factors

The CAWS UAA recommendations pertaining to aquatic life use classification were developed through collaborative stakeholder involvement using USEPA UAA guidelines and procedures outlined in both "*A Suggested Framework for Conducting UAAs and Interpreting Results"* by Michael and Moore (1997) for the Water Environment Federation, and the USEPA's *'Water Quality Standards Handbook'*" (USEPA 1994). Attach. B at 5-1. The study relied on the six UAA factors that the state must take into consideration when conducting a UAA in order to demonstrate that the attainment of the CWA goals use is not feasible. *Id*. The study noted that "the CAWS UAA differs from most UAAs in that improving conditions are prompting a potential use upgrade for most reaches rather than the typical scenario where existing conditions are not supporting an existing designated use and are prompting consideration of a use downgrade." *Id.* In either case, the study noted that the same criteria are still applicable.

UAA Factors Impacting Aquatic life use. The specific UAA factors and the conditions affecting the ability to attain the General Use relating to aquatic life use are summarized below. The UAA Factor 1, "naturally occurring pollutant concentrations prevent the attainment of the use", is not a factor considered to be at issue in CAWS.

Factor 2- Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met (40 C.F.R § 131.10(g)(2)). The UAA noted

the upper reach of the NSC contains the Wilmette Pumping Station, which is used to divert Lake Michigan water into the NSC to improve water quality in the channel and to provide navigational makeup for CAWS, based on discretionary needs of District. Due to the limitations on the quantity of discretionary diversions from Lake Michigan, extended periods of low flow in the channel can create adverse water quality conditions (*e.g.* low DO) that can prevent the attainment of a higher aquatic life designated use. Attach. B at 5-2.

Factor 3 - Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place (40 C.F.R § 131.10(g)(3)). The UAA stated that extensive residential, commercial and industrial development has occurred along the waterways. Reducing or eliminating many of these structures (*e.g.* Chicago area buildings, bulkheads, sheet-piled walls, bridges) to attain a higher aquatic life use could cause significant and widespread economic and social hardship to Chicago's environment. Further, much of CAWS consists of man-made canals constructed to convey stormwater and wastewater, and to provide for navigation. These man-made canals have steep sides, are deep draft, and have very little shallow shoreline areas to provide adequate habitat for a high quality fish. Such conditions prevent CAWS from attaining a high quality aquatic life use. Attach. B at 5-3.

Factor 4 - Dams, diversions or other types of hydrologic modifications preclude the attainment of the use and it is not feasible to restore the water body to its original condition or to operate such modifications in such a way that would result in the attainment of the use (40 C.F.R § 131.10(g)(4)). The UAA study noted that the CAWS cannot be restored to its original conditions because: the flows in CAWS are highly regulated and original flows were diverted through man-made canals to reduce contamination to Lake Michigan in the early 1900s; and the original waterbodies that make up CAWS have been highly modified to support navigation, stormwater and wastewater conveyance and public use. Attach. B at 5-3. These modifications along with flow regulation prevent the attainment of a high quality aquatic life designated use. Additionally, improvements to water quality through treatment may not improve the fish communities due to the lack of suitable habitat to support the fish populations.

Factor 5- Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses, (may be used for determining aquatic life use, but may not be used solely to determine recreational use) (40 C.F.R § 131.10(g)(5)). The UAA noted that CAWS was artificially created to protect the health of the citizens of Chicago, protect Lake Michigan from Chicago's waste, and develop a navigable link to the Gulf of Mexico, with little consideration given to creating suitable aquatic habitat to support a diverse fish and macroinvertebrate community. Because these waterways are considered to be state and federal navigable waterways, they can be modified and dredged to meet navigable requirements further impacting aquatic habitat. Further, the UAA asserted that the potential for dramatic improvements to create aquatic habitat to support a higher designated use would likely be unproductive, and would severely conflict with important navigational uses. Such conditions preclude the attainment of high quality aquatic life use in CAWS. Attach. B at 5-4.

Factor 6 - Controls more stringent than those required by Sections 301(b) and 306 of the CWA would result in substantial and widespread economic and social impact (40 C.F.R § 131.10(g)(6)). The UAA study noted that economic and social factors must be taken into consideration during the UAA process in proposing water quality criteria to protect proposed designated uses. Attach. B at 5-4.

General Comments on UAA Factors. Specifically, the study stated that IEPA is responsible for ascertaining where substantial and widespread economic and social impacts may occur as a result of the UAA by taking into consideration the following factors:

1) Financial analysis of the necessary pollution controls and their economic impacts on publicly owned pollution control discharge facilities (*e.g.* wastewater plants, CSOs).
2) The adverse impacts the affected community will bear if the entity is required to meet existing or proposed water quality criteria. *Id*.

The CAWS UAA study noted that the District and Midwest Generation are conducting feasibility studies to determine the costs they would incur if they would have to make modifications to their existing facilities to meet water quality criteria recommended in the UAA. Attach. B at 5-4. Additionally, the potential economic impact of upgrading the City of Chicago's CSOs to meet water quality criteria needs to be considered in the overall economic evaluation. *Id.* at 5-5.

The CAWS UAA stated that since more than one of the six criteria is applicable, certain uses cannot be attained in CAWS. UAA Factors 2, 3, 4 and 5 prevent the consistent attainment of a high quality aquatic life that would meet the goals of the CWA. The study maintains that good quality aquatic habitat in CAWS is limited and the waterways would need to undergo major habitat restoration to improve the fish and macroinvertebrate populations. However, the UAA noted that despite the physical limitations observed in CAWS, certain reaches have experienced dramatic improvements in water quality since the establishment of the Secondary Contact and Indigenous Aquatic Life Use criteria. The UAA stated that such improvements must be recognized through an upgrade in water quality criteria where appropriate. Attach. B at 5-5.

Aquatic Life Use Designations

According to the CAWS UAA study, one of the main objectives established by IEPA for the CAWS UAA was the development of recommended use designations and associated water quality criteria to achieve the highest attainable uses consistent with CWA goals and Chapter 2 of USEPA's Water Quality Standards Handbook (40 C.F.R. 131.10). Attach. B at 5-5. The study stated that "achieving this objective requires the development of use designations and a regulatory framework that flexibly adapts to the diverse nature" of CAWS. *Id.* In this regard, the study noted that the current use designation of General Use and Secondary Contact and Indigenous Aquatic Life addresses aquatic life and recreational uses together without providing the possibility that a water body may be suitable for one, but not the other. According to the

UAA study, one way of making the framework more specific to local conditions would be to create sub-use categories and designate them independent from one another. *Id.*

The CAWS UAA relied on two biological indices as screening tools to define the different use categories for aquatic life in CAWS: the Ohio Boatable IBI and the Ohio QHEI. Attach. B at 5-6. Based upon existing water quality and biological data, along with existing and proposed uses, the UAA proposed tiered aquatic life use designations for CAWS. *Id.* at 5-8. The UAA maintains that the tiered use designations allow for appropriately varying levels of protection according to the uses currently being attained and uses that could occur within the next ten years. The UAA proposed three tiered aquatic life use designations, which are described below:

1) General Warm-water Aquatic Life (GWAL). These waters are capable of supporting a year-round balanced, diverse warm-water fish and macroinvertebrate community. The fish community is characterized by the presence of a significant proportion of native species, including mimic shiner, spotfin shiner, brook stickleback, longnose dace, hornyhead chub, smallmouth buffalo, rock bass and smallmouth bass. Attach. B at 5-12.

2) Modified Warm-water Aquatic Life (MWAL). These waters are presently not capable of supporting and maintaining a balanced, integrated, adaptive community of a warm-water fish and macroinvertebrate community due to significant modifications of the channel morphology, hydrology and physical habitat that may be recoverable. *Id.* These waters are capable of supporting and maintaining moderately tolerant communities of native fish and macroinvertebrates, including channel catfish, largemouth bass, bluegill, and black crappie. *Id.*

3) Limited Warm-water Aquatic Life (LWAL). These surface waters are not presently capable of sustaining a balanced and diverse warm-water fish and macroinvertebrate community due to irreversible physical and hydrological modifications. The physical and hydrological conditions result fish community comprised of tolerant species, including central mudminnow, golden shiner, white sucker, bluntnose minnow, yellow bullhead and green sunfish. *Id.*

CAWS Reach Aquatic Life Use Designation

The UAA study relied on the stakeholders' input to develop the recreational use designations for the various CAWS reaches. The stakeholders were asked about their perception of each reach of the waterway designation. Attach. B at 5-13. Further they were asked to consider anticipated uses within the next ten years and feasibility of any restoration actions that may be required to attain the assigned designation. The SAC recommendations are summarized in Table 4, below. Attach. B at 5-14.

In addition to the recommended designations in the UAA, CDM developed a strategic plan for establishing overall priorities and associated goals and strategies for CAWS. Attach. B at 6-3. CDM noted that the plan is designed to be concise and includes essential information and viable options to support strategic actions that can be accomplished within the next ten years. Regarding the MWAL segments, the plan's goal is to create favorable habitat and water quality conditions at selected locations in the waterways to support a diverse aquatic and wildlife community. *Id.* at 6-8. In the case of LWAL segments, the goal is to maintain water quality to meet General Use criteria, where attainable and allow for navigation and fish passage. The strategic actions include implementation of best practical treatment technologies to eliminate water impairments in MWAL segments and identify alternative treatment technologies to increase DO levels in LWAL segments.

Table 4
CAWS UAA Study Waterway Reaches – Proposed Use Designations

Waterway Reaches	Description	Present Use Designation Pursuant to Part 303.441	Proposed Use Designation From CAWS UAA
Upper North Shore Channel	Wilmette Pumping Station to North Side WRP	General Use	Modified Warm-water Aquatic Life
Lower North Shore Channel	North Side WRP to confluence with NBCR	Secondary Contact & Indigenous Aquatic Life	Modified Warm-water Aquatic Life
North Branch Chicago River	confluence with NSC to confluence with the SBCR	Secondary Contact & Indigenous Aquatic Life	Modified Warm-water Aquatic Life
Chicago River	CRCW to confluence with NBCR and SBCR	General Use	Limited Warm-water Aquatic Life
South Branch Chicago River	Confluence with Chicago River to confluence with CSSC at Damen Ave. Bridge	Secondary Contact & Indigenous Aquatic Life	Limited Warm-water Aquatic Life
South Fork of South Branch Chicago River	Racine Avenue pumping station to confluence with SBCR	Secondary Contact & Indigenous Aquatic Life	Limited Warm-water Aquatic Life
Chicago Sanitary & Ship Canal	confluence with SBCR at Damen Ave. Bridge to LPL	Secondary Contact & Indigenous Aquatic Life	Limited Warm-water Aquatic Life

Table 4
CAWS UAA Study Waterway Reaches – Proposed Use Designations
(cont.)

Waterway Reaches	**Description**	**Present Use Designation Pursuant to Part 303.441**	**Proposed Use Designation From CAWS UAA**
Cal-Sag channel	Confluence with Little Calumet to confluence with CSSC	Secondary Contact & Indigenous Aquatic Life t	Modified Warm-water Aquatic Life
Little Calumet River (west)	Calumet WRP to confluence with Cal-Sag Channel	Secondary Contact & Indigenous Aquatic Life	Modified Warm-water Aquatic Life
Little Calumet River (east)	O'Brien Lock and Dam to Calumet WRP	Secondary Contact & Indigenous Aquatic Life	Modified Warm-water Aquatic Life
Grand Calumet River	Illinois State Line to confluence with Little Calumet River	Secondary Contact & Indigenous Aquatic Life	Modified Warm-water Aquatic Life
Lake Calumet	Lake Calumet	Secondary Contact & Indigenous Aquatic Life	Modified Warm-water Aquatic Life
Calumet River	Lake Michigan to the confluence with the Little Calumet River	General Use up to O'Brien Lock and Dam, and the remaining segment is Secondary Contact & Indigenous Aquatic Life	Limited Warm-water Aquatic Life

LDPR UAA

The LDPR UAA was performed by the consulting firms AquaNova, International, Ltd., and Hey and Associates, Inc. The UAA Final Report was published in December 2003. The pilot UAA for the LDPR began in March 2000 by convening a stakeholder's advisory group. This group comprised a cross-section of the community likely to be impacted by potential rule changes, including environmental groups, local governments, specific industries, industry trade associations and regulatory agencies. SR at 21.

IEPA is interested in elevating the current, lesser use of the LDPR from Secondary Contact and Indigenous Aquatic Life Use to a higher use for balanced aquatic life and contact recreation. IEPA wishes to achieve the highest attainable water use consistent with the goals of the CWA. Attach. A at 1-3. The UAA is a process for considering the higher use designation where these uses are less than that specified by Section 101(a)(2) of the CWA. The UAA can explore a wide array of actions to improve water quality, including water body and riparian zone restoration, as well as ways to further reduce waste water discharges and Best Management Practices (BMPs) for nonpoint pollution. *Id.* at 1-4. In the following sections, the Board will provide a summary of the LDPR UAA objectives, existing conditions and characterization of the LDPR, existing and proposed use classification, and remedial action recommendations. As noted above, the following summary of the LDPR UAA will be limited to aquatic life use.

LDPR UAA Objectives

The primary purpose of the LDPR UAA was to evaluate the existing conditions and uses and anticipated future uses to determine if revisions to use designations are warranted. To achieve this purpose, five objectives were identified in the LDPR UAA:

1) Evaluate all available data to determine the current conditions of the LDPR.

2) Determine the potential to achieve and maintain a higher use designation such as a diverse and balanced, self-supporting aquatic community.

3) Identify the significance of the major stressors on the aquatic system.

4) Assess water quality data and habitat management activities to reduce these stressors.

5) Develop recommended use designations and water quality standards to achieve the highest attainable uses that are consistent with the CWA. Attach. A at 1-4.

The UAA is organized into nine chapters, five of which relate to the chemical, physical, and biological characteristics of the LDPR. Attach. A at 1-23. Another chapter addresses a modified water use designation for the Brandon Road Pool, and the use upgrade to the Dresden Island Pool. *Id.* at 1-24.

LDPR UAA Description of Existing Conditions

The LDPR UAA covers the area from the confluence of the Des Plaines River with the CSSC near Lockport downstream to the Interstate 55 Bridge. Almost the entire reach is impounded. There are two morphologically different segments: the Brandon Road Pool that extends above the Brandon Road Lock and Dam, and the portion of the Dresden Pool above the Interstate 55 Bridge. The LDPR is on IEPA's Section 303(d) list of impaired waters. Attach. A at 1-7.

The Brandon Road Pool is four miles long and approximately 300 feet wide, with depths of 12-15 feet. It is an artificial channel bordered by side masonry, concrete, or sheet pile embankments. The CSSC is the main tributary of the LDPR segment evaluated in the UAA. The Dresden Island Pool is approximately 14 miles long and 800 feet wide, with a depth of 2-15 feet. The 8.1 miles of this impoundment that was studied as part of the UAA is more natural than the Brandon Road Dam pool. It meanders and has a fair amount of natural shoreline and side channels. The United States Army Corps of Engineers (USACE) maintains a 9-foot deep navigational channel in this pool. Attach. A at 1-7.

The LDPR is a part of the Upper Illinois Waterway. The Illinois Waterway is one of the busiest inland commercial navigation systems in the country, providing a link between the Great Lakes/St. Lawrence Seaway and the Mississippi River navigation systems that link to the Gulf Intercoastal Waterway. The entire waterway is completely channelized to a minimum depth of 9 feet and is used primarily for the commercial transport of bulk commodities. Attach. at 1-7.

Historically, the LDPR has received flows from the CSSC, which receives effluents from several District wastewater reclamation plants and CSOs. As a result, the environmental potential of the LDPR was considered to be limited "to a point of hopelessness". Attach. A at 1-8. According to IEPA's 1998 303(d) list of impaired waters, the following parameters of concern were identified for the LDPR: priority organics, nutrients, metals, habitat alterations, low DO/organic enrichment, ammonia, pathogens, siltation, and flow alteration. *Id.* The UAA addressed these pollutants of concern, as well as the proposal to change the current designation use. *Id*. at 1-11.

LDPR UAA Water Body Assessment

As the first step of the UAA, the chemical integrity of the LDPR was assessed. Tier 1 screening was conducted for 25 parameters. Attach. at 2-31-32. Tier II screening was done for ammonium, copper, pathogens, DO, and temperature. *Id.* at 2-39. The results of the analysis for pathogens will not be discussed here because this issue is related to recreation use, which has been addressed in Subdockets A and B (*see* Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code 301, 302, 303, and 304, R08-9A (Aug. 18, 2011) and R08-9B (Feb. 2, 2012).

Chemical Parameters. Chemical data used for these analyses were provided by IEPA, United States Geological Survey (USGS), the District, ComEd, and Midwest Generation. Attach. A at 2-1. The available chemical sampling data were screened to determine which parameters are currently meeting the General Use standards and which were not. For the parameters that do not meet these standards or where there is a threat that they will not meet them in the near future, further analyses were conducted. These data were used to conduct a probabilistic analysis of parameters covered by the General Use standards using statistical software. *Id.* at 2-24. A total of 25 chemical parameters were analyzed. *Id*. at 1-23.

Of the 25 chemical parameters analyzed, 20 met General Use standards and the federal aquatic life protection and propagation criteria, which means they also meet the current Secondary Contact and Indigenous Aquatic Life Use standards. These 20 water quality parameters passed the 99.8 probability percentile test for nonexceedance. Attach. A at 2-31. Five did not meet these standards: copper, mercury, fecal coliform, DO, and zinc. *Id.* at 2-33-36.

Copper. Noncompliance for total copper concentrations was reported as marginal. General Use standards for copper were not met at four District sampling locations, but IEPA sampling sites did not indicate a problem. Attach. A at 2-33. The detailed Tier II analysis confirmed that compliance with the acute toxicity standard is at 99.8% or better, although copper concentrations were found to exceed standards at one District site.

Mercury. This metal has a very low standard for total concentrations. The probability plots indicated that most measurements are below detection limits, although all District sampling sites have one to three measurements that exceed standards. Attach. A at 2-34.

Fecal coliform bacteria. All sampling sites indicated noncompliance with General Use standards for primary contact recreation, which was addressed in Subdocket A. Attach. A at 2-35.

Dissolved Oxygen (DO). The General Use standard for DO level of 5 mg/L was found to have been met in a range of 50% to 99.8% of the probability plots. DO levels in the Brandon Pool frequently fall below this standard, although at the Dresden Island Dam Pool a 99.8% compliance rate was reported. Attach. A at 2-35. Tier II analysis indicated that the DO problem in the Brandon Road Dam Pool can be corrected by providing additional aeration at the Lockport Dam, although the physical features of the Brandon Road Dam Pool limit the development and propagation of early life forms. *Id.* at 2-78. While the DO standard of 5 mg/L is being met in the Dresden Island Pool, there are exceedances that violate the Water Quality Standard Rule of no excursions at all times. The UAA further stated that meeting the 6 mg/L standard in the Dresden Island Pool for the minimum 16 hours will be difficult in the summer when the temperatures are high. *Id.* at 2-80.

Zinc. Compliance with the chronic General Use standard was not met, and the excursions were significant, with compliance being as low as 40%. The UAA raises a question as to the reality of the General Use standard for zinc and its over protectiveness in that the federal standard is five times greater, which if had been place, would mean all sites had met this standard. Attach. A at 2-36. The results of Tier II analysis indicated that zinc concentrations would have to be reduced by 70-90% to meet the General Use chronic standard. *Id.* at 2-60.

Ammonia. The results of the Tier II evaluation indicate that the chronic standard for ammonium would most likely be met at all stations. The margin of safety would be large for all stations of the LDPR except for one District station at Interstate 55 where a combination of a higher pH caused by algal growth and high temperatures would result in a small margin of safety. Attach. A at 2-44.

pH. In addition to the 25 chemical parameters, the UAA analyzed pH levels and temperature, although pH is not a priority pollutant. Few exceedances were found for the pH General Use standard, which is a range of 6.5 to 9.0. Attach. A at 2-31.

Temperature. The LDPR receives thermal loads from three power plants located upstream on the CSSC in Will County. The effluents from the District waste water treatment plants constitute most of the flow during low flow periods, meaning the LDPR is effluent dominated. Thus, the temperature of the effluents determines the base temperature of the river, more so than it having a natural temperature. The LDPR does receive some natural flow from the upstream Des Plaines River. Attach. A at 2-81.

According to the UAA, the General Use standards require the water temperature to be less than or equal to 32°C (90°F) for the months of April to November and 16°C (60°F) for the remaining months of the year. These limits cannot be exceeded for more than 1% of the hours in the 12-month period ending with any month. The maximum deviation during this allowed exceedance time is 1.8°C (3°F), meaning the maximum temperature cannot exceed 34°C (93°F). The General Use standards are in effect at the end of the investigated reach at the Interstate 55 bridge and further downstream; however, Midwest Generation has an adjusted standard that is applicable to discharges from its plant to the Interstate 55 Bridge. Attach. A at 2-82. For streams designated for Secondary Contact and Indigenous Aquatic Life Use, the temperature shall not exceed 34°C (93°F) more than 5% of the time, or 37.8°C (100°F) at any time. *Id.* at 2-83.

Sediment Quality Data. The UAA reported a dramatic improvement in water quality in the Des Plaines River over the past thirty years. Effluent improvements at the District's treatment plants and the building of TARP to reduce CSOs have been the source of much of this improvement. The inputs of contaminants and contaminated solids have been greatly reduced, resulting in an improvement in sediment quality as well. Attach. A at 3-1. It is important to note that there are currently no standards in place for contaminated sediments. *Id.* at 3-8.

USEPA conducted a detailed assessment of the sediments in the LDPR in 2001. These results, coupled with other available data, demonstrate an improvement in sediment quality. Attach. A at 3-40. Toxic metals and individual PAHs do not appear to present a toxicity problem; however, two concerns remain:

1) An area of contaminated sediments was found in the depositional zone above Brandon Road Dam. The sediment had high PCB, pesticide, and elevated toxic metal contamination. The PCB contamination is likely a legacy pollutant, originating many years ago. *Id.* at 3-41.

2) The LDPR sediments also have high concentrations of dieldrin, chlordane, and heptachlor epoxide. All three pollutants are a result of legacy pollution, originating from the use of pesticides many years ago. *Id.*

Physical Habitat. The UAA explored the current physical habitat of the LDPR and its ability to maintain habitat for fish and aquatic life. Attach. A at 4-2. While outside the study

area for the LDPR, the Upper Des Plaines River (UDPR) was also examined. The UDPR is maintained as a natural channel and is characterized as a large riffle zone with shallow flow and cobble substrate. This zone serves as a refuge for organisms that can drift and migrate into the LDPR and repopulate the lower river. *Id.* at 4-9.

The Brandon Road Pool is a man-made river channel, deepened and widened to accommodate barge traffic. The walls of the channel have been lined with concrete retaining structures to prevent erosion. Attach. A at 4-9. Resuspension of the bottom sediments from barge traffic is a common problem. Substrate for benthic macroinvertebrates is limited to soft, fine-grained organic sediments. Organic detritus and woody debris are limited throughout this pool. Spawning substrate is limited, and shallow substrates and overhanging vegetation do not exist. *Id.* at 4-12.

The Dresden Island Pool (DIP) extends from the Brandon Road Lock and Dam to the Dresden Island Lock and Dam. The banks of the DIP are not armored with concrete walls, and while the banks are vegetated, the vegetation indicates a disturbed community. Maximum depths are approximately 17 feet in the center of the navigational channel. Attach. A at 4-12. The main channel is shallow, which creates a littoral zone along the bank. *Id.* at 4-13.

Habitat throughout the LDPR is degraded due to channelization and impoundment of the river. The LDPR UAA reported QHEI scores for the study area below the Ohio recommended value of 60 to define warm water habitat use that is consistent with goals of the CWA. The habitat scores of the Brandon Road Pool were a medium QHEI value of 37 indicating stream modifications that are severe, irreversible, and widespread. These are conditions that do not provide habitat to support full warm water use. The UAA indicates the DIP has higher habitat index scores, but that the current values still indicate a system that does not meet the optimum for warm water use. Attach. A at 4-33.

Poor habitat in the LDPR is the result of a wide range of factors: a lack of riffle/run habitat, limited hard substrates of gravel and cobble, channelization, lack of in-stream cover, and impounded cover. All of these factors are a result of activities required to maintain the LDPR as a part of the Upper Illinois Waterway.

Macroinvertebrates. The LDPR UAA reported that macroinvertebrate data from the past five years was used for this study. Benthic macroinvertebrate data was provided by the District and IEPA, and additional data was collected in 2000. Attach. A. at 5-4. The family Chironomidae, midge, is the dominant group of benthic macroinvertebrates within the LDPR study area. The chironomids are generally considered to be more tolerant then mayflies, stoneflies, and caddisflies. *Id.* at 5-10. The percent of aquatic worms, Oligochaeta, on the HD samplers was highest in Lockport Forebay and lowest in the LDIP. Aquatic worms generally flourish in conditions considered stressful for other macroinvertebrates. *Id.* at 5-11.

According to the LDPR UAA, the results of the HD sampling suggested a general trend of improved water quality from upstream to downstream. The UDIP appears to provide water quality sufficient to support a General Use classification. The macroinvertebrate community in the Brandon Road Pool does not support this classification, with both the MBI and IBI indicating

a degraded macroinvertebrate community. Samples of benthic macroinvertebrates collected through Ponar dredge-sampling showed a much more degraded condition as compared to samples collected on artificial substrates. MBI values for the entire study area indicate a benthic community that does not meet the General Use classification. Benthic habitat in the entire study area has limited epifaunal substrate suitable for invertebrates, including woody debris, cobbles, and under-cut banks. In both pools, the water is impounded, which reduces stream velocity and creates deep-water habitat not optimal for a diverse benthic macroinvertebrate community. Sediments in the navigational channel are frequently disturbed by barge traffic, which impedes colonization by benthic organisms. The greatest lack of habitat for macroinvertebrates exist in the Brandon Road Pool where the stream edge is channelized and lined with concrete retaining walls. Attach. A. at 5-17.

Fish Community. The fish community was sampled by scientists from EA Engineering, Science and Technology on behalf of Midwest Generation. This was the only source of data used for the LDPR UAA analysis. The Ohio Boatable IBI was determined to be the most appropriate index to use to evaluate the fish community of the LDPR. The Ohio Boatable IBI was calibrated for use on large rivers such as the LDPR. Attach. A. at 6-3.

The assessment revealed a statistically significant decrease in biotic integrity of the fish community moving upstream from the DIP to the UDIP and into Brandon Road Pool. Factors affecting these scores include high temperatures, low DO, and loss of habitat. Reach-specific factors may also play a role, including legacy sediment contamination or barriers to fish passage such as dams. Attach. A. at 6-25. The poor IBI values throughout the LDPR can be attributed to a lack of adequate habitat. Habitat improvements in the Brandon Road Pool are limited due to the maintenance of the navigational channel. Introduction of substrate diversity throughout the LDPR is difficult due to the impounded condition of the river. *Id.* at 6-26.

LDPR UAA Recommended Aquatic Life Use Designation

The LDPR UAA proposed two tiered aquatic life use designations, which are described below:

1) Brandon Pool. The UAA recommends that Brandon Pool be designated as Brandon Modified Impounded Warmwater Use for aquatic life use. Attach. B at 8-37. The study noted that the proposed designation for the Brandon Pool will not lead to a blanket relaxation of the chemically specific standards below those for the General Use standards. The UAA contends that the recommended designation recognizes that habitat and conditions for a balanced aquatic biota are irretrievably affected and cannot be remedied. Further, in the event the physical cause is reversible and can be remedied, the UAA maintains that the assignment of the modified impounded warmwater use will lead to a realistic water body restoration. Attach. A.at 6-26.

2) Dresden Island Pool. The study recommends that the entire Dresden Island Pool must be designated as General (Modified) Use for aquatic life use. The UAA noted that although the portion of Dresden Island pool studied and evaluated

extends only from the Brandon Road Dam to Interstate 55 Bridge, unifying the designation and associated standards for the entire pool to the confluence with the Kankakee River makes sense and will not affect the current General Use standards applicable to the reach from Interstate 55 to the Kankakee River. *Id.*

IEPA REGULATORY PROPOSAL

IEPA proposes three aquatic life uses for CAWS and LDPR:

1) Upper Dresden island Pool Aquatic Life Use Waters,

2) CAWS Use A Waters; and

3) CAWS and Brandon Pool Aquatic Life Use B Waters. ST at 48.

IEPA concludes that UDIP can minimally meet the CWA aquatic life use goal. SR at 52. However, IEPA's CAWS Use A and CAWS Use B are proposed for segments of the CAWS and LDPR that cannot meet the CWA aquatic life goal under the following UAA factors:

3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses. 40 C.F.R. § 131.10(g) (3), (4) and (5); SR at 48.

Upper Dresden Island Pool Aquatic Life Use Waters

IEPA stated that these waters are capable of maintaining aquatic life populations consisting of individuals of tolerant, intermediately tolerant, and intolerant species. SR at 48. These species are adaptive to the unique flow in the UDIP waters that is necessary to maintain navigation and flood control. *Id*. UDIP waters have more diverse habitat conditions than the other two proposed uses. SR at 51. The UDIP is an earthen bank reach with fixed aquatic and overhanging riparian vegetation as well as having other refuge for aquatic life. *Id*.

The UDIP has a midstream channel that is generally about 15 feet deep and is flanked in most areas by littoral zones with gravel substrate. SR at 51. The UDIP also includes some islands and shallow tributary mouths and deltas. *Id*. The UDIP is subject to recurring impacts from navigation and flood control, but to a lesser degree than the other two proposed uses. *Id*.

QHEI scores in the UDIP range from 45 to 80, which corresponds to a fair to excellent biological potential. SR at 52. The UDIP is capable of maintaining a biological condition that minimally meets the CWA aquatic life goal. *Id*. IEPA believes that the IBI scores demonstrate that the existing aquatic life is not achieving the biological potential expected from waters with the habitat scores. *Id*.

CAWS Use A Aquatic Life Use Waters

IEPA stated that the CAWS Use A waters are capable of maintaining aquatic life populations predominated by individuals of tolerant or intermediately tolerant. SR at 48. These species are adaptive to the unique flow conditions necessary to maintain navigation, flood control and drainage functions of the system. *Id*. CAWS Use A waters are artificially constructed or channelized, earthen bank reaches with some fixed aquatic or overhanging riparian vegetation and other areas of refugia. SR at 50.

The CAWS Use A waters are generally less than 15 feet deep, with a narrow, littoral zone flanking one or both sides of a steeper-sloped midstream channel. SR at 50-51. CAWS Use A waters also experience some of the same routine moderate to severe navigation and other anthropogenic conditions found in CAWS Use B waters discussed below. SR at 51.

QHEI scores range from 40 to 55, which corresponds to poor to fair biological potential. SR at 51. IBI scores generally range from 22 to 30 and are consistent with waterways with poor to fair habitat attributes. *Id*. The habitat conditions are not reversible in the foreseeable future and combined with other factors prevent CAWS Use A waters from attaining the CWA aquatic life use goal. *Id*.

CAWS Use A waters are:

1) North Shore Channel,
2) North Branch of Chicago River from its confluence with North Shore Channel to the south end of North Avenue Turning Basin,
3) Calumet River from Torrence Avenue Bridge to its confluence with both Little Calumet River and Grand Calumet River,
4) Lake Calumet,
5) Grand Calumet River,
6) Little Calumet River from its confluence with both Calumet River and Grand Calumet River to its confluence with Cal-Sag Channel, and
7) Cal-Sag Channel. SR at 51.

CAWS and Brandon Pool Aquatic Life Use B Waters

IEPA stated that the CAWS Use B waters are capable of maintaining aquatic life populations predominated by individuals of tolerant types. SR at 49. The species must be adaptive to the unique physical conditions, flow patterns, and operational controls designed to maintain navigational uses, flood control and drainage functions in deep-draft, steep-walled

shipping channels. *Id*. CAWS Use B waters are artificially constructed or channelized, straight, deep-draft, steep-walled shipping channels with little or no fixed aquatic or overhanging riparian vegetation or other refugia. *Id*.

The waterways are generally 15 feet or more deep and square or rectangular in cross section. SR. at 49. The channel walls are held in place by various methods including sheet piling, concrete or timbers. *Id*. The waters are subject to recurring, moderate to severe anthropogenic impacts such as sediment scouring, wake disturbances of shoreline areas, and rapid changes in water levels and flow velocities. *Id*.

IEPA noted that the waterway reaches in the area bound by the Lockport lock and dam, the O'Brien lock and dam, the Chicago River lock and controlling structure and the Wilmette controlling structure (Lockport Zone) are especially subject to such impacts. SR at 49. IEPA stated that to ensure navigation and prevent flooding, the Lockport Zone stage height is dropped by as much as three feet in advance of a rain event and the height can fluctuate four to six feet over a 48-hour storm period. *Id*. Also in April of 2002 a fish barrier was installed to prevent Asian carp and other invasive species from entering Lake Michigan (*see infra* 121). SR at 50.

QHEI scores are below 40, which corresponds to poor or very poor biological potential. SR at 50. The IBI scores are below 22 and are consistent with poor or very poor habitat attributes. *Id*. Such conditions are irreversible and in combination with other factors prevent the CAWS Use B water from maintaining a biological condition that meets the CWA aquatic life use goal. *Id*.

CAWS Use B waters are:

1) North Brach Chicago River from the south end of the North Avenue Turning Basin to its confluence with Chicago River,
2) Chicago River,
3) South Branch Chicago River,
4) South Fork of South Branch Chicago River,
5) CSSC,
6) Brandon Pool-Des Plaines River from its confluence with CSSC to Brandon Road Lock and Dam,
7) Calumet River from Lake Michigan to the Torrence Avenue Bridge and
8) Lake Calumet Connecting Channel. SR at 50.

Regulatory Language

IEPA proposed the following language:

Section 303.230 Chicago Area Waterway System Aquatic Life Use A Waters

Waters designated as Chicago Area Waterway System Aquatic Life Use A Waters are capable of maintaining aquatic-life populations predominated by individuals of tolerant or intermediately tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational

controls necessary to maintain navigational use flood control, and drainage functions of the waterway system. The following waters are designated as Chicago Area Waterway System Aquatic Life Use A waters and must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D:

a) North Shore Channel;
b) North Branch Chicago River from its confluence with North Shore Channel to the south end of the North Avenue Turning Basin;
c) Calumet River from Torrence Avenue to its confluence with Grand Calumet River and Little Calumet River;
d) Lake Calumet;
e) Grand Calumet River;
f) Little Calumet River from its confluence with Calumet River and Grand Calumet River to its confluence with Cal-Sag Channel; and
g) Cal-Sag Channel.

Section 303.235 Chicago Area Waterway System and Brandon Pool Aquatic Life Use B Waters

Waters designated as Chicago Area Waterway System and Brandon Pool Aquatic Life Use B Waters are capable of maintaining aquatic-life populations predominated by individuals of tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational controls designed to maintain navigational use, flood control, and drainage functions in deep-draft steep-walled shipping channels. The following waters are designated as Chicago Area Waterway System and Brandon Pool Aquatic Life Use B waters and must meet the water quality standards of 35 Ill. Adm. Code 302. Subpart D:

a) North Branch Chicago River from the south end of the North Avenue Turning Basin to its confluence with South Branch Chicago River and Chicago River;
b) Chicago River;
c) South Branch Chicano River and its South Fork;
d) Chicano Sanitary and Ship Canal;
e) Calumet River from Lake Michigan to Torrence Avenue;
f) Lake Calumet Connecting Channel: and
g) Lower Des Plaines River from its confluence with Chicago Sanitary and Ship Canal to the Brandon Road Lock and Dam.

Section 303.237 Upper Dresden Island Pool Aquatic Life Use Waters

Lower Des Plaines River from the Brandon Road Lock and Dam to the Interstate 55 Bridge will be designated for the Upper Dresden Island Pool Aquatic Life Use. These waters are capable maintaining aquatic-life populations consisting of individuals of tolerant, intermediately tolerant, and intolerant types that are adaptive to the unique flow conditions necessary to maintain navigational use and upstream flood control functions of the waterway system. These waters must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D.

SUMMARY OF TESTIMONY

IEPA's Testimony

In this section, the Board will summarize testimony relating to aquatic life use designations of CAWS provided by IEPA. That testimony was provided by Rob Sulski (Exh. 1) and Roy Smogor (Exh. 3 and 466).

Rob Sulski

Rob Sulski has been employed by IEPA for 24 years and has a Master's Degree in Environmental Engineering from Southern Illinois University. Exh. 1 at 1. Mr. Sulski worked for 19 years in water pollution control regulatory compliance and became IEPA's expert in the operations of Chicago area industries and wastewater treatment authorities as well as CAWS. *Id*. Mr. Sulski was the project manager for the CAWS UAA and a member of the technical staff for the LDPR UAA. Exh. 1 at 2. Mr. Sulski grew up and lives in the CAWS area and has recreated in and around CAWS both personally and professionally numerous times. *Id*.

Mr. Sulski testified that CAWS and LDPR have been classified in a distinct category separate from the other surface waters of the State since the adoption of the Act. Exh. 1 at 2. He noted that both CAWS and LDPR were not only heavily stressed by chemical and biological degradation, but the physical condition was changed with the reversal of flow and the addition of major new arteries directing drainage to the Illinois River Basin. Exh. 1 at 3.

Mr. Sulski testified that while state and federal laws have driven the establishment of new water quality goals and aggressive water quality standards for most waters of the state, CAWS and LDPR have reflected lower expectations due to the historic and ongoing urban and industrial influences. *Id*. He noted that regulations for CAWS and LDPR have not gone through a comprehensive reevaluation since they were adopted in 1970 until this rulemaking. Exh. 1 at 3-4. Mr. Sulski noted that CAWS and LDPR have been transformed over the last 30 years from a "virtual ecological wasteland . . . into an environmental asset to the community." Exh. 1 at 3. Mr. Sulski maintained there is sound reasoning to "custom tailor water quality standards for this system" to coincide with the uniqueness of the system. *Id*.

Mr. Sulski credited many participants with assisting with the proposal. Those participants included USEPA, the District, Midwest Generation, the City of Chicago, Friends of the Chicago River and the Alliance for the Great Lakes. Exh. 1 at 4.

Mr. Sulski testified on the findings of CAWS and LDPR UAA studies. Regarding LDPR, he noted that the UAA found that at least three of the six UAA factors (3, 4 and 5) limit aquatic life potential and preclude possibilities for safe primary contact recreation use. Exh. 1 at 7. The CAWS UAA also concluded that none of the waterbodies in CAWS could achieve CWA goals due to limitations described in the six UAA factors. Exh. 1 at 9.

Mr. Sulski testified that UAA findings indicated that the aquatic life use attainable in most of the CAWS and LDPR in the foreseeable future are affected by one or more of the UAA

factors. He noted "in some reaches the attainable uses are synonymous with those uses that exist in the waterways today. In other reaches, the existing aquatic life falls short of its attainable biological potential." Exh.1 at 13. In reaches where attainable uses are not being met, Mr. Sulski stated that IEPA has concluded that low DO and high temperatures are major water quality constraints. *Id.* Mr. Sulski testified that IEPA's conclusions also took into account additional habitat and aquatic life data that was not available during the UAA studies. *Id.* at 8-9. He stated that additional habitat and aquatic-life data was generated by Midwest Biodiversity institute for USEPA and by EA Engineering, Science and Technology for Midwest Generation. Exh. 1 at 10-11.

Mr. Sulski testified that IEPA relied on the UAAs and additional information to develop three levels of biological potential in the CAWS and LDPR. He noted that two of the three levels do not meet the CWA's aquatic life goal due to conditions described in UAA Factors 3, 4 and 5. Exh. 1 at 13. The three attainable levels of aquatic life use proposed by IEPA based on the biological potential are as follows: 1) UDIP Aquatic Life Use Waters; 2) CAWS Aquatic Life Use A Waters; and 3) CAWS and Brandon Pool Aquatic Life Use B Waters. Mr. Sulski stated that UDIP Aquatic Life Use Waters are "capable of minimally maintaining aquatic life populations consisting of individuals of tolerant, intermediately tolerant, and intolerant types that are adaptive to the unique flow conditions necessary to maintain navigational use and upstream flood-control functions of the waterway system." *Id.* at 14. These waters have more diverse habitat conditions than the CAWS Use A or Use B waters. He also noted that the UDIP is subject to recurring impacts from navigation use and upstream flood control functions, but to a lesser degree than found in CAWS Aquatic Life Use A and Use B waters. However, Mr. Sulski maintained that based on the available data, including data in the UAA report and the weight of evidence, IEPA concluded that the UDIP could meet the CWA goals for aquatic life use. 1/28/08Tr. at 77.

Mr. Sulski relied on the QHEI determined by Midwest Biodiversity Institute to support the proposed aquatic life use for CAWS and LDPR. He noted that the QHEI scores for the UDIP range from 45 to 80, which according to the report prepared by the CABB, correspond to fair to excellent biological potential. Thus, Mr. Sulski argued that the UDIP is capable of maintaining a biological condition that minimally meets the CWA's aquatic life goal. He also noted that the Ohio Boatable Index and IEPA Fish IBI scores for the UDIP are approximately 20; suggesting that the existing aquatic life is not achieving its expected biological potential. Exh. 1 at 14-15

Mr. Sulski testified that IEPA is proposing to remove certain small segments of CAWS from General Use designation and group them according to the characteristics they share with the other reaches of CAWS. Exh. 1 at 15. He noted that the General Use designation was based on water quality conditions that existed at the time without consideration of habitat and aquatic life potential. Mr. Sulski asserted that the CAWS UAA demonstrates through habitat and other aquatic life data that the North Shore Channel, Chicago River and Calumet River possess conditions described in UAA factors 3, 4 and 5. These conditions, which are not reversible in the foreseeable future, in combination with other factors, prevent the General Use segments from maintaining a biological condition that meets the CWA aquatic life goal. Exh. 1 at 15. Thus, Mr. Sulski maintained that the CAWS UAA supports re-designating the General Use reaches of: North Shore Channel and Calumet River from Torrence Avenue to O'Brien Lock and Dam as

CAWS Aquatic Life Use A Waters; and Chicago River and Calumet River from Torrence Avenue to Lake Michigan as CAWS and Brandon Pool Aquatic Life Use B Waters. *Id.* 15-16.

Mr. Sulski described the CAWS Aquatic Life Use A Waters as "artificially constructed, or channelized, earthen bank reaches with some fixed aquatic and overhanging riparian vegetation and other areas of refugia." Exh. 1 at 16. He noted that the channels are generally less than 15 feet deep, flanked on one or both sides of their steeper-sloped midstream channel by a narrow, littoral zone. Further, the waters are routinely subject to moderate to severe navigation and other anthropogenic related conditions. Mr. Sulski noted that the QHEI scores in the CAWS Aquatic Life Use A waters generally range from 40 to 55, which correspond to the CABB's ranking of poor to fair biological potential. IBI scores in the range from 22 to 30 also reflect waterways with poor to fair habitat attributes. *Id.* Mr. Sulski contended that the existing conditions, which are not reversible in the foreseeable future, when combined with other factors, prevent the CAWS Aquatic Life Use A waters from maintaining a biological condition that meets the CWA's aquatic life goal. *Id.* at 16-17.

Mr. Sulski stated "the CAWS and Brandon Pool Aquatic Life Use B Waters are capable of maintaining aquatic life populations predominated by individuals of tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational controls designed to maintain navigational use, flood control, and drainage functions in deep-draft, steep-walled shipping channels." *Id.* at 17. He noted that the CAWS and Brandon Pool Aquatic Life Use B waters are routinely subject to navigation and other anthropogenic conditions that are more severe than those in the CAWS Aquatic Life Use A Waters. In these waters, the QHEI scores are below 40 and IBI scores generally are below 22 reflecting poor to very poor habitat attributes. Mr. Sulski asserted that existing conditions in the CAWS and Brandon Pool Aquatic Life Use B waters are irreversible, and in combination with other factors, prevent those waters from maintaining a biological condition that meets the CWA's aquatic life goal. *Id.*

At hearing, Mr. Sulski testified that IEPA did not consider that UAA factors 1 and 2 preclude the attainment of aquatic life goals. 1/28/08Tr. at 21 and 24. However, IEPA relied on UAA factor 3 to conclude that full use under the CWA is not achievable in portions of the CAWS and LDPR. 1/28/08Tr. at 27. Regarding the specific segments of the waterways affected by UAA Factor 3, Mr. Sulski stated that the UAA reports contained detailed information. *Id.* IEPA concluded that the impact of human caused conditions and sources of pollution in the waterways was irreversible primarily with respect to downtown areas and areas that have straight-walled channels that have involvement on them. *Id.* at 29. He noted "it would be almost impossible and cause great environmental damage to remove buildings and plants, and in order to rip back slopes or whatever to create aquatic habitat." *Id.*

In response to questions, IEPA submitted a table entitled "UAA Factor Applications to CAWS and Lower Des Plaines River" (*see* Exh. 29), which lists the UAA factors relied upon by IEPA to determine that CWA goals are not attainable on a segment-by-segment basis. See Exh. 29. The table indicates that IEPA relied on UAA Factors 3, 4 and 5 for all segments, except for UDIP for which none of the UAA factors was invoked. *Id.* Mr. Sulski explained that IEPA did not deem that the sources of pollution are irreversible stressors, nor habitat modifications severe enough to invoke UAA Factor 3. Further, he stated that even though barge traffic is present in

the navigation channel, sufficient habitat exists to meet the proposed aquatic life designation for UDIP. 3/10/08Tr.1 at 97-99. Thus, UAA Factors 3, 4, and 5 were not invoked for the UDIP.

Roy Smogor (Exh. 3)

Roy Smogor, a streams biologist, has been employed by IEPA for seven and half years. He has a Master of Science degree in Fisheries and Wildlife Sciences from Virginia Polytechnic Institute and State University in Blacksburg, Virginia and a Bachelor of Science degree in Biology from the University of Illinois at Urbana-Champaign. Mr. Smogor is currently a public service administrator in the Surface Water Section of the Bureau of Water. He testified in support of the proposed aquatic life use designations in the CAWS and LDPR. Exh. 3 at 1. Mr. Smogor stated that IEPA proposed the aquatic life use designations for CAWS and LDPR based on the biologic potential of the various stream segments. IEPA relied on the UAAs and associated information to determine that three levels of attainable biological potential apply to CAWS and LDPR. Exh. 3 at 2.

IEPA proposed the highest attainable level of biological potential as the aquatic-life goal for the UDIP. Mr. Smogor noted that the highest level "represents the capability to maintain aquatic-life populations consisting of individuals of tolerant, intermediately tolerant, and intolerant types that are adaptive to the unique flow conditions necessary to maintain navigational use and upstream flood control functions of the Upper Dresden Island Pool." Exh. 3 at 2. He testified that the proposed aquatic life goal was based on the information in the LDPR UAA concerning physical habitat conditions, water chemistry conditions, and existing biological conditions. 3/10/08Tr.1 at 103.

A second and somewhat lower level of biological potential was chosen as the aquatic-life goal for specific segments of CAWS. This designation, which is called "Chicago Area Waterway System Aquatic Life Use A Waters", represents "the capability to maintain aquatic-life populations predominated by individuals of tolerant or intermediately tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational controls necessary to maintain navigational use, flood control, and drainage functions of the waterway system." *Id.* IEPA proposed a third level with the lowest applicable level of biological potential as the aquatic-life goal for the remaining parts of the CAWS and LDPR. These waters are designated as "Chicago Area Waterway System and Brandon Pool Aquatic Life Use B Waters." Mr. Smogor stated that the third level of "biological potential represents the capability to maintain aquatic-life populations predominated by individuals of tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational controls designed to maintain navigational use, flood control, and drainage functions in deep-draft, steep-walled shipping channels." *Id.*

In addition to relying on direct measurements and observations of the chemical and physical conditions in the CAWS and LDPR, Mr. Smogor noted that IEPA also considered the impact of any foreseeable improvements in these conditions on the potential biological condition. Exh. 3 at 3. Additionally, consideration was also given to "direct observations, including measures of biological integrity, of the types, life stages, and relative numbers of aquatic organisms that have lived or currently live in the Lower Des Plaines River and the

Chicago Area Waterway System." Mr. Smogor maintained that defining and designating aquatic-life uses should be similarly based on the consideration of what level of biological condition represents a reasonable and attainable goal from now into the foreseeable future. *Id.*

Roy Smogor (Exh. 466)

Mr. Smogor took issue with the proposed aquatic-life uses submitted by the District (*see* PC 284). Exh. 476 at 1-2. Both IEPA and the District have proposed aquatic life use for CAWS. *Id.* at 1. Mr. Smogor pointed to flaws of the District's proposal, particularly the "fundamental shortcomings in how the physical, biological, and chemical information was used and interpreted by or for District." *Id.* at 2

Initial Shortcomings of the District Approach. Mr. Smogor first pointed out that the District's proposal has three aquatic life use, compared to IEPA's two for the CAWS. Exh. 476 at 2. He proceeded to identify more subtle differences and the shortcomings of the District's proposal. First, the LimnoTech Study (PC 284 summarized *infra* 140) failed to consider human impact on CAWS, and thus the degree of naturalness of CAWS, which would impair assessing biological potential. *Id.* at 3. With this failure, it would not be possible to determine a best case future for CAWS and whether the CWA goals of balanced aquatic life communities can be attained. *Id.*

Water Quality and CAWS Habitat Index. In developing the CAWS habitat index, the District considered the impact of physical habitat, but not how water quality, the physicochemical condition of the water, might play a role. Exh. 476 at 4. The District considered, for instance, the role of rip-rap banks, despite uncertainty that a correlation exists between the fish population and the rip-rap, as opposed to "some other factor." *Id.* at 4-5. Similarly, other myopic factors include manmade structures, maximum channel depth, and overhanging vegetation. *Id.* at 6-7. The District's analysis of these factors did not examine the possibility that they may merely correspond with differences in water quality. *Id.* Another factor not considered was fish-sampling efficiency. *Id.* at 7.

Sections of CAWS and Future Uses. Mr. Smogor also took issue with the future aquatic life use relative to the potential of different parts of CAWS. Exh. 476 at 8. The District does not group the sections of CAWS according to their potential habitat scores. *Id.* at 9. IEPA believes that there is insufficient explanation for some of the proposed groupings. *Id.* The District suggested that the factor in some groupings was existence of shipping and sediment toxicity, but they have applied these factors inconsistently in their suggestions. *Id.* Certain portions of CAWS with similar situations relating to shipping and sediment toxicity have different proposed future uses. *Id.* at 10.

Mr. Smogor argued that five of the habitat variables out of eleven in the CAWS habitat index are unnecessarily subjective, including "percent overhanging vegetation." Exh. 476 at 10. Insufficient analysis was provided to support its inclusion. *Id.* at 10-11. Using the other six variables, the habitat index scores point to three groupings, with which the District's findings are not consistent. *Id.* at 11

Fish Data Metrics. The District has also displayed shortcomings in its fish data, particularly failing to show a human impact on a continuum from imbalanced to balanced aquatic life communities. Exh. 476 at 12. The numerical scores used do not clearly relate "to the CWA goal of balanced aquatic-life communities." *Id.* The data do not amount to a valid IBI, and the District has not measured the biological condition sufficient to serve the needs of this rulemaking. *Id.* at 13. The fish metric does not adequately show human impacts. *Id.*

The District's metric borrowed fish variables from Wisconsin, Ohio, and Illinois. *Id.* at 14-15. Although the metric borrowed the variables from those states, there is nothing to show the variables were quantified according to the protocols of the state indices. *Id.* at 15. Also, individuals of the same species are not precisely the same across their geographical range, so specifications from an IBI in one state may not be readily adaptable in CAWS. *Id.* at 15-16. Also, the IBIs from Wisconsin, Ohio, and Illinois have methods of scoring adjustments to prevent inaccuracies when few individual fish are captured for observation. *Id.* at 17. The District did not apply these adjustments in its CAWS analysis. *Id.* Finally, the method of combining variables for a final index score used by District is inconsistent with the three states from which it borrowed the variables. *Id.* at 16-17.

Future Water Quality. The District did not adequately assess current or future water quality conditions and the impact of water quality on biological conditions. Exh. 476 at 18. The District merely considered DO and temperature. *Id.* The District collected other water quality data, but failed to analyze it. *Id.* at 19. The District also failed to consider possible non-linear relations between fish and water quality. *Id.* at 20. The habitat evaluation also relied on a lack of "statistical significance" of certain data, but this does not necessarily prove anything; specifically, it does not prove the lack of a relationship. *Id.* at 20-21

Mr. Smogor's Conclusion. Mr. Smogor then explained how the IEPA succeeded where the District has not. Specifically, IEPA has used the Ohio Fish IBI to measure biological conditions, and the Ohio EPA habitat index to measure biological potential, which has been proven effective, rather than the untested CAWS-specific method used by District. Exh. 476 at 21-22.

David Thomas on Behalf of the Environmental Groups

David Thomas presented testimony on two different occasions. In the first, Dr. Thomas addressed IEPA's proposal (Exh. 227). The second appearance was to testify (Exh. 474) regarding the District's habitat reports (PC 284). The Board will first summarize Dr. Thomas' testimony regarding IEPA's proposal and then his testimony on the District's habitat report.

Dr. Thomas has over 40 years of experience in the field of aquatic ecology, Midwest fish populations, and thermal effects from power plant discharges. Exh. 227 at 1. Dr. Thomas was Chief of the Illinois Natural History Survey for over 10 years and has experience conducting habitat studies and life history studies of various species on large rivers including the Kaskaskia River. *Id.* Dr. Thomas testified that he reviewed the documents that IEPA used for the basis of the proposal. *Id.* Dr. Thomas agrees with IEPA's proposed designated uses for CAWS and LDPR. *Id.*

Dr. Thomas suggested that the sensible approach to determine the highest aquatic life attainable is to study the physical habitat characteristics of a waterway. Exh. 227 at 2. Dr. Thomas opined that the QHEI scores are a sound methodology for examining habitat and that a QHEI score of 60 indicates that the waterway can meet the CWA aquatic life goal. *Id*. Dr. Thomas further opined that a QHEI of 45-60 is a range in which the waterways may be able to meet the CWA aquatic life goal depending on the particular characteristics of the area. *Id*.

Dr. Thomas testified that the QHEI scores provide a "snapshot of the quality of the available habitat in the area measured." Exh. 227 at 2. However, Dr. Thomas stated that there is more to determining habitat than simply looking at the QHEI score. *Id*. Dr. Thomas offered that the range of scores shown for an area must be considered as well as the predominant habitat characteristics and the presence of micro-habitats. *Id*. Also to be considered are the factors that might influence the QHEI scores and the species in the system. *Id*. Dr. Thomas opined that fish do not need a continuous stretch of good habitat to support life functions, as some fish will seek out areas to build nests and spawn. *Id*.

Dr. Thomas testified that in the UDIP, QHEI scores establish a potential to meet the CWA aquatic life use goal with a number of scores above 60. Exh. 227 at 3. Dr. Thomas opined that the UDIP can support a balanced and diverse fish population. *Id*. Dr. Thomas believes this can be accomplished by reducing temperatures and addressing DO levels. *Id*. Dr. Thomas stated that temperatures in the UDIP in the summer are sufficient to cause avoidance by fish and limit the carrying capacity of the system. *Id*.

Dr. Thomas did not believe that contaminated sediment in the UDIP impacts aquatic life potential. Exh. 227 at 3. Dr. Thomas's experience with rivers and reservoirs with contaminated sediment is that fish show very little accumulation of heavy metals with the exception of mercury. *Id*. Dr. Thomas has not seen data that demonstrate sediment toxicity is a limiting factor to the aquatic life potential. Exh. 227 at 4.

However, Dr. Thomas agreed that in the future removal of sediment "hot spots" might be necessary to further improve aquatic life potential. Exh. 227 at 4. Dr. Thomas believed that habitat improvement could improve the fish community. *Id*. Dr. Thomas opined that physical habitat can be improved by adding structures to the waterway. *Id*. Dr. Thomas also agreed that spawning is taking place in the UDIP. Exh. 227 at 5.

Dr. Thomas opined that the CAWS Use A waters can support early life stages of tolerant and intermediately tolerant types. Exh. 227 at 5. Dr. Thomas stated "I would be surprised if spawning does not currently take place in those reaches for those species that are common in the waterways." *Id*.

Habitat Report

Dr. Thomas also testified that in 1991 at the invitation of the District he performed aquatic life and habitat surveys upstream of the District's Stickney WRP, into the North Channel of the Chicago River. 8/14/09ATr. at 9. In addition, Dr. Thomas has been involved in surveys

of the Calumet system in looking at contaminant levels and sediment impact on aquatic life. *Id*. at 9-10. Dr. Thomas has examined the areas downstream of the Stickney WRP at the electric barrier in 2008 and 2009 and areas around the UDIP that could be viewed or reached by road. *Id*. at 10-11.

Dr. Thomas stated he observed "emergent weed beds" in the UDIP and was "surprised" at their extent. 8/14/09ATr. at 11. He also observed logs or other structures in that area that would provide habitat for fish and aquatic invertebrates. *Id*. Dr. Thomas also suggested that there is fish habitat below the Brandon Lock and Dam. *Id*. at 12. Dr. Thomas testified that aquatic weed beds are great for young fish. *Id*. at 31.

As to temperature, Dr. Thomas testified that fish avoided the thermal plume at certain times of the year. 8/14/09ATr. at 54-55. Dr. Thomas stated that "fish attraction, fish avoidance, potential lethality due to entrainment through the power plant" are pertinent to the effects of heated discharge. *Id*. Dr. Thomas testified that with cold shock, there were fish kills, but a demonstration of a negative impact on the population of fish was not possible. *Id*. at 57-58.

Dr. Thomas also offered an opinion on QHEI scores and what those mean. 8/14/09ATr. at 64-79. More specifically he opined that the QHEI scores for not only this system but any large river system probably underestimates available habitat. *Id*. at 64. Dr. Thomas stated that fish on large rivers are adaptable to moving over a wide area and the distance used in measuring the QHEI score would only be a small segment. *Id*. at 66.

Laura Barghusen on Behalf of Openlands

Laura Barghusen is the Associate Greenways Director for Openlands, an organization that promotes increased recreational use of area waterways by partnering with local governments and other organizations and groups. Exh. 338 at 1. Openlands assists local governments, homeowners, developers, and citizens groups in planning and restoring watershed habitat to attract wildlife and to make waterways conducive to swimming and fishing. *Id*.

Openlands helps property owners and governments create "buffer strips" of native plants between their land and local waterways as a way of improving water quality. Exh. 338 at 5. Openlands has been involved with four such projects in Will County in the last five years, and in 2004 produced a plan ("The Prairie Streams Watershed: A Habitat Protection and Restoration Strategy for Jackson, Prairie, Grant, and Fork Creeks") to promote further protection of local waterways. *Id*.

Jackson Creek was identified in the report as a hoped-for example of species returning to waterways once their quality improves, in part as a result of designating more stretches of the LDPR for protected aquatic life use. Exh. 338 at 6. Local governments and park preserves have committed to converting stretches of Jackson Creek into greenways to coax back wildlife. Exh. 338 at 7.

Ms. Barghusen testified that improved water quality would increase the presence of wildlife and species diversity which would in turn entice more people to recreate in area waterways. Exh. 338 at 7.

In response to questions, Ms. Barghusen noted that Jackson Creek is approximately 25 miles long with a watershed of approximately 54 square miles. 10/5/09Tr. at 61. Jackson Creek has varying widths and depths, but Ms. Barghusen was familiar with a portion approximately one to two feet deep and 34½to 36½ feet wide. *Id.* at 61. The UDIP, a part of the Des Plaines River watershed that drains 1,000 square miles, is much larger at up to 300 feet wide, 22 to 28 feet deep, and 7.73 miles long. *Id.* at 61.

Ms. Barghusen stated that Jackson Creek doesn't necessarily have the highest species diversity, but that measurement is not the only way to gauge water quality. 10/5/09Tr. at 79. In her opinion, Ms. Barghusen stated that the surrounding waters of Jackson Creek were potentially able to supply migrating fish to Jackson Creek because the flow is not impeded by dams and the distances are small. *Id.* at 82. The distance between the confluence of the Kankakee River and LDPR is approximately six and a half miles, and several species have been known to move that far according to Ms. Barghusen. *Id.* at 83. The goal of monitoring is to determine whether the LDPR has high enough water quality to act as a viable migration route for fish from the Kankakee River, which has very high quality water, to Jackson Creek. *Id.* at 85-87.

Jackson Creek now contains small populations of a number of species (including the Black Redhorse, Darter, and Sucker species), but with improved water quality, the hope is that the numbers and varieties would increase. 10/5/09Tr. at 89. For example, the 2005 report found 23 Black Redhorse fish in the Lower Kankakee River, whereas the 2003 Jackson Creek survey discovered only one Redhorse. *Id.* at 90. Recovery, of which water quality is a contributing but not an exclusive factor, would involve increasing water standards north of Interstate 55. *Id.* at 91. Another potential newcomer to Jackson Creek could be the Redhorse species, which was found in a 2003 IDNR survey (Exh. 339) to be swimming in the LDPR, which Ms. Barghusen takes as a positive sign of migration toward Jackson Creek. *Id.* at 92.

The EA Engineering report (Attach. MM) showed a greater number of species than the IDNR report (Exh. 339) because more samples were taken. 10/5/09Tr. at 99. The distance between the Kankakee River and Jackson Creek is six miles, with a mile of that being north of Interstate 55. *Id.* at 100-101. Even though Jackson Creek is only a mile-long segment of water, several factors are likely impeding fish migration, including low DO and high ammonia and nitrogen levels. *Id.* at 102. Ms. Barghusen did not have measurements for DO or ammonia nitrogen in this segment and did not know whether there are any violations of these levels north of Interstate 55 in the last five years. *Id.* at 103.

Generally, the larger populations of fish there are, the more likely and quickly they are to recover following a disturbance such as drought. Slow recovery is a concern for Jackson Creek given the low fish population there. *Id.* at 104-105.

Ms. Barghusen stated that there was a minor natural variation in IBI scores between 1997 and 2003 in Jackson Creek and the Manhattan Branch. The cause of the drop in species numbers

is not clear and will require further monitoring. 10/5/09Tr. at 107-108. The USGS water gauge measured a below average flow in the winter of 2002 and spring of 2003, which likely reflected drought conditions. *Id.* at 108-109. Low water conditions in Jackson Creek would not necessarily be shared by the UDIP because it is a larger and deeper system, as is the Des Plaines, which would ideally act as a repository for emigrant fish from Jackson Creek in the event of another drought. *Id.* at 110. But Ms. Barghusen did not directly compare Jackson Creek's 2003 water levels with those of the UDIP. *Id.* at 110.

Ms. Barghusen stated that based on her visual inspection of the five mile stretch of Jackson Creek, which contained a noted rippled flow, the stretch was high-grade water. 10/5/09Tr. at 115. Ms. Barghusen noted that the lower portion of Jackson Creek had high water quality, diverse habitat, and stable substrate composition, while upper portions of the creek had less diverse habitat. *Id.* at 116. Ms. Barghusen did not compare Jackson Creek's diversity levels to the UDIP because the UDIP has not been studied in a comparable manner. *Id.* at 118.

Ms. Barghusen did not monitor water chemistry, so she could not comment on the influence of CSO events on DO in Jackson Creek. The creek has no barge traffic, and unlike the UDIP, Jackson Creek is not an impounded waterway. 10/5/09Tr. at 119-121. Ms. Barghusen believed that raising the use classification in the UDIP would improve habitat by creating a corridor through which species could migrate to Jackson Creek. *Id.* at 122-123. But Ms. Barghusen could not point to any evidence that juvenile fishes are using Jackson Creek as a nursery and leaving the creek later in life. *Id.* at 124-125.

Gerald Adelmann on Behalf of Openlands

Gerald Adelman is the Executive Director of Openlands. Exh. 344 at 1. Mr. Adelmann pointed out that the area's waterways serve multiple functions, including recreation, transportation, flood control, and wildlife habitat, with local governments putting particular emphasis on clean waterways as an economic driver. *Id.*

As discussed above, Openlands has identified Jackson Creek as a waterway that would likely benefit from improved water quality in the LDPR because a high quality water source would allow fish and wildlife to migrate into the Jackson Creek from its confluence with other rivers. Mr. Adelmann believed that greater numbers and diversity of wildlife would make the Jackson Creek habitat less vulnerable to drought and the effects of urbanization. Exh. 344 at 3.

District

The District presented testimony from several witnesses, both employees of the District and others hired by the District. Employees of the District who testified are: Thomas Granato, Jennifer Wasik, and Samuel Dennison. Others who testified on behalf of the District are: Paul Freedman, Scott Bell, Scudder Mackey, Adrienne Nemura, Charles Melching, and Marcelo Garcia. The Board will summarize each of their testimonies below.

Thomas Granato, District

Thomas Granato is the Assistant Director of Research and Development at the District, managing the Environmental Monitoring and Research Division. Dr. Granato provided an overview of the District's concerns with IEPA's original proposal and summarized the District's efforts to provide information to make scientifically supported decisions concerning the appropriate aquatic life use designations for CAWS. 3/3/09PTr. at 33-34.

Dr. Granato testified that the District initiated research projects and studies regarding the CAWS UAA. However, Dr. Granato explained that the District was concerned that IEPA filed its proposal before the results of crucial studies were available. 3/3/09PTr. at 35. The District suggested IEPA's proposal was based on insufficient habitat and biotic index data, which were derived from indices that are not appropriate for use in CAWS and that were calculated incorrectly. 3/3/09MTr. at 37. Dr. Granato pointed out that all of the water quality, sediment quality, and biological data referenced in the CAWS UAA were collected before or during 2002. Since 2001, the District has collected such data, including sediment chemistry, sediment toxicity, and benthic invetebrate data, but none of this information was considered when IEPA designated the proposed aquatic life use. 3/3/09PTr. at 38.

To provide more extensive data on physical habitat and aquatic life potential in CAWS, Dr. Granato explained that the District initiated a "Habitat Evaluation and Improvement Study" covering many more locations than were assessed in the CAWS UAA. The study was designed to fill in the gaps and determine what physical habitat modifications would be required to achieve a sustainable fish community in CAWS. The study would also assess water quality in relation to tolerance levels of fish species expected to colonize CAWS if habitat improvements were made. 3/3/09PTr. at 36-37. Additionally, the District worked with others to provide three dimensional modeling of CAWS and studies of the economic and environmental impacts as discussed in the testimonies summarized below. 3/3/09PTr. at 51-52.

Dr. Granato also found that IEPA's proposal did not adequately account for the unique characteristics of CAWS, such as flow reversals, slow water velocity, and wet weather, all of which present challenges in CAWS not found in most natural waterbodies. In addition, Dr. Granato found that IEPA's proposal did not adequately account for habitat limitations in CAWS stating, "[w]ithout suitable habitat pattern and diversity, sustainable aquatic populations will not be established even with improvements in water quality." 3/3/09PTr. at 38-39.

Dr. Granato testified that the District is concerned that the aquatic life use proposed by IEPA were based on incomplete, inappropriate, and incorrect data. Dr. Granato indicated that IEPA's proposal would require significant resources to implement flow augmentation and supplemental aeration projects that could not guarantee the proposed standards would be achieved. On behalf of the District, Dr. Granato urged the Board not to adopt IEPA's proposal. 3/3/09PTr. at 41.

In conclusion, Dr. Granato stated, "[T]he CAWS was created largely by the District for purposes other than sustaining aquatic life use, long before the CWA was conceived or passed into law. Nevertheless, the District has expended considerable resources and has undertaken

many ambitious projects, such as building some of the world's largest wastewater treatment plants and developing and implementing TARP to improve water quality in the CAWS . . . The District shares the goal of its fellow UAA stakeholders to continuously improve Chicago's aquatic environment, both the CAWS and Lake Michigan." 3/3/09PTr. at 46-47. To that end, Dr. Granato indicated the District was planning to develop a comprehensive proposal for numeric criteria and wet weather standards for aquatic life following the completion of the District's studies. 3/3/09PTr. at 71-72.

Paul Freedman, LimnoTech

Paul Freedman is an environmental engineer and founder and President of LimnoTech, an environmental consulting firm. During 2007-2008, Mr. Freedman served as Vice President of the Water Environment Federation, an educational and professional association of more than 80,000 water quality professionals. Exh. 204 at 1. Mr. Freedman testified regarding his professional opinion that IEPA's proposal for aquatic life use did not adequately account for unique characteristics of CAWS. Mr. Freedman advised the Board and IEPA to consider the findings of several studies ongoing during the course of this rulemaking to provide "a more proper and rigorous development of appropriate standards." Exh. 204 at 2.

Mr. Freedman testified:

> Based on my 35 years of experience, I would have to say that the CAWS is unique in its combination of factors. Yes, you could take any individual factor and you could say that factor existed in other systems, but when you look at the whole compendium of them, that there's no system that I'm aware of that has all of these in one setting. Manmade or severely altered redirection of flow, reversal of flow, channelization, deep walls, contrived, nonnatural hydraulics with emptying and filling, flow regulated, lack of shallows and ripples, sedimentation, flow reversals, effluent dominated, CSOs, pump stations, barge traffic, . . . stratification[. W]hen you take this combination, it's – it's very unique." 2/17/09Tr. at 55-56.

Mr. Freedman found that IEPA's proposal lacked clear justification as to how IEPA considered impacts of wet weather and all lines of evidence in determining attainable aquatic life use. In addition, Mr. Freedman noted that IEPA's proposal was not accompanied by any modeling or habitat improvement plans demonstrating that the proposed use designations could be attained. Exh. 204 at 5-6, 8-9, 11, 2/17/09Tr. at 48-49.

Mr. Freedman pointed out that IEPA's proposed criteria for DO is in most respects identical to the current criteria for General Use waters, except for chronic criteria and early life stage protection criteria. However, CAWS has very different characteristics from other General Use waters. Exh. 204 at 4, Att. 2 at 4-5. Mr. Freedman highlighted the differences, noting the water sources for General Use waters are typically rain runoff, natural drainage and groundwater recharge, whereas CAWS is mainly effluent and CSOs. Exh. 204 at 4. The morphology of General Use waters generally exhibits meanders, pools and riffles, and a floodplain connection, whereas CAWS exhibits straightened channelized beds with no floodplain connection. The

hydraulics of General Use waters typically are free flowing with natural mixing and downstream flow, whereas CAWS experiences regulated flow, bi-directional flow (flow reversal), and flow stagnation and stratification. The substrate of General Use waters is variable, CAWS which is characterized by fine bottom sediments. Exh. 204 at 4-5, 2/17/09Tr. at 72. These differences, Mr. Freedman stated, impact water quality and potential biologic uses. Exh. 204 at 4.

Although IEPA's proposed DO criteria is nearly identical to the criteria for General Use waters, Mr. Freedman pointed out that IEPA's proposal did not include the exception that exists in the General Use criteria for "quiescent and isolated sectors of General Use waters including . . . waters below the thermocline . . .", even though IEPA documents locations within CAWS with low flow, stagnant conditions, and stratification. Exh. 204 at 5, 2/17/09Tr. at 74-75, citing 35 Ill. Adm. Code 302.206(a).

Mr. Freedman also stated that the impacts of wet weather were not documented in IEPA's consideration of attainable aquatic life use. Mr. Freedman reiterated that water levels in CAWS change rapidly when the water levels are lowered in anticipation of a major rain event only to be followed by enormous wet weather flows from stormwater, CSOs, and pumping stations. Exh. 204 at 5-6. Mr. Freeman explained that the dramatic rise and fall of water levels and extreme changes in flow can result in substrate scouring, sediment resuspension, drying of shoreline aquatic habitats, and a sudden decrease in DO. Exh. 204 at 6. Mr. Freedman identified unique concerns of wet weather in Bubbly Creek (South Fork of the South Branch Chicago River) that IEPA also did not appear to consider. Bubbly Creek is stagnant, receiving no flow during dry weather but significant flow from CSOs and the Racine Avenue Pumping Station during wet weather. Mr. Freedman explained that as a result of the stagnant conditions combined with sediments and CSO pollutant loads exerting a high oxygen demand, the oxygen in Bubbly Creek can be depleted for days. Exh. 204 at 6, 2/17/09Tr. at 51.

To address wet weather issues, Mr. Freedman recommended that IEPA consider how other states have applied standards to altered waterways. Exh. 204 at 6. Mr. Freedman provided several examples from states that currently have provisions for wet weather standards for highly urbanized areas, including Indiana, Maine, Massachusetts, and Ohio. Exh. 204 at 6-7, Att. 2 at 8, Exh. 207, 208, 2/17/09Tr. at 80-82. Mr. Freedman also provided examples of states with alternative classifications for severely modified waterways such as Ohio, Louisiana, Wisconsin, Texas, and Maryland. Exh. 204 at 6-8, Att. 2 at 8-9. For further guidance, Mr. Freedman referred to a draft USEPA document entitled, "Use of Biological Information to Better Define Designated Aquatic Life Use in State and Tribal Water Quality Standards: Tiered Aquatic Life Use". 2/17/09Tr. at 58, Exh. 205.

With respect to IEPA's proposed ALU A and B, Mr. Freedman found IEPA's proposal lacked clear justification based on available evidence. Mr. Freedman deduced that IEPA appeared to physically segregate Use A and B waters based on the presence or absence of "deep-draft, steep-walled shipping channels" and on an arbitrary 75th percentile IBI value. Exh. 204 at 8-9. How these two factors determine the potential for existing or improved habitat to support the proposed designated uses is not explained in either the CAWS UAA or IEPA's proposal, stated Mr. Freedman. Exh. 204 at 9. Additionally, Mr. Freedman noted that the QHEI and IBI scoring in the CAWS UAA on which IEPA relied was found by others to be "fraught with error".

Exh. 204 at 9, 12/2/08Tr. at 218-219. With regard to early life stages in Use A Waters, Mr. Freedman pointed out that IEPA did not present any data on early life stages stated in CAWS to support such protection as IEPA proposed. Exh. 204 at 9, 2/17/09Tr. at 48.

Mr. Freedman also stated that IEPA did not document how the proposed aquatic life use or the corresponding DO criteria could be attained. IEPA did not use modeling or data to demonstrate the water quality criteria could be attained, nor did IEPA provide an analysis of water quality under future conditions when TARP is completed. Mr. Freedman pointed out that the CAWS UAA and IEPA both recognized that the proposed use designations could not be attained until a strategic plan that goes beyond effluent limits is complete. However, suggested actions, such as habitat improvement and removal of contaminated sediments, were not accompanied by any existing or proposed plans. Exh. 204 at 11, 2/17/09Tr. at 48-49.

To better define attainable uses and appropriate DO criteria, Mr. Freedman advised IEPA and the Board to consider the studies ongoing during the course of this rulemaking. Exh. 204 at 2, 12. Mr. Freedman summarized ten studies that have been initiated by the District to provide useful scientific, technical, and economic information for this rulemaking. One is the habitat and biological assessment study looking at CAWS habitat and fish communities, including early life stages being done by LimnoTech. Another study involves DO modeling being done by Marquette University to assess the attainability of IEPA's proposed DO criteria. Continuous DO monitoring done by the District is being used to better understand the transient effects of wet weather. The District is sampling water chemistry, sediment chemistry, sediment toxicity, habitat, fish, and benthic invertebrates to supplement studies ongoing since 2001. The District is also completing an analysis of water quality and sediment in CAWS to provide a better understanding of factors impacting DO and attainable uses. An integrated water quality strategy is being studied by LimnoTech and CTE (AECOM) to examine the feasibility, effectiveness, and economic costs of various actions in CAWS. Based on this, the District is conducting an economic and environmental impact assessment. Field tests are being conducted using SEPA to determine the feasibility of complying with IEPA's proposed standards. The District has also prepared studies on flow augmentation and supplemental aeration. Hydraulic modeling is also being performed by the University of Illinois to better understand the complex hydraulics of CAWS involving stratification, bi-directional flow (flow reversal), stagnation, wet and dry weather conditions, and sediment resuspension. Exh. 204 at 12-13, 2/17/09Tr. at 32-33.

Mr. Freedman concluded by recommending IEPA and the Board consider alternative uses for heavily altered water bodies adopted by other States, creation of a wet weather standard, a separate use designation for Bubbly Creek, and a use designation for the Cal-Sag Channel more consistent with IEPA's proposed CAWS Use B Waters. Exh. 204 at 2, 13, 2/17/09Tr. at 51-53.

Scott Bell, LimnoTech (Exh. 447)

During the course of this rulemaking, the District commissioned a study of the habitat in CAWS. Scott Bell was the project manager of that study, which was entitled "Chicago Area Waterway System (CAWS) Habitat Evaluation and Improvement Study" (LimnoTech Study (PC 284, summarized *infra* 140)). Mr. Bell is Vice President and consulting environmental engineer with LimnoTech, Inc. Exh. 447 at 1, PC 284.

Mr. Bell explained the goal of the LimnoTech Study was to evaluate the relationships between fish, physical habitat, and water quality in CAWS. Exh. 447 at 2. The LimnoTech Study drew from eight years of data previously collected by the District plus new data specifically collected for this study. Exh. 447 at 2. Mr. Bell highlighted the significant findings of the LimnoTech Study regarding the importance of DO and physical habitat to fish and the potential for improving fisheries in CAWS as follows:

1) "Aquatic habitat is inherently limited in the CAWS by the system's form and function." 447 at 2.

2) "Physical habitat is more important to fish in the CAWS than DO." *Id*.

3) "DO is relatively poor at explaining variability in fish data in the CAWS." Exh. 447 at 3.

4) "The ability of physical habitat to explain about half of the variability in fish data is excellent, considering the natural variability in the fish data itself." *Id*.

5) "There is limited potential for physical habitat improvement in the CAWS and potential changes might not result in measurable improvements to fisheries." *Id*.

Habitat Limited by Form and Function. For the first finding, Mr. Bell described how the form and function of CAWS pose severe limitations on the physical habitat. Exh. 447 at 2. Of the nearly 78 miles of waterways included in the LimnoTech Study, approximately 75% are manmade while the other 25% have been extensively modified. The manmade and modified waterways were constructed to function in conveying treated wastewater and urban stormwater as well as in supporting navigation. Exh. 447 at 4.

Mr. Bell pointed out that the form of CAWS follows its function, with channel banks that were dug into bedrock or armored with stone or other materials to prevent erosion. The banks are relatively straight and deep with few shallow, near shore areas. A digital video survey of the banks showed 61% consisted of vertical walls or banks covered with riprap. Exh. 447 at 4-5. Mr. Bell explained that in natural rivers and streams, essential features to create habitat to support aquatic life include curving channels and shallow, near shore areas that provide variations in flow velocity, depth, and bed materials. Exh. 447 at 4-5.

Mr. Bell explained that channel substrate (bed materials) is a very important aspect of physical habitat. While sand and gravel substrate is considered a preferable habitat, the substrate in CAWS consists mainly of either silt or bedrock. Exh. 447 at 6. Fine sediments carried in by urban stormwater contribute to the silty substrate and also cause high turbidity in the water, especially when resuspended by currents or passing boats. Exh. 447 at 7. The substrate in CAWS also contains widespread contamination from human activity, showing elevated levels of petroleum products, pesticides, PCBs, volatile organic compounds, and heavy metals. Exh. 447 at 6. In this regard, the LimnoTech Study found that sediment contamination was statistically

correlated to poor invertebrate condition. Exh. 447 at 7. Mr. Bell pointed out that benthic invertebrates are a key part of the food chain in aquatic systems. Exh. 447 at 6.

Mr. Bell explained that a connection to the floodplain is also important to physical aquatic habitat. A connection to the floodplain provides seasonal habitat diversity and a source of materials required by various aquatic life stages, whereas disconnection can lead to lower fish diversity. Mr. Bell noted that floodplains never existed for the 75% of CAWS that was manmade, and that channelization all but eliminated floodplain connectivity for the other 25% of CAWS that was modified. Exh. 447 at 6-7.

In addition to the limitations on habitat from the form of CAWS, Mr. Bell further stated that the functions of CAWS also limit habitat potential. As mentioned earlier, the function of CAWS to convey urban stormwater carries fine sediments that contribute to a silty substrate and turbidity. Exh. 447 at 7. Navigation also poses a significant negative impact on fish as evidenced by statistically significant poorer fisheries conditions in CAWS reaches with high commercial navigation. Exh. 447 at 7.

As Mr. Bell testified, "[t]he LimnoTech Study found that channel depth, lack of off-channel areas and bank refuge for fish, vertical-walled or riprapped banks, and manmade structures in the channels were all strongly, negatively correlated with fish condition." Exh. 447 at 7, *referring to* PC 284. Mr. Bell noted that, even for the modified reaches that were once natural streams, their form is unlikely to be reversed as long as CAWS needs to serve the functions for which it was built. Exh. 447 at 2. Mr. Bell testified, "[t]hese observations and findings of the LimnoTech Study all support the conclusion that aquatic habitat is inherently limited in CAWS by the system's form and function." Exh. 447 at 8, *referring to* PC 284.

In response to questions from the Environmental Groups about the effect of temperature on fish, Mr. Bell indicated that LimnoTech reran the analysis with temperature as a variable. Mr. Bell stated that evaluating for temperature did not change the outcome of the analysis, "[s]o when we, in other words, look at temperature, DO and habitat together[,] habitat still comes out as the most limiting factor for fish." 3/10/11Tr. at 113.

Habitat More Important than DO. Mr. Bell explained how the LimnoTech Study concluded that physical habitat is more important to fish in CAWS than DO. The study identified key variables for both physical habitat and DO and then statistically compared these to fish data. The habitat variables correlated to 48% of the variability in fish data, whereas a much weaker correlation was found with the DO variables (around 2 to 27 %). Exh. 447 at 9. The six key habitat variables found to be most strongly correlated were: maximum channel depth, number of off-channel bays, percent of vertical walled banks, percent of riprap banks, manmade structures, and macrophyte cover.

Poor Correlation between DO and Fish Data. Mr. Bell noted that the DO variable showing the best correlation at 27% was for the percent of time from June through September that DO was less than 5 mg/L. Based on the correlations between habitat variables at 48% and DO variables at 2 to 27%, the LimnoTech Study found that physical habitat is more important (more limiting) to fish than DO in CAWS. Exh. 447 at 9, *referring to* PC 284.

Validity of CAWS Habitat Index. Mr. Bell explained the development of the CAWS Habitat Index and how it compared with existing protocols. To evaluate the relationships between fish, physical habitat, and water quality in CAWS, Mr. Bell described how a CAWS-specific index of biological integrity for fish was developed as a part of the LimnoTech Study. The index was called "CAWS Habitat Index". Exh. 447 at 11. The six key variables mentioned above that were found to be most strongly correlated with fish data were used to develop the CAWS Habitat Index: maximum channel depth, number of off-channel bays, percent of vertical walled banks, and percent of riprap banks, manmade structures, and macrophyte cover. Exh. 447 at 11. Five additional variables were added to the index to reflect other important habitat attributes: bank pocket areas, large substrate in shallow and deep parts of the channel, organic sludge, and overhanging vegetation. The statistical relationship between these 11 habitat variables and fish data for CAWS produced an "r-squared value" of 0.48 through a multiple linear regression analysis.

Mr. Bell observed that the r-squared value of 0.48 for the correlation between the CAWS fish data and CAWS Habitat Index is "very good" compared to the correlation between the CAWS fish data and other published habitat indices. Exh. 447 at 11. For example, Mr. Bell cited to Ohio's QHEI and the Michigan Non-Wadeable Habitat Index. When the QHEI was developed, the original dataset produced an r-squared value of 0.45. Exh. 447 at 11. However, when the QHEI and the Michigan Non-Wadeable Habitat Index were compared to the CAWS fish data, the correlations were poor and yielded r-squared values of 0.02 and 0.04, respectively. Exh. 447 at 12.

In response to questions from IEPA, Mr. Bell stated that these other indices were not used because they did a poor job of explaining the fish data in CAWS. 3/10/11Tr. at 179. The other indices were not adequate to differentiate or measure factors that are important in CAWS because CAWS is so different from rivers where the other indices were developed. Tr. 5-16-11 at 16-17. "[T]he factors that were measured by existing indices either didn't vary or didn't exist in the CAWS. So, as a tool, those existing indices would be very limited." 5/16/11Tr. at 17. Examples of variables in the existing protocols that were not applicable to a system like CAWS are sinuosity, gradient, large woody debris, and embeddedness. The LimnoTech Study explained that in CAWS, sinuosity is absent, gradient is artificially controlled, large woody debris is removed for navigation and flow, and embeddedness is for gravel-bed streams. PC 284 Habitat Evaluation Report at 26-27. Mr. Bell pointed out that the r-squared value of 0.48 for the CAWS Habitat Index is more than ten times higher than with other published indices, "validating its superiority for evaluating the relationship between physical habitat and fish in the CAWS." Exh. 447 at 12.

Mr. Bell then addressed the question, "if physical habitat alone can, at best, explain about half of the variability of fish data in CAWS, what can explain the other half?" After further statistical analysis, Mr. Bell explained that the variability in fish data that is not tied to habitat can be explained by the natural variation in fish data from time to time, and location to location. Exh. 447- at 9-10.

Limited Potential for Habitat or Fisheries Improvement. Mr. Bell discussed the potential for improvement in either the physical habitat or fisheries in CAWS. Mr. Bell explained how the CAWS Habitat Index could be used not only to quantify the most important habitat attributes at any particular site in CAWS but also to identify which attributes are most limiting. The CAWS Habitat Index could also be used to assess to what degree the habitat attributes could be improved and calculate the probable effect of improvement on the index score at a particular location. Mr. Bell explained that "[t]his provides a means of indirectly quantifying the potential for fisheries improvement through habitat improvement." Exh. 447 at 12.

Mr. Bell explained that each habitat variable for each reach of CAWS was evaluated for potential improvement and represented quantitatively. The percent change in the CAWS Habitat Index scores was then calculated based on the adjusted quantities for the improved habitat variables. Exh. 447 at 13. The percent change varied by reach from 0% to 38%. Exh. 447 at 4, PC 284 Habitat Improvement Report at 56-57.

Mr. Bell cautioned that although many of the assumptions used to assess possible habitat improvement were based on professional judgment, uncertainty exists and some assumptions might not be realistic. For example, the estimated 38% increase in the CAWS Habitat Index score for the South Branch Chicago River assumed that half of the vertical side walls could be removed and improved, which might not be feasible. Exh. 447 at 13. In addition, other factors limiting the potential for improving fisheries, such as the presence of high navigation, were not accounted for in the CAWS Habitat Index, but were found to be a significant limiting factor for fish. Exh. 447 at 14. Other factors that might negate the benefits of habitat improvements would include the presence of sediment contamination and sudden high-velocity flows that occur in CAWS. Exh. 447 at 14.

Mr. Bell addressed the question of whether improvements in habitat would result in measureable improvements in fish. Mr. Bell stated, "Because the existing fish data from CAWS exhibits significant variability over time, it is uncertain whether observed changes in fish populations where habitat improvement is implemented could be attributed to the habitat improvement or simply to natural variability." Exh. 447 at 15.

The LimnoTech Study concluded that physical habitat is more important to fish in CAWS than DO, and that the physical habitat is inherently limited. Exh. 447 at 2-3. With limited potential for improvements to habitat, Mr. Bell testified there might be no measurable improvements to fisheries. Exh. 447 at 2-3. Mr. Bell added that based on the data, the aquatic community in CAWS would not improve if IEPA's proposed water quality standards were adopted without addressing the other stressors. 5/19/11Tr. at 168.

Scudder Mackey, Habitat Solutions NA (Exh. 457)

Scudder Mackey is the owner of Habitat Solutions NA, an environmental consulting firm, and specializes in aquatic habitat mapping and characterization. Exh. 457 at 1. Dr. Mackey testified twice, once before the LimnoTech Study was completed in December 2008 and once again in May 2011after it was completed. Dr. Mackey provided support for the District's

alternate proposal for aquatic life use designations and criteria. Dr. Mackey asserted that CAWS was limited by habitat and that the standards proposed by IEPA were unlikely to provide a significant improvement in the fish community structure and diversity in CAWS. Exh. 179 at 3, Exh. 457 at 2.

Dr. Mackey prefaced his testimony by explaining that "physical habitats are defined by a range of physical characteristics and energy conditions that can be delineated geographically that meet the needs of a specific species, biological community, or ecological functions." Exh. 179 at 4. Dr. Mackey emphasized that the pattern and connectivity of different types of habitat are critically important for supporting different life stages of fish. Exh. 179 at 4. When assessing aquatic habitat, Dr. Mackey advised that the variables of energy (flow), substrate, and water characteristics (water chemistry and water quantity) must be considered along with the aquatic community. Exh. 179 at 4.

Upon reviewing IEPA's Statement of Reasons and the CAWS UAA Report, Dr. Mackey found that IEPA did not adequately consider all of the key elements to assess the condition of aquatic habitats. Exh. 179 at 3, Exh. 457 at 2. Dr. Mackey testified, "[b]y focusing almost exclusively on the IBI metrics and percentiles, IEPA did *not* provide an integrated analysis of physical habitat, flow regime, temperature, water quality, and existing aquatic communities in their assessment of the CAWS" (emphasis in original). Exh. 179 at 6. In addition, Dr. Mackey criticized the use of the QHEI in the CAWS UAA, stating, "[t]he QHEI protocol is *not* designed for use in low gradient, non-wadeable streams and rivers . . . " (emphasis in original). Exh. 179 at 8. To address the deficiencies in the CAWS UAA Report, Dr. Mackey expressed confidence in the design of the then on-going LimnoTech Study. Exh. 179 at 18. Consistent with the LimnoTech Study, Dr. Mackey found a need for habitat indices that would be specifically designed to assess habitat and biological conditions in "low-gradient, non-wadeable, highly altered, urban streams and rivers." Exh. 457 at 3.

After the LimnoTech Study was completed, Dr. Mackey elaborated on the findings of the study. Dr. Mackey found that the LimnoTech Study was well-supported by the scientific data and underwent a rigorous peer-review. Exh. 457 at 3. Dr. Mackey stressed that the designation of aquatic life use must consider the irreversible limitations of CAWS. Exh. 457 at 4. Dr. Mackey agreed that although shoreline habitat improvements recommended in the LimnoTech Study would benefit many of the fish species already found in CAWS, these improvements would still not benefit populations of other types of fish that were considered intolerant or moderately intolerant "obligate riffle dwellers". Dr. Mackey explained that such species require fast moving water and coarse substrates found in natural channels, unlike CAWS. Exh. 457 at 4. Dr. Mackey reasoned, "[w]ithout suitable habitat pattern and diversity, sustainable populations of these species can not be established *irrespective of how much improvement there is in water quality*" (emphasis in original). Exh. 457 at 6, Exh. 179 at 15-16. In response to questions from Midwest Generation, Dr. Mackey added, " . . . I believe that the same limitations would apply to the Upper Dresden Island Pool", not including the Brandon tailwaters. 5/17/11PTr. at 30-31.

Dr. Mackey agreed with the findings of the LimnoTech Study that DO was significantly less important to aquatic life than habitat in CAWS. Exh. 457 at 5. Dr. Mackey pointed out that only 1.5% of the total variability in the fish data could be explained by DO. Dr. Mackey

testified, "further increases in DO would yield only marginal improvements to aquatic life in CAWS due to severe physical habitat limitations." Exh. 457 at 5.

Dr. Mackey remarked on the existing fish community in CAWS, emphasizing the findings of the LimnoTech Study that "[the] limited habitat features have resulted in a biotic community (as measured by fish) that is tolerant of the modified conditions and appears to be thriving." Exh. 457 at 6. Dr. Mackey explained that 96% of fish in CAWS belong to three families considered warm-water, pool-oriented species that are tolerant or moderately tolerant to pollution. Dr. Mackey described the fish community in CAWS as "relatively complete" since the dominant species occupies most of the trophic levels of the food web. Moreover, Dr. Mackey noted that while the existing community is thriving, it has also achieved a sustainable balance within CAWS. Exh. 457 at 7.

Dr. Mackey also responded to a public comment by IDNR regarding fish counts taken in conjunction with rotenone applications as part of the Asian carp control operations. Exh. 457 at 7; *see also* PC 505. Dr. Mackey indicated that IDNR considered the data from the fish recovered following the rotenone applications to represent a high species abundance and diversity in CAWS. Exh. 457 at 7. Dr. Mackey did not agree with IDNR's analysis or conclusions drawn from the rotenone sampling data. Exh. 457 at 8. Dr. Mackey stressed that IDNR did not use standardized sampling methods, like electrofishing, that are directly comparable with historical datasets or indices. Exh. 457 at 8-9. IDNR's sampling results actually recorded fewer species than were found in the District's fish surveys. Exh. 457 at 9. Contrary to IDNR's comment that "spawning [of channel catfish] is commonly occurring" in the CSSC (PC 505 at 3), Dr. Mackey stated that the type of habitat for these "cavity spawners" is somewhat unique and not used as spawning habitat by most other species. Exh. 457 at 10. The IDNR sampling area extended from the electric dispersal barrier past the Lockport Lock and Dam and the confluence with the Des Plaines River. Dr. Mackey stated that many of the fish sampled from the rotenone application could have come from sites with potential spawning and nesting habitat in portions of the CSSC which are wider and shallower as well as the LDPR, which is a natural river. Exh. 457 at 10-11. Regarding IDNR's support of IEPA's proposal, Dr. Mackey stated, "[t]he recommendation made by IDNR to alter aquatic life use designations and habitat assessments based solely on rotenone fish sample data is flawed and not scientifically defensible." Exh. 457 at 13-14. Dr. Mackey also cited to the testimony of Greg Seegert of EA Engineering, testifying on behalf of Midwest Generation, to describe the deficiencies of IDNR's analysis.

In response to questions from Citgo Lemont Refinery regarding the electric dispersal barrier, Dr. Mackey added that although fish and macroinvertebrates would not be comfortable in the pulsing electric field, he was not certain this reach would require a special aquatic life use designation. 5/16/11Tr. at 223-224.

Prompted by questions from Openlands and Environmental Groups, Dr. Mackey explained why he believed the potential for habitat improvements in CAWS is limited and the resulting benefits of improving water quality would be relatively small. The environmental groups questioned Dr. Mackey on the efficacy of potential habitat improvements suggested in the LimnoTech Study, such as introducing overhanging and immersed vegetation, floating islands, and gravel substrate. For overhanging vegetation, Dr. Mackey indicated that because CAWS is

fairly wide (150 to 200 feet), planting trees would only provide overhanging vegetation to a very narrow portion of the bank habitat. Dr. Mackey did acknowledge that floating islands could also provide some localized benefits, however, Dr. Mackey continued that the District periodically removes floating wood debris and overhanging vegetation that are considered hazards to navigation and conveyance of wastewater and stormwater. 5/17/11ATr. at 13-15. As to the potential for using gravel to create pools and riffles for spawning sites, Dr. Mackey noted that this would also conflict with navigation and conveyance of wastewater and stormwater. Even if it were possible, Dr. Mackey advised that appropriate flows would be needed to maintain the habitat structure, otherwise the gravel would silt in. 5/16/11Tr. at 232-233.

On the issue of potential habitat improvements, Dr. Mackey stressed that, "[i]t's not just dumping gravel into the river . . .. You have to look at the pattern and actually it's what we call habitat diversity. It's a pattern of connectivity between different types of habitat that are really important when you think about restoration because, for example, just a pile of gravel sitting on the channel bed[,] that's all it is." 5/16/11Tr. at 234. Dr. Mackey explained habitats need to be "connected to other types of habitat structure that are necessary for the organisms to basically grow through the different life stages to become adults. So it's not just about one type of habitat. It's about a habitat pattern and connectivity." 5/16/11Tr. at 234. Dr. Mackey offered the example that fish may spawn on the introduced gravel habitat, but without a connection to a nursery habitat, the eggs would not survive once they emerge from the spawning beds. 5-16-11Tr. at 234, Exh. 179 at 4.

Dr. Mackey asserted that CAWS was limited by habitat and that the standards proposed by IEPA were unlikely to provide a significant improvement in the fish community structure and diversity in CAWS. Exh. 179 at 3, Exh. 457 at 2. Dr. Mackey concluded by providing support for the District's alternate proposal for aquatic life use. Speaking of the categories of uses proposed by the District, Dr. Mackey found, "These Categories, when applied to CAWS, compare favorably with field observations and general environmental conditions observed in each of the waterway segments." Exh. 457 at 12.

Jennifer Wasik, District (Exh. 461)

Jennifer Wasik is the Supervising Aquatic Biologist in the Aquatic Ecology and Water Quality Section at the District, and provided testimony on several issues. Ms. Wasik offered two sets of testimony, and the second set will be summarized below on the issue of Asian carp. *See* Exh. 431 and 461.

The District's Proposal for Aquatic Life Use and Water Quality Criteria in CAWS.
Ms. Wasik detailed the District's proposal for the three categories of aquatic life use for CAWS: 1) CAWS Category 1 (Modified Warm Water Aquatic Life Use); 2) CAWS Category 2 (Limited Warm Water Aquatic Life Use); and 3) CAWS Category 3 (Severely Limited Water Aquatic Life Use). Exh. 461 at 2-3.

Ms. Wasik explained that the District's proposal relied mainly on the findings of the LimnoTech Study. Ms. Wasik stated that the LimnoTech Study confirmed the assertion of Dr. Mackey that the primary limiting factor affecting the biotic communities in CAWS is the lack of

physical habitat. Exh. 461 at 3. Ms. Wasik recounted that the LimnoTech Study assessed physical habitat throughout the reaches of CAWS and developed a CAWS Habitat Index "uniquely applicable to these urban waterways" since the QHEI has limited applicability for a system like CAWS. Exh. 461 at 3-4, 12/2/08Tr. at 23-24, 251. The CAWS Habitat Index scores were used to assess the relative importance of physical habitat compared to water quality. The index scores were also used as a measure of potential habitat improvements. Ms. Wasik stated that the District believes the index scores should be considered in determining the appropriate designated uses for aquatic life for each segment. When the habitat and habitat improvement index scores are borderline or inconclusive, Ms. Wasik indicated that other important environmental factors should be considered, including sediment toxicity and flow conditions. Exh. 461 at 4.

Ms. Wasik noted that her review of the data did not address the UDIP. 5/17/11PTr. at 9-10.

The District believes its proposal for aquatic life use is a better fit for CAWS than IEPA's proposal because it uses a CAWS specific habitat index, considers sediment toxicity, includes a third tier that acknowledges stagnant water bodies, and provides for a wet weather use for pre-TARP conditions. 5/17/11PTr. at 44.

CAWS Category 1: Modified Warm Water Aquatic Life Use. The LimnoTech Study found relatively high index scores for the North Shore Channel, Upper North Branch Chicago River, and Little Calumet River compared to other segments. These waterways are artificially constructed or channelized, contain reaches with earthen banks steeper than most natural systems that would have connectivity to a floodplain, exhibit some areas of instream cover (*e.g.* overhanging and immersed vegetation and woody debris), have some relatively lower depth areas, and experience commercial navigation (except the Little Calumet River). Exh. 461 at 4, 5/17/11PTr. at 11. The majority of fine sediments in these waters were found to be nontoxic. Although important habitat features are not widespread in these waters, Ms. Wasik stated that the physical habitat is relatively better than in other waterways in CAWS. Still, Ms. Wasik explained that the physical habitat is not adequate to support a warmwater aquatic community that meets the goals of the CWA, nor does it have the potential to do so. Exh. 461 at 5, 5/17/11PTr. at 25. Although such conditions are not reversible in the foreseeable future, Ms. Wasik reiterated that some physical habitat improvements are conceivable as described in the LimnoTech Study. Exh. 461 at 5.

In addition to the North Shore Channel, Upper North Branch Chicago River, and Little Calumet River, Ms. Wasik explained that the District believes other segments contain similar habitat features and should be included in the CAWS Category 1. These segments are Lake Calumet and the Calumet River (south of 130th Street to the O'Brien Lock and Dam and north of the O'Brien Lock and Dam). Exh. 461 at 6. Lake Calumet exhibits several shallow areas and instream cover consisting of overhanging vegetation and woody debris near the shoreline. Exh. 461 at 6. Ms. Wasik testified, "[t]he Calumet River, south of 130th Street to the O'Brien Lock and Dam, has a substantial continuous reach which contains certain physical habitat attributes that are either absent or found in isolated pockets in the rest of the CAWS." Exh. 461 at 6. The

Calumet River north of the O'Brien Lock and Dam has a direct hydrological connection to Lake Michigan, and fish uncommon to the rest of CAWS are sometimes found here. Exh. 461 at 6.

CAWS Category 2: Limited Warm Water Aquatic Life Use. The LimnoTech Study found significantly lower habitat scores for the South Branch Chicago River, the CSSC, and the Cal-Sag Channel than those for the proposed Category 1 Waters. Exh. 461 at 6-7. Ms. Wasik described the proposed Category 2 waters as artificially constructed or channelized and lacking significant reaches of earthen banks and instream cover such as overhanging vegetation, fixed aquatic vegetation, boulders, or woody debris. Exh. 461 at 7. These waters exhibit very few areas of shallow depth, toxicity in most sediment samples, and the majority of commercial navigation in CAWS. Exh. 461 at 7.

Ms. Wasik identified two additional segments with "borderline" habitat index scores that would also belong to Category 2: the Chicago River main stem and the lower North Branch of the Chicago River. Although the habitat index scores were considered borderline; the habitat improvement potential, physical nature, and sediment toxicity of these segments were more characteristic of Category 2 than 1. Exh. 461 at 7. Ms. Wasik explained that for the Chicago River, habitat improvement to alter the vertical armored banks and lack of overhanging vegetation would be infeasible "because of the developed urban nature of the riparian land of the Chicago River . . .." Exh. 461 at 7, quoting the PC 284HR at 49. For the lower North Branch Chicago River, Ms. Wasik distinguished the physical habitat attributes from the upper reach. Such differences include the existence of vertical wall banks, less overhanging vegetation, fewer bank pocket areas, toxic sediment, and commercial navigation. Exh. 461 at 8.

In addition to these waters, Ms. Wasik also identified the Lake Calumet Connecting Channel as appropriate for classification as a Category 2 Water. Ms. Wasik described the Lake Calumet Connecting Channel as very deep with vertical sheet piling, rip rap, and no instream cover or overhanging vegetation. The CAWS UAA classified this segment as "Aquatic Life Use B." Although the LimnoTech Study did not assess this segment, Ms. Wasik stated that available information led the District to believe the segment most appropriately belongs in Category 2. Exh. 461 at 8.

For Category 2 Waters, Ms. Wasik stated that the goal for aquatic life use would be to maintain current fish populations. Exh. 461 at 8, 5/17/11ATr. at 130. Recognizing the more severe physical habitat limitations and fewer opportunities for habitat improvement, Ms. Wasik explained fish populations in Category 2 Waters would not reach levels present in the proposed Category 1 Waters. Exh. 461 at 8.

CAWS Category 3: Severely Limited Aquatic Life Use. For Category 3 Waters, the District is proposing to include the south fork of the south branch of the Chicago River (Bubbly Creek), the Grand Calumet River, the North Branch Canal, the Collateral Channel, and other off-channel slips. For Bubbly Creek, Ms. Wasik noted that the habitat index score was in the range of other Category 2 Waters. However, Bubbly Creek's significant sediment contamination and flow, which varies from stagnant in dry weather to high-velocity during CSO events, place more limitations on aquatic uses than in other segments in CAWS. Exh. 461 at 9.

The Grand Calumet River exhibits stagnant conditions during dry weather, toxic sediment in the majority of samples, and only 3 fish species in samples collected during 2001 and 2008. Although habitat of the Grand Calumet River was not assessed as part of the LimnoTech Study, the stagnant flow and toxic sediment, as well as information from USEPA on beneficial use impairments, lead the District to believe the Grand Calumet would be appropriately included in the Category 3 Waters. Exh. 461 at 9.

Ms. Wasik described the North Branch Canal, Collateral Channel (off the CSSC just south of Bubbly Creek, at 31st Street and Albany Avenue), and other off-channel slips as similarly stagnant. Exh. 461 at 9, 12/3/08Tr. at 41, 6/28/11Tr. at 47. The District believes these waters should be treated in the same way as other quiescent waters under the water quality standards. Exh. 461 at 10, 5/17/11PTr. at 59.

Wet Weather Limited Use. In addition to the proposed Category 1, 2 and 3 Waters, Ms. Wasik also explained the District's proposal for a Wet Weather Limited Use. Since wet weather sources of pollution contribute to significant decreases in DO and cause excursions from water quality criteria for days to weeks following precipitation events, the District believes a wet weather provision is necessary in order for the uses to be attainable. Exh. 461 at 14, 18, 5/17/11ATr. at 95.

Ms. Wasik described DO levels falling to significantly reduced levels, sometimes to zero, for up to a week after some wet weather events. However, Mr. Wasik explained that the existing biotic community appears to be tolerant of these conditions. Ms. Wasik testified, "For example, fish kills do not occur following wet weather events in the CAWS except under extremely rare circumstances (*e.g.*, in the case of a high intensity rain event following a prolonged antecedent dry period in the midst of extremely hot weather >90ºF)." Exh. 461 at 14. Ms. Wasik stressed that the DO impact of these wet weather events needs to be acknowledged in the aquatic life use designations for CAWS because eliminating or capturing the wet weather sources is not feasible in the foreseeable future. Exh. 461 at 18.

Ms. Wasik testified that a Wet Weather Limited Use would be necessary in the aquatic life use designations for CAWS in order for the uses to be attainable. 5/17/11ATr. at 94-95. Ms. Wasik stated, ". . . there has to be some provision that allows for these [wet weather] conditions that are going to be continuing into the future in the CAWS." 5/17/11ATr. at 95. As for the concept of addressing wet weather issues in the water quality criteria rather than in a separate use category, Ms. Wasik stated that she did not think the District could propose DO criteria that would adequately protect the aquatic life use during wet weather without the Wet Weather Limited Use. 5/17/11PTr. at 72. Ms. Wasik continued that the aquatic life use actually change because the fish avoid these areas during those times. 5/17/11PTr. at 75, 105.

In support of creating an aquatic life use for a temporary and transient situation, Ms. Wasik testified that the Wet Weather Limited Use is intended to acknowledge the wet weather conditions as "temporary and fleeting" and to make all of the proposed uses attainable. 5/17/11PTr. at 74-77, 5/17/11ATr. at 95. Ms. Wasik compared this approach to the way some communities have handled recreational use issues for temporary conditions during wet weather

where bacterial water quality standards are suspended. 5/17/11PTr. at 74. Although unlike recreational use where you can tell people not to recreate after a CSO event, Ms. Wasik testified,

> You don't have to tell the fish to avoid [areas of low DO] because they have controls in their body to avoid areas of low DO as I've discussed in some of my attachments to my testimony. There's a lot of evidence that fish will avoid areas of – anoxic areas or areas that are below, for instance, two mg/L of DO. They'll move to an area with higher DO which is why it's important I think this doesn't hit the CAWS system all at once. There would be areas of refuge and clearly there are currently areas of refuge, DO refuge for fish because as I've pointed out, we really don't have frequent fish kills except under [] particular conditions. 5/17/11PTr. at 75-76.

Ms. Wasik continued that the District just completed the first year of a two-year study regarding the effect of wet weather on fish with the Water Environment Research Foundation and LimnoTech. 5/17/11PTr. at 76. The study involves tagging fish and using continuous DO monitoring data to determine where the fish go when DO levels drop. 5/17/11PTr. at 76.

In response to questions about other types of aquatic life that would not be able to swim away from low DO conditions, Ms. Wasik replied that benthic invertebrates wouldn't necessarily be able to swim away, but DO in the fine sediments is quite low anyway. 5/17/11PTr. at 78-79. Ms. Wasik stated, "So the DO in the water column might be the least of their worries." 5/17/11PTr. at 79. As to mussels in CAWS, Ms. Wasik added that she has never found any mussels or data about mussels in CAWS. 5/17/11PTr. at 79.

Because DO standards proposed could not be possibly met at times during and following wet weather events, the District believes a Wet Weather Limited Used designation should apply when the following criteria are fulfilled:

1) A "trigger" such as a CSO discharge or specified rainfall amount occurs.

2) There are DO standard exceedances during or following the trigger event for a predefined maximum period.

3) There were no DO standard exceedances prior to the trigger event. Exh. 461 at 15.

The District proposed to use data from CSO discharges, rainfall gauges, and continuous DO monitors to track the number of hours when the Wet Weather Limited Use would be applied and report the information to IEPA on an agreed upon schedule. Exh. 461 at 15. To provide assurance that the amount of time below the proposed minimum levels for DO would be minimized, Ms. Wasik cited to requirements set forth in Long-Term Control Plans for CSOs and permits for sources such as MS4s. The District is proposing that at all other times, DO criteria would apply. Ms. Wasik added that the proposed Wet Weather Limited Use designation was also designed to be reassessed and revised as significant changes are made to CAWS, such as the progress of TARP. Exh. 461 at 15.

For further details regarding provisions for the Wet Weather Limited Use, Ms. Wasik referred to the testimony of Adrienne Nemura. Exh. 461 at 15.

Sediment Sampling Program. Ms. Wasik also testified regarding the District's sediment and benthic invertebrate sample collection program. Exh. 187. Ms. Wasik summarized data collected by the District from 2001 to 2007 at 59 ambient water quality monitoring stations located in the natural and man-made waterways in the District's service area. Exh. 187 at 1. Of the 59 stations, 28 are in CAWS while the others are in the General Use shallow waterways. Exh. 187 at 1.

The District collected data on sediment physical characteristics, sediment chemistry and toxicity, and benthic invertebrates. The sediment evaluation is one part of the habitat assessment process. Ms. Wasik pointed out that in the absence of sediment toxicity data, the CAWS UAA relied on screening levels from an outside study to identify "potential problems areas and constituents." Exh. 187 at 3. In this regard, Ms. Wasik explained that the District has several years of sediment toxicity data from CAWS itself for the years 2002-2007. Exh. 187 at 3. The District has also been collecting benthic invertebrate samples since 2001 using ponar grab and Hester Dendy samplers. Ms. Wasik described the ponar grab samplers as collecting the actual sediment, whereas the Hester Dendy samplers provide an artificial substrate for benthic invertebrates to colonize. Ms. Wasik explained that the Hester Dendy data reflect the potential for benthic invertebrates to colonize if habitat were available, whereas the ponar grab samples reflect the actual assemblage. Exh. 187 at 3-4.

Ms. Wasik summarized the sediment and benthic invertebrate sampling data by reach in CAWS. In general, Ms. Wasik found homogeneous fine sediments dominate CAWS and no quality habitat was available for benthic invertebrates. Exh. 187 at 9, 12/2/08Tr. at 239-240. Sediments exhibited widespread chemical contamination by metals, PAH, and PCB. Exh. 187 at 9, 12/2/08Tr. at 264. The toxicity analysis demonstrated that sediments were not suitable for relatively tolerant benthic invertebrates to survive, leaving only tolerant species of worms and midges throughout CAWS. In contrast, the Hester Dendy samples taken on the artificial substrate exhibited a higher taxa richness. Ms. Wasik concluded that this indicated that water quality is adequate for more sensitive species, but habitat is limiting their colonization. Exh. 187 at 9-10, 12/2/08Tr. at 249, 12/3/08Tr. at 19-20. Ms. Wasik added that contaminated sediment also impacts fish as well as benthic invertebrates. Although bottom-dwelling fish would possibly be more affected, Ms. Wasik stated, "with food chain effects, I think possibly all of the fish communities could be affected by sediment contamination." 12/3/08Tr. at 53. Ms. Wasik continued, "It is my opinion that the toxic sediments throughout CAWS prevent attainment of the aquatic life use proposed by IEPA." 12/3/08Tr. at 30-31.

Adrienne Nemura, LimnoTech (Exh. 465)

Adrienne Nemura is owner, Vice President, and consulting environmental engineer for LimnoTech. Ms. Nemura's experience lies in evaluating the impact of pollutant sources, including CSOs, on waterways and development of control measures to meet water quality

standards. Ms. Nemura has also supported USEPA in developing guidance documents and Reports to Congress regarding long-term control plans for CSOs. Exh. 465 at 1.

Ms. Nemura testified regarding the District's proposal for a Wet Weather Limited Use. Ms. Nemura believes that a wet weather provision is necessary for the protection of aquatic life use in CAWS because wet weather sources of pollution can significantly impact DO levels for days to weeks following a precipitation event. Exh. 465 at 2. Since eliminating or fully treating wet weather sources is not possible in the foreseeable future, Ms. Nemura asserted that considering the impact of wet weather events on DO levels is necessary when establishing the highest attainable designated uses. Exh. 465 at 2-3.

Even with additional supplemental aeration, flow augmentation, progress in reducing CSOs impacts, and hypothetical elimination of gravity CSOs, Ms. Nemura cited to studies and testimony indicating that the criteria proposed by IEPA will be occasionally violated as a result of wet weather. Exh. 465 at 3, Exh. 116, Att. 4. A study by Dr. Melching found, "[s]ubstantial impact of storm loading on DO concentrations in the [CAWS] on average lasts one day to a few weeks depending on the location in the [CAWS]". Exh. 116, Att. 5 at 17. Ms. Nemura indicated that model simulations where gravity CSOs were hypothetically eliminated and an analysis of the District's Continuous LimnoTech Study Monitoring (CDOM) Program indicate wet weather conditions will continue to adversely impact DO levels. Exh. 465 at 4. Even after TARP or potential green infrastructure measures are fully implemented, Ms. Nemura believes that the Wet Weather Limited Use will still be needed because there will still be discharges from CSOs, municipal storm sewers, and overland runoff. 6/28/11Tr. at 11, 108, 110-111, 141, 143, 7/27/10Tr. at 11.

Ms. Nemura cited to USEPA guidance stating that water quality criteria can explicitly state applicability under certain conditions, such as dry weather, in order to reduce the importance of the criteria during other conditions, such as wet weather. Exh. 116 at 6 citing to EPA 841-B-07-006 at 12. As examples of wet weather limited use designations, Mr. Nemura pointed to other states that have modified their water quality standards to reflect the challenges associated with attaining aquatic life use during wet weather. Massachusetts, Ms. Nemura explained, "allows for a partial use designation for recreational or aquatic life use with a UAA or a variance." Exh. 116 at 7. Ms. Nemura added that Maine has provisions for a CSO subcategory where aquatic life use may be temporarily suspended through a variance if a community submits a long-term CSO control plan, implementation schedule, and UAA. Exh. 116 at 7-8, Att. 3 at 2.

Based on the testimonies of Dr. Dennison, Mr. Bell, and Dr. Mackey, Ms. Nemura reiterated that improving DO conditions would not result in appreciable improvements in the resident fish population in CAWS. Exh. 465 at 4. Ms. Nemura stressed that establishing a Wet Weather Limited Use would not result in degraded water quality or more hours of low DO. Exh. 465 at 4, 6/28/11Tr. at 26.

As to the reasons behind why the Wet Weather Limited Use concept was proposed as a use designation rather than as part of the water quality criteria, Ms. Nemura described how DO

conditions vary within CAWS and the apparent effect on the behavior of fish. Ms. Nemura testified:

> During dry weather, the DO conditions across the [CAWS] are similar for periods of time and fish might have to swim a long ways to find different conditions. During wet weather, not all of the segments are affected at the same time. If the DO is depleted, the fish appear to move to the adjacent segment to avoid the low DO. The DO then recovers as the slug of low DO moves through the system. Therefore, the wet weather limited use recognizes the aquatic use is different during wet weather conditions. In my opinion, you need to establish the appropriate aquatic life use first and then determine the DO criteria to support the uses. 6/27/11Tr. at 48-49.

Mr. Nemura outlined how the proposed Wet Weather Limited Use would be applied. Exh. 465 at 5. The Wet Weather Limited Use designation would apply to segments affected by wet weather flows and would remain in effect during and up to a predefined maximum amount of time after a wet weather event. The amount of time would be determined based on the amount of rainfall. The Wet Weather Limited Use would apply on a segment-by-segment, event-by-event basis. Exh. 465 at 5. A rainfall "trigger" (in inches per day) would be used to define the onset of a wet weather event and the corresponding maximum amount of time after a wet weather event that the Wet Weather Limited Use would apply. Ms. Nemura explained that 0.25 to 0.49 inches per day would correspond to a maximum duration of 2 days after the trigger day for the Wet Weather Limited Use, 0.5 to 1.0 inches per day would correspond to 4 days, and more than 1.0 inch per day would correspond to 6 days. Exh. 465 at 5, 6/27/11Tr. at 157. For overlapping wet weather events, the maximum durations would also overlap. Exh. 465 at 11. Outside of these bounds, the waterways would need to comply with the DO standards. Exh. 465 at 5. However, when DO levels equal or exceed the DO standards under wet weather conditions, the Wet Weather Limited Use would not be applied. The Wet Weather Limited Use would also not be applied when DO levels are below the DO standards immediately preceding the wet weather event. Exh. 465 at 5-6.

Only waters proposed under Category 1 and 2 would be eligible for the Wet Weather Limited Use designation because the proposed numeric DO standards for the Category 1 and 2 uses cannot be met during wet weather. Exh. 465 at 6, 6/27/11Tr. at 38. Waters proposed under Category 3 would be addressed under the District's proposed narrative standard regardless of the wet weather discharges. Exh. 465 at 6.

To support the function of the Wet Weather Limited Use, Ms. Nemura explained that the District's proposal requires the District to continue operating its rainfall monitoring and CDOM programs. Exh. 465 at 7. Ms. Nemura noted that the CDOM program is reviewed on an annual basis, and the District would notify IEPA before making any proposed changes. Exh. 465 at 7, 11-13, 6/27/11Tr. at 56-59. Ms. Nemura also pointed out that the District's proposal calls for annual documentation of data for water quality, rainfall, and CDOM. The annual documentation would also include a report of when and where the Wet Weather Limited Use was applied and any wet weather non-compliance issues. Exh. 465 at 7, 11-13. Ms. Nemura added that since wet

weather events span calendar months and data quality assurance checks can take several weeks, documentation on an annual basis is appropriate. Exh. 465 at 11.

To demonstrate that the proposed Wet Weather Limited Use would not adversely affect the resident aquatic life, Ms. Nemura illustrated the application of the District's proposal by using data from 2001 to 2008. Exh. 465 at 13. Based on rainfall and CDOM data for 2001 to 2008, Ms. Nemura found that the Wet Weather Limited Use designation would have been applied less than 10% of the time at any CDOM station, with one exception at Main Street on the North Shore Channel. Exh. 465 at 13-14. To address this exception, Ms. Nemura explained that the District has included provisions in its proposal to provide this location with additional treatment to improve DO conditions during both dry and wet weather. Exh. 13 at 465, 6/27/11Tr. at 149-150. Ms. Nemura referred to the testimony of Dr. David Zenz (Exh. 217 and 463)[4] for details on the District's proposal to improve DO conditions. Exh. 465 at 13.

Ms. Nemura explained that the "beauty of the District's proposal with this wet weather limited use" was that it was crafted to be re-evaluated to consider new information. Re-evaluation could be prompted by data in the annual reports or major changes in CAWS, such as new wet weather source controls, supplemental aeration, or flow augmentation. Exh. 465 at 4, 6/27/11Tr. at 33-34, 107, 143. Re-evaluation could include re-evaluating the amount of rainfall "trigger" and the corresponding duration of time the Wet Weather Limited Use would apply. Exh. 465 at 6. Over time as more wet weather sources are controlled, Ms. Nemura indicated there would be fewer and fewer times where the Wet Weather Limited Use would be applied. 6/27/11Tr. at 159.

In response to a question from the environmental groups, Ms. Nemura testified that USEPA has adopted state standards that allow DO levels to fall below 1.25 mg/L for Chesapeake Bay, Maryland, and the District of Columbia. 6/27/11Tr. at 147.

As to the use of aeration technologies, Ms. Nemura indicated the District's proposal included substantial investment in additional technologies, but she referred to Dr. Zenz's testimony (Exh. 217 and 463) for further details. 6/27/11Tr. at 139.

In discussing the need for the Wet Weather Limited Use, Ms. Nemura emphasized:

> This provision needs to be included in the standard because if there is no provision[,] the standards cannot be attained and standards need to be attainable. The standards will still be protective even with this provision as discussed in Ms. Wasik's testimony . . .. This is the basis of the whole use attainability analysis provision under the Clean Water Act . . .. Under the Clean Water Act, you would

[4] The testimony of Dr. David R. Zenz, PE, with Consoer Townsend Environdyne Engineers, Inc. (CTE)/AECOM Technical Services, Inc. (Exh. 217, Exh. 463) and the associated CTE/AECOM/Melching studies of potential technologies and costs to increase dissolved oxygen in the CAWS, found in Attachments QQ, PP and OO of IEPA's proposal, will be addressed under R08-9(D).

> set appropriate use designations that could be attainable . . .. [T]he Clean Water Act requires that once uses are established that the states also adopt water quality standards which consist of the designated uses, the narrative or numeric criteria and antidegradation provisions . . .. Every use attainability analysis that I've been involved in or research never look[ed] at whether some use is attainable with criteria that cannot be met. 6/27/10Tr. at 19-23.

Charles Melching, Marquette University

Charles Melching is an Associate Professor of Civil and Environmental Engineering at Marquette University in Milwaukee, Wisconsin. Dr. Melching testified on behalf of the District about the hydraulics of CAWS and the relationship of hydraulics to habitat and biological potential. Exh. 169 at 1-3.

Hydraulics of CAWS. Dr. Melching worked to tailor a model for the hydraulics and water quality in CAWS. Dr. Melching indicated that because of the effects of dry and wet weather conditions on the water quality in CAWS, the model selected needed to be capable of simulating flows under unsteady conditions, such as from storm runoff and CSOs. Exh. 169, Att. 1 at 5. The model selected was DUFLOW, which couples hydraulic and water quality models directly. 11/17/08Tr. at 18.

The DUFLOW model was then used to evaluate various scenarios for managing water quality within CAWS. Scenarios involved: supplemental aeration, flow augmentation, combination of both supplemental aeration and flow augmentation, pollutant removal at gravity CSOs, and disinfection. Exh. 169 at 2. Dr. Melching referred to Dr. Zenz's testimony (Exh. 217 and 463) for details on the modeling work that was done to evaluate the amount of supplemental aeration to achieve 90% and 100% compliance with IEPA's proposed DO standards. 11/17/08Tr. at 59, Exh. 116, Att. 5.

Dr. Melching described the hydraulic features characteristic of CAWS, beginning with "flow reversal". Dr. Melching pointed out that the reversal of flow in CAWS not only occurs during large storms events, but also during dry weather. During large storms, water flows from CAWS into Lake Michigan, but flow reversals are also common in other areas of CAWS where the flow does not necessarily reach the Lake. Dr. Melching explained that flow reversal occurs because the slope of the water surface of CAWS is so small and because the flow from the District's three main water reclamation plants (WRP) is substantially higher than the flow upstream of the WRPs. The elevation of the water surface upstream of the WRPs is frequently lower than the elevation of the water surface downstream. The result, as Dr. Melching illustrated, is that the outfall of the WRP acts as a "hydraulic dam inserting treated effluent to the upstream reaches". Exh. 169 at 4. The hydraulic dam holds the upstream flow and stagnates the upstream reaches. Exh. 169 at 4. Dr. Melching characterized this bi-directional flow as an "unnatural condition". Exh. 169 at 4.

One of the other hydraulic features characteristic of CAWS identified by Dr. Melching is "slow travel times". Exh. 169 at 4. In the vicinity of the hydraulic dams upstream of the Stickney and Calumet WRPs, flows were calculated showing travel times of 2.5 days to go 8

miles from Madison Street to Cicero Avenue and 1.5 days to go 2.3 miles from Indiana Avenue to Halsted Street. Exh. 169 at 4. In addition to the hydraulic dams, Dr. Melching explained that slow travel times are caused by the Sag Junction where the Cal-Sag Channel flows into the CSSC. The cross-sectional geometry of the CSSC is the same both up and downstream of its confluence with the Cal-Sag Channel. Dr. Melching compared the confluence of the CSSC and the Cal-Sag Channel to "two lanes narrowing to one lane on the freeway with large backups and long travel times resulting." Exh. 169 at 5. As a consequence of the slow travel times and low slope, Dr. Melching explained that DO is lower due to reduced natural reaeration. Exh. 169 at 5. Dr. Melching added that CAWS is deeper than most natural systems, which also limits the distribution of oxygen coming in from the atmosphere. 11/17/08Tr. at 35-37. In addition, Dr. Melching associated slow travel times in CAWS with difficulty in effectively dispersing DO generated by engineered aeration stations. Exh. 169 at 5.

Dr. Melching also addressed the hydraulic features of wet weather conditions in CAWS. To determine the duration of storm effects on water quality, the DUFLOW model was applied. Results of the modeling showed that the impact of wet weather events on DO concentrations in CAWS range from one day to more than two weeks, depending on the location and storm event. Exh. 169 at 6, Exh. 1. Locations exhibiting one-day effects following one storm event exhibited 15-day effects following other storm events. Exh. 169 at 6, Exh. 1. Dr. Melching related the duration of storm impacts to the hydraulic dams and other stagnant conditions in CAWS. Exh. 169 at 7. Dr. Melching stated, "The long effects of storm flows on water quality also indicate that it may be appropriate to consider wet weather standards for the CAWS." Ex. 169 at 7.

Relationship between Hydraulics and Ecological Conditions. Dr. Melching then integrated the implications of the unique and complex hydraulic features of CAWS with the CAWS UAA findings on biological potential. Exh. 169 at 3. The CAWS UAA relied on the efforts by Rankin (Attach. R) using the QHEI and IBI to relate habitat quality to biological potential in a water body. Exh. 169 at 8. Dr. Melching summarized the goal of the Rankin 1989 study, which was to provide guidance on specifying aquatic life use for water bodies impaired by pollution. Exh. 169 at 8. While IEPA suggested that where the QHEI is higher and IBI is lower, improvement in water quality is needed to achieve the ecological potential of the higher QHEI, Dr. Melching countered that the comparison requires further consideration. Exh. 169 at 8, citing to 4/23/08Tr. at 211-216. Dr. Melching quoted Rankin who stated, "[U]sing the QHEI as a site-specific predictor of IBI can vary widely depending on the predominant character of the habitat of the reach." Exh. 169 at 8, quoting Exh. 175 at 12.

To determine whether QHEI habitat scores compared to IBI scores truly indicate when an improvement in water quality would achieve a higher biological potential, Dr. Melching suggested looking at the nature of key QHEI habitat metrics found in CAWS specifically. Exh. 169 at 9. For the habitat metric of substrate, Dr. Melching focused on the dichotomy between Macroinvertebrate Biotic Index (MBI) data in the CAWS UAA where half of the samples indicated "poor" water quality and the other half indicated "fair to good". The "poor" samples were taken in the actual CAWS substrate (petite ponar dredge), whereas the "fair to good" samples were taken on an artificial substrate (Hester Dendy sampler). Since the ponar dredge samples were taken in conjunction with the retrieval of the Hester Dendy samples, Dr. Melching recognized the difference in the two did not appear to be explained by water quality. Dr.

Melching concluded, "The difference in the sampler results shows that the CAWS substrate will prevent any further improvements in water quality from translating to a better macroinvertebrate community and will not likely result in improvements in aquatic life use." Exh. 169 at 9, Attach. B at 4-17 to 4-19.

Although IEPA relied on the use of QHEI and IBI to determine the need for water quality improvement, Dr. Melching provided a different approach by applying the Habitat Suitability Index (HSI) models developed by the US Fish and Wildlife Service (USFWS) of the US Department of Interior. Exh. 169 at 13, Att. 1 at 32. Dr. Melching acknowledged that the HSI models are not perfect predictors, and that the USFWS recommends that they be compared with actual fish data for the water body of interest before interpreting the suitability of the results. Exh. 169 at 13, Att. 1 at 32. In summary, the HSI models indicated CAWS provides poor habitat for adult smallmouth bass and channel catfish and near optimal habitat for adult largemouth bass. However, the HSI models indicated CAWS provides poor habitat for early life stages for all of these fish. As recommended by the USFWS, Dr. Melching corroborated the HSI model predictions with fish data in the UAA report. To determine the source of the early life stages of these fish, Dr. Melching examined the possibility that tributaries of CAWS with suitable habitat might be contributing to the fish population. Dr. Melching stated that although the origin of the channel catfish in CAWS is unclear, fish data indicated the largemouth and small mouth bass spawn and spend the early life stages in Lake Michigan and colonize CAWS as adults. Dr. Melching found, "[t]hus, seeking to protect early life stages for these species of fish in CAWS is inconsistent with the habitat suitability and the available fish abundance data." Exh. 169 at 14, Att. 1 at 36, 11/17/08Tr. at 120-122, 129, 135-136.

As further support for the assertion that habitat will limit any further improvements in water quality from translating to improvements in aquatic life use, Dr. Melching referred to the CAWS UAA, which stated, "[i]mprovements to water quality through various technologies, like re-aeration may not improve the fish communities due to the lack of suitable habitat to support the fish population." Ex. 169 at 14, quoting SR Att. B. at 5-3. Dr. Melching concluded by quoting Rankin (1989, p. 52): "[i]t makes little sense to 'protect' the biota by multimillion dollar improvements to a point source discharge while important biological uses are impaired by habitat modifications for reasons such as 'flood control', construction activities, and waterway improvements. Exh. 169 at 14.

Samuel Dennison, District

Samuel Dennison is a biologist in the Environmental Monitoring and Research Division of the Research and Development Department of the District. Exh. 192 at 1. Dr. Dennison testified regarding several issues on behalf of the District.

Additional Aquatic Life Use Tier for Bubbly Creek. Dr. Dennison commented on IEPA's proposal as it related to Bubbly Creek (the South Fork of the South Branch Chicago River) and provided justification for an additional aquatic life use tier for Bubbly Creek. Dr. Dennison criticized IEPA's proposal that classified Bubbly Creek as Aquatic Life Use B. Dr. Dennison found that not only did the CAWS UAA not assess any physical habitat or fish data specifically for Bubbly Creek, but IEPA also did not take into account that Bubbly Creek is

stagnant during dry weather and has very unique sediments that impose a significant oxygen demand. Exh. 192 at 3. Dr. Dennison testified that these factors result in consistently low DO levels in Bubbly Creek and that measures to improve DO could result in a worse situation. Exh. 192 at 3, 5 12/3/08Tr. at 102-103.

From a historical perspective, Dr. Dennison described Bubbly Creek as once meandering creek that slowly drained a five square mile area of marshland. Beginning in the 1860's, the Union Stock Yards were constructed along the banks, and the creek became "an open sewer for the meatpacking industry for nearly a century." Exh. 192 at 2. The channel was straightened, deepened, and widened. The marshland that drained into the creek was entirely filled in, and now Bubbly Creek receives no dry weather flow. Exh. 192 at 2.

Dr. Dennison described Bubbly Creek today as a relatively straight 1.3 mile channel, 120 to 200 feet wide with depths from 6 to 14 feet. The physical alterations to the channel and drainage area have eliminated most of the natural aquatic and riparian habitats. With no dry weather flow, Dr. Dennison explained that flow in the system is almost exclusively from CSOs (the Racine Avenue Pumping Station as well as gravity sewers). Exh. 192 at 2. Dr. Dennison continued that the transition from stagnant conditions to wet weather flow velocities in excess of five feet per second can damage aquatic habitat and resuspend sediments. Exh. 192 at 3-4.

Dr. Dennison pointed to both the organic content of the CSO flows and the sediment as the sources of oxygen demand severely impacting the DO levels in Bubbly Creek. Exh. 192 at 4. Based on the District's CDOM data, Dr. Dennison noted that the DO recovery at stations in Bubbly Creek can take several days longer than at other stations in CAWS. For example, Dr. Dennison remarks that DO levels of 0.0 mg/L have been shown to occur for over 3 days following rain events at one monitoring station in Bubbly Creek. Exh. 192 at 4.

Even during dry weather, Dr. Dennison stated that DO levels in Bubbly Creek can often drop to zero. Dr. Dennison attributes the low DO levels to stagnant conditions, oxygen demand from the sediment, and oxygen demand from high phytoplankton levels that are sustained by the stagnant conditions and abundant nutrient loads from the CSOs. Exh. 192 at 4.

In an effort to limit the stagnant conditions, Dr. Dennison described the District's initiative to draw water from Bubbly Creek back through the Racine Avenue Pumping Station to the Stickney WRP for treatment. Exh. 192 at 5, 12/3/08Tr. at 102. Between April and September 2006, the District pumped 3.7 billion gallons of water from Bubbly Creek back through the Racine Avenue Pumping Station to the Stickney WRP. Despite the District's efforts, Dr. Dennison reported that the low DO concentrations in Bubbly Creek prevailed. Exh. 192 at 5. Based on this experience, Dr. Dennison suggests that flow augmentation does not appear to be a feasible means for attaining IEPA's proposed water quality standards for Bubbly Creek even under dry weather conditions. Exh. 192 at 5. Dr. Dennison testified that flow augmentation in Bubbly Creek would resuspend oxygen demanding sediment and further deplete oxygen. 12/3/08Tr. at 102-103.

In addition to flow augmentation, Dr. Dennison relayed that the District also evaluated the use of supplemental aeration to meet IEPA's proposed water quality standards for Bubbly

Creek. For details on the technical concerns and environmental impacts of supplemental aeration in Bubbly Creek, Dr. Dennison referred to the testimonies of Dr. Zenz, Mr. McGowan, Mr. Mastracchio, and Dr. Garcia. Exh. 192 at 5.

Dr. Dennison also examined how increasing DO in Bubbly Creek by artificial means could make the waterway an "attractive nuisance" to fish. Exh. 192 at 5. Dr. Dennison described how higher DO levels might attract fish from the connecting South Branch of the Chicago River only to place them at risk from sudden, high volume, low DO CSO flows. Dr. Dennison explained that this would result in fish kills. The fish kills would in turn create an odor problem and offensive conditions for area residents. Exh. 192 at 5. Dr. Dennison added that Bubbly Creek is a side fork, and it is not necessary to maintain DO levels even for fish passage through CAWS. Dr. Dennison testified that currently even during periods of low DO, fish kills are infrequent, less than one per year, with the last one being in 2004 as Dr. Dennison recalled. Dr. Dennison surmised that fish appear to be finding other places to go. 12/3/08Tr. at 109, 129.

Dr. Dennison supported the District's recommendation that another aquatic life use tier be developed for Bubbly Creek that would be protected by a narrative DO standard to prevent fish kills and maintain aesthetics, such as preventing nuisance odors. Dr. Dennison concluded by stating, "[t]his would be appropriate until such time as the sediments are capped, removed or remediated and the frequency of discharge at [Racine Avenue Pumping Station] is diminished sometime after 2024. If a numerical DO standard is deemed imperative, then the IPCB should consider the testimonies of Mr. Paul Freedman and Dr. Marcelo Garcia as a basis for such standard." Exh. 192 at 6.

Aquatic Life Use for Cal-Sag Channel. Dr. Dennison also testified to provide justification for designating the aquatic life use of the Cal-Sag Channel differently than IEPA had proposed. IEPA proposed the Cal-Sag Channel as an Aquatic Life Use A Water, the higher of the proposed CAWS Aquatic Life Use tiers A and B. Exh. 191 at 1-2.

Dr. Dennison explained that the CAWS UAA used the IBI and QHEI scores to classify the waterways into Aquatic Life tiers. The 75th percentile of the IBI scores was used as the dividing line between two Aquatic Life tiers: a higher tier of "Modified Warm-Water" and a lower tier of "Limited Warm-Water". Exh. 191 at 1-2. Although the Aquatic Life tiers in the CAWS UAA differ from those in IEPA's proposal, Dr. Dennison stated that this dividing line appears to be what IEPA used as the upper bound for its lower tier of Aquatic Life Use B. Dr. Dennison pointed out that the IBI scores calculated for the Cal-Sag for two locations were either at or below the 75th percentile dividing line, while the QHEI scores for both locations were in the "poor" range. Exh. 191 at 2, Attach. B at 4-22. With habitat scores in the "poor" range and IBI scores below the higher tiered "Modified Warm-Water" range, Dr. Dennison asserted that IEPA's proposal to include the Cal-Sag in the higher tier of Aquatic Life Use A is not defensible. Exh. 191 at 2.

In addition, Dr. Dennison described the Cal-Sag Channel as more similar in physical characteristics to the CSSC, which IEPA proposed as Aquatic Life Use B. Exh. 191 at 2, SR at 45. For example, Dr. Dennison stated that both are entirely man-made. Exh. 191 at 2. Restoring the Cal-Sag Channel to its original condition would mean filling it in. 12/3/08Tr. at 96. Both the

CSSC and Cal-Sag are deep-draft, with a high volume of commercial navigation and limited shallow areas along the banks. Exh. 191 at 2. Both scored "poor" for habitat based on the QHEI scale that IEPA used. Both are dominated by soft homogeneous sediments that are not conducive to a balanced benthic invertebrate community. In addition, the sediment in the Cal-Sag Channel was also found to be toxic. Exh. 191 at 2-5.

Dr. Dennison asserted that UAA Factors 3, 4, and 5 are present in the Cal-Sag demonstrating the extent of the irreversible conditions and limitations on aquatic life. Exh. 191 at 3, referring to 40 C.F.R. 131.10(g). Human caused conditions (UAA Factor 3) are seen in the manmade features of straight, deep-draft channel with no riffle and pool sequences. Hydrologic modifications (UAA Factor 4) are present in the regulated flow from the O'Brien Lock and Dam and the Lockport Lock, where high flows can sweep habitat and aquatic organisms downstream. Physical conditions (UAA Factor 5) are evident in the toxic sediment and the frequent navigation causing the resuspension of the sediment. Exh. 191 at 3-5, 12/3/08Tr. at 95. Dr. Dennison added that the creating aquatic habit that would support a higher aquatic life use would likely be unproductive and would severely conflict with important navigational uses. 12/3/08Tr. at 97.

Dr. Dennison concluded by recommending that additional habitat data be collected to verify the aquatic life use designation for the Cal-Sag Channel. Dr. Dennison referred to the District's efforts to do so as part of the comprehensive LimnoTech Study being completed by LimnoTech. Exh. 191 at 5, 12/3/08Tr.at 80, 90-91.

Marcelo Garcia, University of Illinois

Marcelo Garcia is a Professor of Civil and Environmental Engineering at the University of Illinois. Dr. Garcia also testified on behalf of the District regarding the need to establish different aquatic life water quality standards for Bubbly Creek than for the rest of CAWS. Exh. 193 at 1.

Following the observance of bi-directional flows (also known as "flow reversal" as described by Dr. Melching above), Dr. Garcia testified that her research group was the first to recognize the phenomenon of density currents in the Chicago River. Exh. 193 at 2, Exh. 169 at 4. Dr. Garcia described density current as a "river under a river" that can go upstream or downstream and deposit whatever it carries there. 2/17/09ATr. at 11. The analysis of Dr. Garcia's research group pointed to salt used for road deicing as the main culprit leading to the density currents in the Chicago River. Exh. 193 at 2. Dr. Garcia's work had previously found that, "[d]ensity currents could affect water quality and transport low-oxygen, sediment-laden water and contaminants for long distances (Garcia 1992)." Exh. 193 at 3. As discussed below, Dr. Garcia's new modeling efforts showed this was also occurring in CAWS. 2/17/09ATr. at 12.

In terms of maintaining DO levels as proposed by IEPA, Dr. Garcia further explained the significance of sediment transport in CAWS. Dr. Garcia pointed to large storms contributing to the suspension of organic-rich sediments that can curtail the efficiency of a SEPA station. Additionally, Dr. Garcia identified barge traffic as another factor impacting sediment entrainment and turbidity levels, however, Dr. Garcia noted that this factor received "practically no attention" in the CAWS UAA. Exh. 193 at 4.

Dr. Garcia then turned her discussion to focus primarily on Bubbly Creek and the role of sediments, flow, and physical characteristics in the appropriate designation of an aquatic life use and water quality criteria. Dr. Garcia described Bubbly Creek as a 1.3 mile, fairly straight channel with steeply sloped banks and vertical dock walls, averaging 150 feet in width with flow depths varying from 3 to 13 feet. Exh. 193 at 4. The downstream 40% is scoured by barge traffic. Exh. 193 at 4. From a historical standpoint, Dr. Garcia told of how Bubbly Creek received wastes from Chicago's Union Stockyards and other industries from 1865 to 1940. Exh. 193 at 4-5. Dr. Garcia explained that it is the degradation of organic matter in the bed sediments under anaerobic conditions that causes gas to bubble to the surface of Bubbly Creek. Exh. 193 at 6.

Dr. Garcia criticized IEPA's proposal for assigning the same aquatic life use for Bubbly Creek as the South Branch of the Chicago River, which has none of the unique characteristics of Bubbly Creek. Exh. 193 at 13.

Dr. Garcia explained that the sediment in Bubbly Creek exerts an oxygen demand that is at a maximum during both dry-weather periods and light rainfall events. Exh. 193 at 6. Without wet weather flow, Dr. Garcia noted that Bubbly Creek is stagnant. Exh. 193 at 6. During heavy storms, when the Stickney WRP's capacity is surpassed, the Racine Avenue Pumping Station, one of the largest sewage pumping stations in the world, discharges partially to Bubbly Creek. Exh. 193 at 6. In addition, there are 9 CSOs that discharge directly to Bubbly Creek. Exh. 193 at 6-7. Dr. Garcia explained that flows from storm discharges are strong enough to cause erosion and resuspension of sediments in Bubbly Creek. Exh. 193 at 7. Once the sediments are resuspended, Dr. Garcia asserted that the resulting high turbidity and low oxygen levels would have a detrimental effect on fish and other aquatic life forms. Exh. 193 at 7.

Dr. Garcia recognized that the impact of sediment and wet weather sources on oxygen demand in Bubbly Creek is not yet well understood and makes water-quality management "a challenging endeavor in Bubbly Creek." Exh. 193 at 7-8. Dr. Garcia acknowledged that the work done by Dr. Melching using the DUFLOW Model has been beneficial in understanding the dynamic conditions of CAWS. However, Dr. Melching noted that the DUFLOW Model does not account for other effects that impact Bubbly Creek, such as sediment erosion and resuspension or stratified flow conditions ("*i.e.* vertical variation of flow velocity, temperature, and DO, etc."). Exh. 193 at 11, Exh. 169 at 2.

Dr. Garcia related the need to better understand these effects motivated efforts to develop "a state-of-the-art, three-dimensional hydrodynamic, sediment transport and water quality computer model of the CAWS." Exh. 193 at 11. Dr. Garcia's research group selected the Environmental Fluid Dynamics Code which Dr. Garcia characterized as supported by USEPA and "one of the most widely used and technically defensible hydrodynamic models." Exh. 193 at 12, 2/17/09ATr. at 43-44. At the time of her testimony, Dr. Garcia indicated he is about half way through the 3-year long modeling research effort. Exh. 193 at 12, 2/17/09ATr. at 12, 36-37.

Dr. Garcia cautioned that before any measures are taken in Bubbly Creek to improve water quality, such as flow augmentation and or re-aeration, the impact of sediment and oxygen

demand during dry and wet weather needs to be assessed. Exh. 193 at 13. Dr. Garcia advocated waiting until the 3-dimensional modeling studies are complete before determining which water-quality management technology would be "most effective, or even feasible". Exh. 193 at 14. Dr. Garcia concluded by saying,

> If this study is not completed and supplemental aeration systems are nevertheless constructed on Bubbly Creek, they may not work to increase DO levels enough to meet the proposed standards. They may simply re-suspend the very fine organic-rich sediment and further exacerbate the depletion of DO in this isolated water body, potentially causing more harm than good. Exh. 193 at 14.

James E. Huff on Behalf of Citgo/PDV

Mr. Huff presented testimony on three different occasions. Mr. Huff testified twice on behalf of Citgo/PDV (Exh. 285, Exh. 437) and that testimony will be summarized here. Mr. Huff also testified on behalf of Corn Products (Exh. 304) and that testimony will be summarized here with the testimony of other witnesses from Corn Products.

Mr. Huff is Vice President and part owner of Huff & Huff, Inc. an environmental consulting firm, and his work experience includes two years at the Mobil Joliet Refining Corporation. Exh. 285 at 1. Mr. Huff stated that for the last 29 years he has been involved in over 40 environmental impact studies relating to the impact of wastewater discharges on receiving streams. *Id*. These have included stream surveys for the District, Citgo, and Corn Products. *Id*.

Mr. Huff indicated that he was retained by the Citgo Lemont Refinery to review IEPA's proposed aquatic life use designation for the CSSC and IEPA's technical justification for the proposed use designation. Exh. 285 at 2. Mr. Huff opined that the collection of waterways under consideration in this rulemaking are dissimilar and range from natural streams to manmade canals. *Id*. Mr. Huff noted that IEPA recognized this fact by proposing CAWS Use A and Use B designations. *Id*. Mr. Huff argued that the uses of the CSSC "are demonstrably different" from other portions of the CAWS and LDPR. *Id*.

Mr. Huff observed that IEPA's proposal groups the CSSC with the North Branch Chicago River, the Chicago River, South Branch Chicago River the Calumet River to Torrence Avenue, Lake Calumet Connecting Channel and the Lower Des Plaines River from the Ship Canal to the Brandon Road Lock and Dam as Aquatic Life Use B waters. Exh. 285 at 2. Mr. Huff further observed that most of these waterways are natural waterways. *Id*. Mr. Huff opined that the uniqueness of the artificially created and physically constrained CSSC is lost by including it in this group of waterways, and he would distinguish the CSSC from other Aquatic Life Use B waters. Exh. 285 at 2-3.

Mr. Huff detailed the physical qualities of the CSSC, noting that it is 31.1 miles upstream from the confluence of the Des Plaines River to the Damen Avenue Bridge in Chicago and is typically 200 to 330 feet wide with depths ranging from 27 feet to 50 feet. Exh. 285 at 3. Mr. Huff noted that the CSSC was completed in 1907 to divert pollutants away from Lake Michigan

and was expanded in 1919 to increase navigation capabilities and provide additional dilution. *Id*. Mr. Huff opined that except for the Cal-Sag Channel no other waterbody in CAWS shares the unique physical features, commercial shipping, discharge loading, or lack of habitat with the CSSC. Exh. 285 at 3-4.

Mr. Huff noted that the aquatic habitat is rated by IEPA as poor to very poor, and overall stream use is designated as non-supportive of aquatic life and for fish consumption and aquatic life. Exh. 285 at 4. Causes for the impairment include PCBs, iron, oil and grease, DO, total nitrogen, and total phosphorus. Exh. 285 at 4-5. The District's discharge contributes 70% of the total flow of the CSSC at Lockport. Exh. 285 at 5. In addition to the discharge by the District, the CSSC receives discharges from three coal-fired power plants which add a thermal load to the CSSC. Barge traffic also flows to a variety of industries on the CSSC, which withdraw or discharge to and from the CSSC. *Id*.

Mr. Huff noted that another distinguishing factor of the CSSC is the electric barrier installed near the Lockport Lock to prevent aquatic invasive species from entering the Great Lakes. Exh. 295 at 5. Mr. Huff pointed out that these barriers were authorized by Congress with an understating that any positive fish migration was being sacrificed to protect the Great Lakes. *Id*. The barriers not only prevent species from entering the Great Lakes, but also prevent species from migrating through the CSSC. *Id*.

Mr. Huff summarized the uniqueness of the CSSC indicating:

1. The CSSC is vital to the economic well-being of the region and the electric barrier is vital to protecting Lake Michigan and the Mississippi River from aquatic invasive species, which also results in no fish migration at Lockport.

2. The CSSC carries the treated wastewater effluents from most of Cook County which represent 70% of the Ship Canal flow at Lockport on an annual basis. Effluent equal to an estimated population equivalent of 9.5 million people is discharged through the District.

3. A significant pollutant load from CSOs enters the CSSC, and the reservoir portion of the TARP program will not be completed for several years. Stormwater runoff from this highly urbanized area also discharges to the CSSC.

4. The shoreline of the CSSC houses many industries, including three coal-fired power plants that rely upon the waterway for cooling water, effluent discharge, as well as for commerce.

5. The CSSC is manmade and is unsafe for small boat traffic, from both wave generated turbulence from barges as well as from the electric barrier(s).

6. There are limited shallow areas along the shoreline and a lack of suitable physical habitat to promote a more diversified aquatic community, as well as frequent disturbances caused by the barge traffic.

7. The CSSC has silty substrates and or substrate material. There is little instream cover and channelization has occurred. Routine dredging is required to maintain channel depth. Further there is no sinuosity and backwater areas or tributary mouths along the CSSC.

8. The CSSC has minimal slope and low velocities. These are not optimal conditions for aquatic habitat, but they are optimal conditions for sediment depositions.

9. The shoreline is predominantly commercially owned with limited access and no recreation potential. Downstream from the Cal-Sag Channel to the confluence with the Des Plaines River, no public access points exist. Exh. 285 at 6-7.

Mr. Huff noted that the CAWS UAA (Attach. B) indicated the goal for the CSSC and other limited warm water aquatic life stretches was "[m]aintain water quality to meet General Use criteria, where attainable, and allow for navigation and fish passage." Exh. 285 at 7, citing Attach. B. The UAA then stated that the objective is to "ensure DO and temperature criteria are met, and if unattainable, identify a treatment alternative to increase DO levels and reduce temperature level." *Id.* Mr. Huff opined that the goal and objective make two significant assumptions: 1) fish passage occurs; and 2) fish passage is desirable. Exh. 285 at 8. Mr. Huff asserted that fish passage is not desirable at Lockport, thus fish passage is restricted to either above or below Lockport. *Id.*

Mr. Huff offered that given the poor habitat of the CSSC, it is unclear where fish passage from Lake Michigan would be going and he has seen no indication that such fish passage even occurs or would occur with improved water quality. Exh. 285 at 8. Mr. Huff stated that one would assume the natural avoidance mechanism of the fish would discourage them from swimming from Lake Michigan into the CSSC because of poor habitat and water quality. *Id.* Mr. Huff believed that habitat limitations suggest that it is improbable that any species indigenous to the Great Lakes would establish a viable population in the CSSC. *Id.* Mr. Huff therefore did not feel that establishing more stringent water quality standards would improve the overall biological assemblage in the CSSC. *Id.*

Mr. Huff maintained that poor physical habitat conditions need to be considered when determining whether or not to upgrade standards in the CSSC. Exh. 285 at 8. Changing water quality standards has an economic cost and the benefits are merely expected to occur, according to Mr. Huff. *Id.* And given the poor habitat, Mr. Huff believed that any improvement in aquatic life in the CSSC is "questionable". Exh. 285 at 8-9.

Mr. Huff also believed that the re-designation of the CSSC for aquatic life use should be examined in the context of the economic impact on the region due to more expensive electricity. Exh. 285 at 9. Mr. Huff opined that changes in temperature standards could result in power generation facilities not being able to operate at peak times. *Id.*

Mr. Huff returned to testify more specifically about the Lower CSSC, to highlight the use of that segment for snow melt runoff and protection from invasive species. Exh. 437 at 1-2. Mr. Huff urged the Board not to accept IEPA's proposed Aquatic Life Use B designation for the CSSC and instead suggests a Use C category. Exh. 437 at 3. Mr. Huff explained that the Use C category would include the area surrounding the electric barrier system, known as the Regulated Navigation Area. *Id*. Mr. Huff opined that a Use C category would properly take into account "the exceptional characteristics" of the CSSC. Exh. 437 at 4.

Mr. Huff reiterated the characteristics of the CSSC that make it unique from other waterways in the Aquatic Life Use B group and stated that many of the concerns about the CSSC from the 1970s remain valid today. Exh. 437 at 4. Mr. Huff noted further that the aquatic habitat of the Lower CSSC is poor to very poor and the overall stream designation is non-support for fish consumption and aquatic life. Exh. 437 at 5.

Mr. Huff noted that stormwater runoff flows into the Lower CSSC and carries pollutants with the runoff. Exh. 437 at 5. In the winter months this runoff can carry road salt and chemicals which contribute to chloride in the waterway which can result in an exceedance of the proposed 500 mg/L water quality standard. *Id*. Mr. Huff noted that the application of rotenone is particularly hazardous to aquatic life. *Id*. Mr. Huff opined that IEPA's proposal to upgrade the aquatic life designation "conflicts with the local, state, and federal existing use" of the CSSC. Exh. 437 at 6.

Mr. Huff argued that a separate category is also appropriate because of the impact the proposed water quality standards for Aquatic Life Use B can have on the CSSC. Exh. 437 at 6. Mr. Huff expressed concern that, if the CSSC is designated as Aquatic Life Use B, mixing zones will not be available to dischargers and at certain times of the year water quality standard would have to be met at the end of the pipe. Exh. 437 at 6-7.

For all these reasons, Mr. Huff opined that an upgrade of the aquatic life designated use is not appropriate for the CSSC. Exh. 437 at 9.

Robin L. Garibay, on Behalf of Citgo/PDV

Robin L. Garibay testified on two occasions. Ms. Garibay testified on behalf of Stepan Company with Dr. Carl Adams and that testimony is summarized with the Stepan testimony. Ms. Garibay also testified on November 8, 2010, on behalf of Citgo/PDV which is summarized here. Although the hearings on November 8 and 9, 2010 were dedicated to issues surrounding Asian carp preventative measures, Ms. Garibay's testimony is also relevant to aquatic life use designations. Therefore, that testimony is summarized here. Ms. Garibay is with ENVIRON International Corporation, which was contracted by Citgo/PDV. Exh. 420. Ms. Garibay is a registered environmental engineer with a bachelor's of science in biochemistry. Exh. 420 at 1. She is a principal at ENVIRON International Corporation and the manager for the Wastewater Management services of the Integrated Industrial Wastewater Management Practice Area. *Id.* She has previously worked for the State of Kansas Board of Agriculture Laboratories where she focused on pesticide characterization in products, residues, and groundwater. *Id.* At ENVIRON, she works on characterization studies of effluents. *Id.* In total, she has over twenty years of

experience in wastewater management, which includes federal and state water quality standards and NPDES permitting and establishment of water quality-based effluent limits based on water quality criteria. *Id.*

In preparing this pre-filed testimony, Ms. Garibay worked with Dr. Jeff Fisher from the ENVIRON office for the Pacific Northwest region. Exh. 420. at 2. Their respective resumes are included in Attachment 1. Ms. Garibay focuses the testimony on "the highest quality of aquatic life use in the Chicago Sanitary and Ship Canal." *Id.* The testimony is intended to clarify the appropriate use for the Lower CSSC based on documented facts and recent information. *Id.* The Lower CSSC has been noted for its unique ability to support aquatic life which is not captured in the proposed Aquatic Life Use B. *Id.* Ms. Garibay emphasized the importance of not upgrading the designated aquatic life use to Aquatic Life Use B. *Id.* .

Ms. Garibay reasoned that the Lower CSSC is unique to recreational and aquatic life support uses, and she based her conclusion on the IEPA 2007 UAA. Exh. 420 at 3. The UAA recommended that the Lower CSSC be designated for non-recreational use and Aquatic Life Use B. *Id.* Ms. Garibay also considered the UAA Factors for Water Quality Standards regarding human-caused conditions, hydrologic modifications, and physical conditions, and she believes that the Lower CSSC cannot support an upgrade to an Aquatic Life Use B. *Id.* Ms. Garibay's testimony evaluates the various UAA factors in relation to appropriate aquatic use designation for the Lower CSSC.

UAA Factor 4-Hydrologic Modification and UAA Factor 5-Physical Condition

All of the assessment and data evaluating hydrological modifications and physical conditions in determining the appropriate aquatic use of the Lower CSSC are intertwined because of the design and operations of the Lower CSSC. The following discussion is in support of both factors.

The Lower CSSC is the portion of CSSC that begins at the confluence with the Cal-Sag-Channel and ends at the confluence with the Des Plaines River near the EJ&E railroad crossing. Exh. 420 at 4. The monitoring data are from the following sites: 16th Street at Lockport, Romeoville Road, and Stephen Street. *Id.* There is no data from Damen Avenue, Cicero Avenue, Harlem Avenue, Route 83, Bedford Park, or Willow Springs because those are part of the upper portion of the Ship Canal. *Id.* Ms. Garibay testified that IEPA's filing, the "Statement of Reasons," Attachment B, Attachment R, and PC 284 "Chicago Area Waterway System Habitat Evaluation and Improvement Study: Habitat Evaluation Report" from 2010 provide further information in support of her testimony.

The LimnoTech Study (PC 284) demonstrated that: 1) the habitat for supporting aquatic life is poor to very poor and 2) the richness and abundance of aquatic species is poor to very poor. Exh. 420 at 4. The Canal depth and shape, lack of sinuosity, absence of riffle-run or pool-glide characteristics, rapid changes in flow velocity and water level, lack of overhanging vegetation, poor substrate material and silty substrates, and the presence of suspended sediments all attribute to the poor to very poor categorizations. Exh. 420 at 5.

Further, the data from the 2010 QHEI repeated the 2007 QHEI. Exh. 420 at 5. The scores were 37 at Stephen Street, 27 at Romeoville, and 40.5 at Lockport. *Id.* QHEI scores of less than 30 indicate very poor ability to support aquatic life, and scores between 30 and 45 indicate a poor ability to support aquatic life. *Id.* The 2010 QHEI reported that the off-channel refuge score was 4, which is half the maximum for CAWS. *Id.* The 2010 QHEI also reported that 35.5 miles of the Lower CSSC is vertically walled and 3.3 miles are riprap-armored banks. *Id.* at 5-6. The 2010 QHEI also revealed that there is 0% macrophyte cover at Stephen Street and less than 2% at Lockport, where the higher percentage of coverage means that the river is more supportive of aquatic life. *Id.* at 6. Also, there is less than 2% overhanging vegetation at Stephen Street and less than 3% at Lockport, where the higher percentage of overhanging vegetation means greater support of aquatic life. *Id.* Further, Stephen Street scored a 20 in Bank Pocket Areas while Lockport scored a 6; 20 is the maximum from CAWS. *Id.* In all of these categories, a higher score indicates a greater support for aquatic life. *Id.*

Ms. Garibay testified that the 2007 Fish IBI gave Lockport a 17, where an IBI score of greater than 41 indicates a fully supported fish community and less than 20 very poor. Exh. 420 at 6. The 2007 MBI at Lockport was a 10, where any score less than 5.9 would indicate a fully supported fish community and greater than 8.9 would be poor. *Id.* The 2010 Fish Richness value was between two and nine at Lockport, and more than 80% of those two to nine species were pollution tolerant species. *Id.* The 2010 Fish Abundance score was between 22 and 179 individual fish, which indicates mobile species. *Id.*

Ms. Garibay testified that researchers have also evaluated the sediment quality and water quality data for the Lower CSSC. Exh. 420 at 7. Those assessments revealed that the sediment quality in the Lower CSSC exceeds published sediment threshold effect concentrations for seven metals and two organic chemical families. *Id.* The water quality has not been attained for 10 constituents, including DO, temperature, and ammonia. *Id.* Further, the predominant factor impacting aquatic life is related to the physical habitat characteristics of the Lower CSSC. *Id.* Ms. Garibay stated that those characteristics will not change and cannot be significantly improved regardless of proposed water quality criteria changes associated with the proposed upgrade to Aquatic Life Use B. *Id.*

Ms. Garibay expanded on this conclusion by stating that the poor habitat characteristics are those related to the main objectives of the manmade canal: the accommodations for commercial navigations and the flow of water away from Lake Michigan. Exh. 420 at 7. The operation of the Lower CSSC cause wetting and drying of the limited shoreline habitat, encouraging sediment scouring and resuspension; it does not allow for submerged or overhanging vegetation to grow. *Id.* Because this is a ship canal, these conditions are inherently irreversible. *Id.* at 8.

Ms. Garibay went on to state that the Lower CSSC has been classified according to the estimates of species' richness and abundance as poor to very poor, and that the species that currently reside there are pollutant tolerant. Exh. 420 at 8. Ms. Garibay believed that IEPA incorrectly interpreted their evaluation of UAA Factors 4 and 5 to support an upgraded use for the Lower CSSC. *Id.* IEPA's studies and assessments reveal that optimal uses for the Lower CSSC could not be obtained and do not support an upgrade. *Id.* Ms. Garibay testified that

because the design and operation of the Lower CSSC are inherently irreversible, the evaluation of UAA Factor 4 (hydrologic modification, including dams) and Factor 5 (physical conditions, including flow, depth, pools, and riffles) demonstrate that the attainment of aquatic life use higher than the current one is extremely unlikely. *Id.*

Ms. Garibay supplemented this argument with conclusions from the District's LimnoTech Study." Exh. 420 at 9. She stated that the habitat improvements identified in the report for the Lower CSSC may not be technically feasible. *Id.* Therefore, based on UAA Factors 4 and 5, the appropriate expectation of designated use for the Lower CSSC is as currently designated: indigenous aquatic life use. *Id.*

UAA Factor 3-Human-Caused Conditions

Ms. Garibay stated that many of the human-caused conditions that render an upgrade in use designation infeasible are already identified in the evaluation of UAA Factors 4 and 5. Exh. 420 at 9. Those relate to the use of the Lower CSSC for navigation, flood control, and conveyance away from Lake Michigan. *Id.* Ms. Garibay reiterated that the evaluation of those human-caused conditions prevent an upgrade because those measures cannot be remedied without causing further environmental damage. *Id.*

Further, Ms. Garibay testified that the 2007 Statement of Reasons demonstrated that the Aquatic Invasive Species Dispersal Barrier involves an electric fence to prevent fish from passing through it. Exh. 420 at 9. Since 2007, the operations plan has increased to the operation of two electric barriers and pesticides to control fish encroachment. *Id.* Ms. Garibay testified that those operations are integral to managing water quality and invasive species control at current conditions and cannot be overlooked in the designated use of the Lower CSSC. *Id.*

Human-Caused Condition: Invasive Species Prevention and Control.

Ms. Garibay testified that the Great Lakes Basin supports the most taxonomically invaded temperate freshwater ecosystem in the world. Exh. 420 at 10. Examples include the alewife, sea lamprey, zebra mussel, Eurasian ruffe, and Asian carp. *Id.* at 10. The presence of these invasive species has resulted in many strategies to prevent additional invasive non-native species from entering the Great Lakes, including the electric barrier and piscicide rotenone. *Id.* at 10. Currently, those efforts are aimed specifically at preventing the spread of Asian carp. *Id.* at 11. The harm of the Asian carp to Mississippi and Illinois drainages illustrate the need to assert maximum efforts to prevent the spread of Asian carp into the Great Lakes. *Id.* Therefore, it is important for the State of Illinois to continue to support prevention of such invasive species from migrating through the Lower CSSC to Lake Michigan. *Id.*

Ms. Garibay pointed out that the American Fisheries Society and the Asian carp Regional Coordinating Committee (Committee) approve of the electronic barrier in CAWS. Exh. 420 at 11-12. Those entities state that the Asian carp is a threat to both the Great Lakes and the Illinois River System. *Id.* at 12. Moreover, the Committee stated that Asian carp confound typical control strategies. *Id.* at 13, citing http://www.asiancarp.org/faq.asp. The electric barrier deterrent is part of the Lower CSSC's current and existing use, and the barrier should be

recognized in the water quality standards. *Id.* at 14. Further, the electric barrier cannot allow for recreational use within the Lower CSSC. *Id.*

In her testimony, Ms. Garibay recommended that the Board recognize the design and operation of invasive species controls as:

1) A mechanism that prevents support for an upgraded designated aquatic life use;

2) A recognized designated use for the Lower CSSC, specifically through operation of electrical barriers to deter migration of Asian carp to the Great Lakes, and use of piscicides to allow maintenance of the barriers, and

3) A designated use including electrical barriers and piscicides, discontinuations of which would cause more system wide environmental damage than leaving them in place. Exh. 420 at 14.

Ms. Garibay also testified that another strategy to prevent invasive species from invading the Great Lakes is to prevent or minimize conditions that would attract the target species, such as available habitat and food. *Id.* at 15. The biological habitat of the Lower CSSC is poor, which further discourages Asian carp from using it to migrate to Lake Michigan. *Id.* Improving the Lower CSSC and upgrading the use designation would be self-defeating with regard to the Asian carp. *Id.* The Asian carp could be attracted to the aquatic life that might flourish in a cleaner Lower CSSC. *Id.* at 16. Then the Asian carp would harm the fish populations that might exist in the Lower CSSC if the use designation were upgraded because Asian carp could crowd them out and consume all the planktonic food sources. *Id.* This would counteract any type of use designation upgrade. *Id.*

Ms. Garibay concluded her pre-filed testimony and urged IEPA and the Board to re-evaluate the UAA factors with regard to the Lower CSSC. Exh. 420 at 17. Ms. Garibay stated that ENVIRON found that UAA Factors 3, 4, 5, and the design and operation of the Lower CSSC impact the aquatic life use attainable for the Lower CSSC. *Id.* Additionally, she stated that the aquatic life limitations in the Lower CSSC are irreversible. She concluded that any possible remedies are limited and would not be able to achieve an upgraded designated use. *Id.* Further, she stated that improving water quality could have detrimental effects on the aquatic life by creating conditions that are counterproductive to mandatory invasive species control. *Id.* at 18. Ms. Garibay recommended that the current designated aquatic life use is appropriate and an upgrade is not warranted or advisable.

Alan Jirik on Behalf of Corn Products

Alan Jirik is the Vice President of Regulatory Affairs at Corn Products and he testified concerning the proposed aquatic life use designation for the CSSC. Exh. 303 at 1-2. Mr. Jirik stated that Corn Products' Argo plant is located at 6400 Archer Avenue in Bedford Park. The plant processes corn and produces a variety of food products, including corn sweeteners,

starches, edible oils, and animal feed. Exh. 303 at 2. Corn Products has operated continuously at this location for over 100 years with the first bushel of corn processed at Argo on March 28, 1910. *Id*. Argo is directly responsible for providing approximately 3,000 jobs. *Id*.

As a part of the processing at Argo, as much as 60 million gallons of water per day is withdrawn from the CSSC for non-contact cooling. Exh. 303 at 3. The warmed water is returned to the CSSC pursuant to an NPDES permit. The intake and discharge points are located at mile post 311.7 of the CSSC, generally located between Harlem Avenue and La Grange Road. *Id*. Mr. Jirik testified that the use of non-contact cooling water from the CSSC is "fundamental to the design and operation of the various processes at Argo." *Id*. Mr. Jirik noted that the cooling waters provide necessary and highly efficient heat removal in their production and operating processes. *Id*. In the mid-1990s, Argo installed new equipment that resulted in increased heat load and cooling needs for the plant. *Id*. A cooling tower was included in the project to address concerns that the discharge might result in noncompliance with the thermal standards in the NPDES permit. *Id*.

Mr. Jirik explained that the dedicated-use cooling tower accepts or takes less than one percent of the current amount of water withdrawn from the CSSC by Argo and the blowdown from the tower is not returned to the CSSC. Exh. 303 at 4. The blowdown is instead discharged to the District. Mr. Jirik stated that the cooling tower allows Argo to remain in compliance with the NPDES permit as Argo is able to avoid adding thermal load to the discharge to the CSSC. *Id*. Mr. Jirik opined that Corn Products is "near the approximate limit of its allowable thermal discharge" to the CSSC and tightening the thermal standards "threatens the use" of the CSSC water for cooling purposes at Argo. *Id*.

Mr. Jirik testified that Corn Products believes that IEPA's proposal of Aquatic Life Use B for the CSSC is inappropriate because the designation does not account for characteristics of the CSSC that are different from other waters proposed for the CAWS Use B designation. Exh. 303 at 4. Mr. Jirik stated that the fisheries present in the CSSC are subject to habitat limitations and other non-thermal stressors and thus categorizing the CSSC as CAWS Use B "will provide no meaningful improvement of fisheries relative to current conditions." Exh. 303 at 4-5. Mr. Jirik opined that therefore "justification for the CAWS Use B designation for the CSSC is not supported by the record." Exh. 303 at 5.

Mr. Jirik stated that Corn Products further believes that if the Board adopts the proposed Use B designation for the CSSC, Argo's use of the waters for non-contact cooling will be jeopardized. Exh. 303 at 5. Mr. Jirik asserted that there is "ample evidence" that the CSSC does not meet the proposed Use B thermal water quality standard. Exh. 303 at 5, citing to Exh. 285, Attach 6. Mr. Jirik offered temperature data recorded at the intake structure for Argo during the period from January 2004 through November 2007. Exh. 303 at 5 and Attach 1. Mr. Jirik stated that the data indicate that the water temperature at the intake often equals or exceeds the proposed thermal water quality standards of proposed CAWS Use B. *Id*. Mr. Jirik testified that these data demonstrate that a mixing zone is not available based on testimony by IEPA. Exh. 303 at 5-6, citing 1/28/08Tr. at 47. Further, as a practical matter, if the CSSC is at or near the thermal water quality standard, there would be insufficient assimilative capacity for the heated effluent to reach the thermal water quality standard. Exh. 303 at 6.

Corn Products evaluated methods identified by IEPA as available to meet the proposed CAWS Use B standards and specifically IEPA's suggestion that cooling towers are an economically reasonable method to attain compliance. Exh. 303 at 6. Mr. Jirik opined that IEPA's opinion is based on the fact that cooling towers are used at other facilities; however IEPA did not consider whether cooling towers would be adequate for each discharger. *Id*. Mr. Jirik testified that Corn Products has found that a cooling tower would be inadequate to attain and maintain compliance with the proposed standard. *Id*. Corn Products' position is based on a study performed by Ambitech Engineering Corporation (Ambitech), which determined that chillers in addition to a new cooling tower would be required. Exh. 303 at 6. Ambitech estimates the total costs for installation alone would be $23,645,000.

In establishing a proper use designation for the CSSC, Mr. Jirik suggested that the Board should consider the CSSC is a relatively recently created artificial man-made channel that was mined and excavated through limestone bedrock. Exh. 303 at 7. Mr. Jirik noted that the CSSC was created for the primary purpose of reversing the flow of the Chicago River. *Id*. Mr. Jirik stated that from "both a functionally and physical perspective" the CSSC is more like an aqueduct than a river. Exh. 303 at 8.

Mr. Jirik offered that the CSSC provides navigation between the Great Lakes and the Mississippi River and primary transport for industrial materials. Exh. 303 at 8. Primary development along the CSSC is commercial and industrial and the District is the largest landowner along the CSSC. *Id.*

Mr. Jirik claimed that IEPA recognizes that the CSSC receives discharges from a significant number of facilities and that thermal discharges are a noteworthy group of sources. Exh. 303 at 8, citing SR at 103. Mr. Jirik noted that Midwest Generation's Fisk and Crawford plants discharge heated non-contact cooling waters upstream of Argo, and the District's Stickney WRP is also upstream. Exh. 303 at 8. Mr. Jirik opined that a large percentage of the water in the CSSC "has been used, re-used, and/or recycled." Exh. 303 at 9.

Mr. Jirik noted that the Board recognized the unique nature of the CSSC when allowing an alternative thermal standard for discharges from the Fisk and Crawford plants. Exh. 303 at 9, citing Petition of Commonwealth Edison for Adjusted Standard from 35 Ill. Adm. Code 302.211(d) and (e), AS 96-10 (Oct. 3, 1996). Mr. Jirik stated that the Board recognized that the CSSC was "greatly modified" and that the area was heavily developed with industry. *Id*.

In conclusion, Mr. Jirik testified that the CSSC combines the attributes of an artificial creation, waste water dominance, and multiple significant reuses of water. Exh. 303 at 10. Corn Products believes that the CSSC serves important social and industrial purposes. *Id*. Corn Products does not believe IEPA properly evaluated the proposed rule and the impact on discharges. *Id*.

James Huff on Behalf of Corn Products

Mr. Huff testified on three occasions; twice on behalf of Citgo/PDV (Exh. 285, Exh. 437) and once on behalf of Corn Products (Exh. 304). His testimony on behalf of Corn Products is summarized here. Mr. Huff specifically incorporates his testimony on behalf of Citgo/PDV into his testimony on behalf of Corn Products, as that testimony relates to the uniqueness of the CSSC, the use attainability goals, thermal mixing zones, thermal water quality standards and characteristics of the CSSC. Exh. 304 at 2. Mr. Huff was retained by Corn Products to review IEPA's aquatic life use designation for the CSSC and the technical justification for those use designations. Exh. 304 at 1.

Mr. Huff reiterated his opinion that the CSSC is demonstrably different from the other waterbodies in CAWS. Exh. 304 at 2. Mr. Huff further noted that the waterbodies in the proposed Aquatic Life Use B waters are all natural waterways except for the Lake Calumet Connecting Channel. Exh. 304 at 2-3. Mr. Huff argued that the Board has "consistently recognized the challenges, variability, and uniqueness of the CAWS and LDPR," and some of the same challenges facing the CAWS and LDPR in the 1970s remain today. Exh. 304 at 3-4. Mr. Huff opined that the CSSC is a harsh aquatic environment with limited habitat as evidenced by the low IBI scores. Exh. 304 at 4. Mr. Huff believed that these conditions exist because of the unnatural creation of the CSSC and the steep walled hard rock nature of the CSSC. *Id*. Furthermore, Mr. Huff noted that the electric barriers installed in the CSSC prevent migration of aquatic invasive species into Lake Michigan; but also block movement of native fish into the CSSC. *Id*. Mr. Huff stated that from a biological perspective the CSSC terminates at the fish barrier. *Id*.

Mr. Huff testified that the physical habitat in the CSSC ranges from poor to very poor, and the diversity of aquatic life supportable is limited. Exh. 304 at 4. Mr. Huff noted that IEPA's testimony acknowledges that a balanced indigenous population of fish cannot be attained in the CSSC. *Id*., citing 1/28/09Tr. at 116.

Joseph Idaszak on Behalf of Corn Products

Joseph Idaszak is the General Manager, Indiana Operation of Ambitech. Ambitech is a full service engineering, procurement, and construction management company specializing in retrofit and revamp projects. Exh. 305 at 1. Ambitech was retained by Corn Products to evaluate options to allow Corn Product to maintain the current use of non-contact cooling waters from the CSSC under the proposed CAWS Use B designation. Exh. 305 at 1-2. Ambitech studied options for end of the pipe compliance, as Corn Products believes that is what will be required under the proposed standards. Exh. 305 at 2, citing Exh. 303.

Ambitech evaluated four options:

1) Current use case;

2) Single CSSC water cooling tower;

3) Unit specific closed loop cooling with several smaller cooling towers; and

4) Mechanical cooling in conjunction with option 2. Exh. 305 at 2.

With the first option, Ambitech found that Corn Products could not meet the proposed temperature standard during some averaging periods as well as some daily maximum periods during a typical year. Exh. 305 at 3.

The second option was the focus of Ambitech's evaluation. This would require installation of a cooling tower that would be used after the process heat has been transferred to the cooling water but before the return of the water to the CSSC. Exh. 305 at 3. To install such a cooling tower, Corn Products would need a suitable physical location to site a cooling tower sized for peak flow of 45,000 gallons per minute, with structural support for the tower as well as pumps and piping. *Id*. Mr. Idaszak noted that cooling towers rely on evaporative cooling along with some sensitive heat removal due to direct contact with air for removal of heat. *Id*. Mr. Idaszak opined that there is a practical limit on the ability of a cooling tower to remove heat, and that assessment is made using the wet bulb temperature of the water entering the cooling tower. *Id*.

Ambitech determined which area at Argo was best suited for new cooling tower and then selected a design for the cooling tower. Exh. 305 at 4. The capital cost to purchase and install a new cooling tower was $23,645,000. *Id*. Mr. Idaszak testified that there is a 90% confidence level that the installation would not exceed this cost. *Id*. This cost does not include any redundancies which need to be included at an additional cost of $2,000,000. *Id*. Mr. Idaszak noted that there would still be times of the year when the period averaging for the proposed rule would be exceeded. Exh. 305 at 5. Mr. Idaszak testified that for this reason the second option was not considered technically feasible. *Id*.

The third option is a closed loop cooling system that would consist of multiple cooling towers. Exh. 305 at 5. Mr. Idaszak testified that the costs for this system would be higher than option two because of the need to purchase multiple towers. *Id*. The maintenance and operation costs would also be higher than option two. *Id*. Mr. Idaszak stated that for these reasons option three was eliminated as not being economically feasible. *Id*.

The fourth option was considered as a supplement to the cooling tower considered in option two. Exh. 305 at 6. This option would require the addition of a refrigerant compressor and evaporator system. *Id*. Mr. Idaszak offered that 12,375 tons of mechanical cooling would be required and the cost would be upwards of $20,000,000. *Id*. Mr. Idaszak opined that the fourth option may be technically feasible, but the option is not economically reasonable. *Id*.

Mr. Idaszak concluded that none of the four technologies evaluated individually provide for the continuation of the exiting use of cooling water in compliance with the proposed thermal water quality standard. Exh. 305 at 6. Mr. Idaszak conceded that combining the second and fourth option might achieve compliance but the cost would be at least $43,645,000. *Id*.

Dr. Carl Adams and Robin Garibay on Behalf of Stepan Company

Carl Adams and Robin Garibay presented testimony on behalf of Stepan Company. Exh. 318. Dr. Adams and Ms. Garibay are employed by ENVIRON International Corporation, and Stepan asked them to assess the impact of IEPA's proposed aquatic life use designations on the Stepan's Millsdale plant. Exh. 318 at 1-2. To analyze the impact of the proposal, they reviewed IEPA's proposed regulatory revisions and the supporting documents. Exh. 318 at 2.

Stepan is a global manufacturer of specialty and intermediate chemicals used in consumer products and industrial applications, mainly in the soap and detergent industry. Exh. 318 at 2. The Millsdale plant was constructed in 1954 and is located in an unincorporated area near Elwood in Will County. *Id*. The plant employs about 400 people and operates in many respects as a specialty chemical manufacturer. The Millsdale plant produces between 1,200 and 1,500 varying products according to consumer specifications. Exh. 318 at 2-3.

The Millsdale plant has a "complex" wastewater treatment system that include over 15 tanks and numerous processes. Exh. 318 at 3. The Millsdale plant generates digested sludge that is land applied pursuant to the Millsdale plant's land application permit. *Id*. Effluent from the wastewater treatment system is discharged into the UDIP. *Id*. The discharge at the time testimony was given, was 0.88 mgd of treated process wastewater, sanitary wastewater and stormwater. *Id*. The discharge is monitored for 68 parameters, and the discharge limits are based on the use of the best available treatment technology for the organic chemical industry. *Id*.

IEPA's proposal to re-designate the aquatic life use of the UDIP would necessitate changes to the current water quality standards for temperature and DO. Exh. 318 at 3, 11. With temperature, Stepan is currently not subject to standards for temperature, and it is assumed the DO standard will be applied at the end of pipe. *Id*. Stepan would be subject to the proposed temperature limitations "likely without the option of a mixing zone due to" upstream discharges of heated effluent. Exh. 318 at 3. The proposed temperature limits would require radical temperature reduction and/or control that would be costly to construct and operate. *Id*. The reduction and/or control option would also have "significant" cross-media impacts. *Id*.

Dr. Adams and Ms. Garibay stated:

> Although our opinions/conclusions do not address the impact on the river directly, it is very evident that maintaining heat within the biological treatment process and then being required to remove that heat prior to discharge of the effluent is contrary to most, if not all, laws of nature on conservation and carbon footprint. The energy that creates the heat in the wastewater treatment plant effluent cannot be destroyed and can only be removed from the effluent by transferring it to some other environmental media, for example ambient air, through processes that themselves require energy recourses and thus the production of more energy and heat. Exh. 318 at 4.

Julia Wozniak on Behalf of Midwest Generation

Julia Wozniak testified twice on behalf of Midwest Generation where she is employed as an Environmental Project Manager. *See* Exh. 364 and Exh. 425. Ms. Wozniak's first testified regarding Midwest Generation's operations as they relate to the rulemaking which is summarized in this section. She later testified on the issue of Asian carp which will be summarized together with other witnesses on that topic.

Ms. Wozniak worked for ComEd and later Midwest Generation beginning in 1982. Exh. 364 at 1. Ms. Wozniak has a Bachelor of Science in Environmental Science from the University of Illinois. For the past 24 years Ms. Wozniak was "involved in overseeing, coordinating and implementing water quality related biological and physicochemical monitoring and analytical sampling activities for all Midwest Generation facilities, modeling the complex thermo-hydrodynamics of power plant and waterway interactions, and participating in state and federal policy and rulemakings". Exh. 364 at 1.

Ms. Wozniak's testimony focused on four key issues: 1) providing an overview of Midwest Generation's generating stations along CAWS and the LDPR, 2) describing the existing thermal water quality standards applicable to Midwest Generation, 3) describing the procedures used by Midwest Generation to achieve compliance with existing thermal water quality standards, and 4) describing Midwest Generation's involvement in the public participation process related to IEPA's proposed UAA Rules. Exh. 364 at 2.

An Overview of Midwest Generation's Generating Stations Along CAWS and the LDPR

Midwest Generation owns and operates seven electric generating stations in Illinois with three of these stations located on CAWS: Fisk, Crawford, and Will County stations. Ms. Wozniak reported that the "generating units at each of Midwest Generation's CAWS Stations are coal-fired, and each utilizes an open cycle, once-through condenser cooling system. The Midwest Generation Stations are steam electric generating processes that require the use of large volumes of surface water." Exh. 364 at 2. None of the three generating stations located on CAWS is equipped with cooling towers. Exh. 364 at 3.

Ms. Wozniak stated that Midwest Generation has two separate generating stations on the LDPR, Joliet Unit 6 along the east bank of the LDPR and Joliet Units 7&8 along the west bank of LDPR. The two stations (three units) are located approximately one mile southwest of the City of Joliet, adjacent to the LDPR in the UDIP. Exh. 364 at 3. Both the Joliet 6 and Joliet 7&8 stations are steam electric coal-fired generating facilities, and utilize open-cycle once through cooling systems. Exh. 364 at 3 and 4. She reported that cooling towers for the generating station at Joliet Units 7&8 were installed in 1999. Ms. Wozniak reported that the "purpose of the towers is to minimize potential thermal impacts to the river ecosystem and maintain compliance with existing thermal water quality standards, while optimizing Midwest Generation's ability to produce needed power during critical weather conditions." Exh. 364 at 4. Ms. Wozniak explained that the towers "are used when the circulating water discharge temperature exceeds 93°F for an extended period of time. Exh. 364 at 5.

Existing Thermal Water Quality Standards Applicable to Midwest Generation

Ms. Wozniak stated that the five Midwest Generation stations located on CAWS and LDPR "are currently subject to Secondary Contact and Indigenous Aquatic Life Water Quality Standards on a near-field basis". This means that the point of compliance for thermal discharges from each of the stations is the edge of the allowed mixing zone, which is currently the maximum area of 26 acres. All five stations are also subject to the Interstate 55 Adjusted Thermal Standards ("Adjusted Standards"). Exh. 364 at 5. She reported that "extensive multi-year biological, physical, and chemical monitoring and modeling work was performed as part of the Upper Illinois Waterways (UIW) Studies to support the Adjusted Standards, which were adopted by the Board in 1996." Exh. 364 at 6.

Ms. Wozniak stated that IEPA and the Board "agreed to the Adjusted Standards based on a number of factors, including the fact that ComEd had successfully demonstrated that the heat discharges from the Joliet facilities did not cause nor could be reasonably expected to cause significant ecological damage to the waters of the Five-Mile Stretch (the Lower Des Plaines below I-55)". Exh. 364 at 6. She said that it was also agreed that "heat was not a factor limiting the quality of the aquatic habitat of the Five-Mile Stretch, but rather other factors such as the loss of habitat due to channelization, disruption of habitat due to barge traffic, and the presence of heavy metals and other pollutants in the system, were overriding the effect of temperature on the waterway". Exh. 364 at 6. When issuing the Adjusted Standard in 1996, IEPA believed that while the installation of cooling towers may be technically feasible in reducing the temperature of the effluents, the cost of providing this cooling was not economically reasonable when compared to the likelihood there would be no improvement in the aquatic community. *Id*.

Ms. Wozniak reported that the Adjusted Standards "are in-stream temperature limits applicable specifically to the Interstate 55 Bridge location and consist of a set of monthly/semi-monthly temperature limits that vary on a seasonal basis", from a low of 60 degrees F to a high of 90 degrees. Exh. 364 at 7. She elaborated that these standards "may be exceeded by no more than 3°F during 2% of the hours in the 12-month period ending December 31, except that at no time shall Midwest Generation's plants cause the water temperature at the Interstate 55 Bridge to exceed 93°F". Exh. 364 at 7. She also noted that the "Adjusted standards are identical to the existing General Use numeric thermal standards during the months of January and February, and are within 1°F of the General Use numeric thermal standards during June, July and August." *Id*. Further, she noted, during the transitional months of the year, the Adjusted Standards limits at the Interstate 55 Bridge are more stringent than the corresponding General Use Standards. Exh. 364 at 7. She noted that based on her "experience and first hand observations through the UIW Studies, the Adjusted Standards provide an adequate level of protection for the aquatic community below Interstate 55, and provide a more representative normal, seasonal fluctuation than either the Secondary Contact or the General Use numeric standards". Exh. 364 at 8.

Midwest Generation's Compliance with Applicable Thermal Water Quality Standards

Ms. Wozniak reported that since the Adjusted Standards became effective in 1996, Midwest Generation has been in compliance with thermal water quality standards. She said this has been achieved by use of supplemental cooling towers at Joliet Facilities Units 7&8, by

lowering the megawatt load for one or more of the Joliet Facilities' units; or a combination of both. Maintaining compliance with thermal standards is complicated in that ambient stream temperature is largely associated with the volume of flow in the river. She stated that Midwest Generation's compliance efforts are largely dictated by upstream flow manipulations and conditions that in turn affect the volume of flow to the UDIP. Exh. 364 at 9. The flow of the river in CAWS can fluctuate greatly depending upon weather or regulated flow, stemming from the artificially controlled nature of the flow of the LDPR, which includes upstream wastewater effluents, storm events, and flood control measures instituted by the USACE at the two existing upstream lock and dams. Exh. 364 at 10. She detailed the complexity of the modeling required to meet the thermal standards, particularly during critical periods when river flows are low and the demand for power is high. Exh. 364 at 11. She reported that the "model is constantly updated with real-time data and manually run in an iterative, continuous manner during critical periods, in order to gauge compliance and provide continuing operating guidance to Joliet station personnel in order to both optimize station load, as well as maintain thermal compliance." Exh. 364 at 12.

Midwest Generation's Participation In The LDPR UAA Stakeholder Process

Ms. Wozniak reported that Midwest Generation was invited to participate in the LDPR UAA Workgroup in 2000, in part, because aside from the District, Midwest Generation had the most extensive biological monitoring database in the UIW system, particularly for the LDPR portion of the UIW. She stated that she had participated in every meeting held. Exh. 364 at 12. Midwest Generation also participated in the CAWS SAC that began in 2002. Ms. Wozniak stated that the primary purpose of the LDPR UAA was to "bring all interested parties together on a regular basis to discuss use designation and water quality issues and to help develop the basis and support for the conclusions of the UAA Report." Exh. 364 at 13.

Ms. Wozniak explained that during the first two years of the workgroup, "major differences existed between IEPA and the stakeholders regarding what the appropriate thermal and bacterial standards should be for the waterway". Exh. 364 at 13. These two issues were set aside until the August 2003 draft LDPR UAA Report was released. She noted this draft concluded that General Use thermal standards could be applied to the LDPR without providing supporting data or justification that such standards would be appropriate. She reported that Midwest Generation "provided extensive comments showing that the potential applicability of the General Use thermal standards to the LDPR was not warranted or justified based of the lack of adequate habitat to support an aquatic community that needed such stringent thermal standards". Exh. 364 at 13. The issues related to thermal standards were not resolved with the release of the LDPR UAA report in December 2003, at which time meetings of LDPR UAA stakeholder workgroup ceased. Exh. 364 at 14. Ms. Wozniak reported that USEPA and IEPA continued working on the issues related to thermal standards, and in "January 2007, Midwest Gen[eration] and the other stakeholders were presented with IEPA's proposed numeric thermal water quality standards for CAWS without the benefit of stakeholder participation". Exh. 364 at 15.

Ms. Wozniak concluded by saying over an 8-year period, "Midwest Gen[eration] has expended substantial time and effort in helping to inform the UAA process, including providing

key, long-term biological monitoring program data and comprehensive UIW Study information". Exh. 364 at 15. Despite this effort she believed that IEPA had "ignored an overwhelming amount of information and data that if fairly considered", would not support IEPA's current proposal. *Id*. Ms. Wozniak opined "that the physical features of the waterway are the primary factors limiting further biological improvements, and (2) that the current contribution of heat from Midwest Generation's generating station discharges is not having an adverse impact on the biological communities of the CSSC or the LDPR". Exh. 364 at 15 and 16.

Greg Seegert, on Behalf of Midwest Generation

Greg Seegert is employed as a Senior Scientist and Chief Ichthyologist with EA Engineering, Science, and Technology where he has been involved in aquatic life field studies in the UIW. Mr. Seegert has 35 years of experience in the areas of aquatic ecology and ichthyology. Exh. 366 at 1. Mr. Seegert offered testimony twice on behalf of Midwest Generation (*See* Exh. 366 and 428). His second set of testimony related to the issue of Asian carp and is summarized with other witnesses on that topic. Summarized here, Mr. Seegert provided testimony on behalf of Midwest Generation on four issues: 1) a review of the regulatory requirements applicable to UAA used in assessing whether waters can attain CWA goals for aquatic life use; 2) an assessment of whether CWA aquatic life use are attainable in the CSCC and LDPR; 3) a review of the aquatic habitat suitability for the CSSC and UDIP; and 4) a review of fish and QHEI surveys conducted in the UDIP. Exh. 366 at 1 and 2. Mr. Seegert testified that, in his professional opinion, based on extensive experience, the limiting conditions adversely affecting the CSSC and LDPR do not allow the attainment of CWA aquatic life goals. Exh. 366 at 2.

Mr. Seegert stated that if any one of the six UAA factors established by USEPA can be demonstrated to apply to a water body, it is sufficient to conclude that the CWA aquatic life use goals cannot be met. He elaborated by stating "a minimum of four of six UAA factors apply to the CSSC and LDPR, thus precluding attainment of CWA aquatic life use goals." Exh. 366 at 2. Mr. Seegert contends that UAA Factors 2, 3, 4, and 5 are all applicable. *Id*.

Mr. Seegert opined that "UAA Factor 2 applies in the event that natural, ephemeral, intermittent or low flow conditions or water levels prevent use attainment, unless such conditions may be mitigated by the discharge of sufficient volumes of effluent discharges without violating state water quality standards". Exh. 366 at 3. He noted that flows in CAWS are highly variable and therefore do not support a balanced aquatic community. While it is well known that high flow regimes can adversely affect fish, IEPA acknowledged that it had not considered whether extreme flow changes occurred, and if so, what negative impact these changes might have on fish populations. Mr. Seegert asserted that as a result of these facts, Factor 2 is clearly met. *Id*.

The second UAA factor that Mr. Seegert contended was met is UAA Factor 3, which "applies where use attainment of a water body cannot be met due to human caused conditions or sources of pollution that cannot be remedied or, if attempted to be remedied, would cause greater environmental harm than leaving in place". Exh. 366 at 3. He noted that the "heavy barge traffic and navigation, protected uses in the CSSC and UDIP, have a direct, adverse impact on the aquatic ecosystem". These impacts include physical injury to aquatic life, "stranding,

disrupting spawning, uprooting aquatic vegetation used as habitat, increasing turbidity, and increasing mortality through the resuspension of sediments, both contaminated and uncontaminated". *Id*. As a result of the flow conditions related to navigation, Mr. Seegert opined that attainment of CWA goals is not achievable. Exh. 366 at 3.

He discussed the adverse impacts to the aquatic community caused by barge traffic, which are similar to those discussed in UAA Factor 2. In addition, Mr. Seegert discussed "the physical and chemical makeup of the river sediments and how sediments are dispersed and accumulated in the river" as a key limiting factor to CAWS aquatic ecosystem. Exh. 366 at 4. He presented the results of a 2003 evaluation of the Dresden Pool where sedimentation was found to be moderate to severe in 70% of the areas where QHEI scores were assessed. These sediments are contaminated as shown by studies of all three navigational pools (Brandon, Dresden, and Lockport) and in the side channels and backwater areas, although Mr. Seegert contended IEPA failed to consider whether these factors would prevent these waters from achieving CWA aquatic life use goals. Mr. Seegert stated that in his opinion, UAA Factor 3 has been met. Exh. 366 at 5.

Mr. Seegert explained that UAA "Factor 4 applies in situations where dams, diversions, or other types of hydrologic modifications preclude use attainment, and restoration is not feasible". Because CAWS is designed for barge traffic and to handle stormwater and municipal wastewater, there are large pools separated by locks and dams within the CSCC and LDPR Exh. 366 at 5 and 6. According to Mr. Seegert, these impoundments "adversely affect fish species by eliminating riffles, reducing stream velocity, increasing sedimentation, interrupting fish migration, reducing insects that provide a food source, and reducing overall habitat complexity and biological integrity". Exh. 366 at 6. Mr. Seegert asserted that the "dams and locks in the CSSC and UDP currently function as originally designed and constructed and their impact on aquatic communities is unmistakable and irreversible", which led him to conclude that UAA Factor 4 also applies. Mr. Seegert discussed UAA Factor 5, which "applies to water bodies where there is a lack of natural features such as proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, that preclude attainment of aquatic life protection uses". Exh. 366 at 7. The many physical limitations already discussed apply to UAA Factor 5, which led Mr. Seegert to conclude that it applies as well. *Id*.

Mr. Seegert contended that habitat conditions in the CSSC are degraded and irreversible and therefore do not allow attainment of CWA aquatic life goals, supported by QHEI scores of less than 60 for much of the system. It is widely accepted that streams with a QHEI scores of over 60 are capable of "supporting balanced indigenous fish populations that are consistent with the goals of the CWA". Exh. 366 at 8. QHEI data collected in 2003 and 2008 confirmed that the "average score in the UDP is generally between 45 to 50, which is at the lower end of the range of habitat that may have the potential to support CWA aquatic life goals". *Id*. The only portion of the UDIP that has been documented as having suitable habitat is the "Brandon tailwater area, which accounts for only a small fraction (around 7%) of the entire Dresden Pool", although this area "is isolated and surrounded by predominantly poor to fair habitat in the Dresden Pool". Exh. 366 at 11.

Mr. Seegert asserted that "much of the data relied upon by IEPA to establish uses in the LDPR are significantly flawed". Exh. 366 at 13. This includes having relied on QHEI scores that were calculated from a very small and non-representative portion of the UDIP and were mathematically or methodologically inaccurate. Although some of these inaccuracies were individually small, they collectively resulted in "systematic scoring inflation that wrongly gives the impression that habitat in the UDIP (and elsewhere) is better than it really is". Exh. 366 at 13. Mistakes were also made in calculating IBI scores at numerous locations, including misidentifying species, the inclusion of exotic species in the total species richness, and the incorrectly tallying the number of fish caught. Exh. 366 at 13 and 14. The large number of errors in calculations led to "perhaps most of the IBI scores being wrong". Exh. 366 at 14.

Mr. Seegert noted that IEPA had concluded that the UDIP "shares characteristics with Illinois General Use waters that enable it to attain CWA aquatic use goals". Exh. 366 at 14. He refuted this conclusion by asserting the "comparison to Illinois General Use waters is misleading and misguided, as General Use waters do not have the combination of channelization, impoundment, commercial navigation, irregular flows, and significant inputs from urban storm water and wastewater discharges that characterize the UDIP". *Id*. As a result Mr. Seegert opines that IEPA's proposed use designation for the UDIP "is not an appropriate designation and is not scientifically supportable". *Id*.

Mr. Seegert reported on extensive fish surveys that confirm the CSSC "is dominated by pollutant tolerant species, reflecting degraded habitat conditions". Exh. 366 at 17. In 1994, fish eggs and larvae were collected at 16 locations in the UIW. The six most commonly collected species "share early life history characteristics that appear to be most successful" in the CSCC, which include adaptations to low DO concentrations and having minimal contact with bottom sediments". Exh. 366 at 18. These six species accounted for 86% of the larvae collected. *Id*. Similar surveys were conducted in 1993 and 1994 that resulted in the capture of 25,349 adult and juvenile fish representing 82 species, with over 60% being highly tolerant species, a result of severe habitat limitations within the system. Exh. 366 at 18 and 19.

Mr. Seegert provided additional evidence of the poor habitat conditions that exist within the UIW. "The highest incidence of diseased fish as measured by abnormalities such as deformities, erosion, lesions, and tumors (DELTs) were observed in the upper three segments of the study area (*i.e.*, Lockport Pool, Brandon Pool and Upper Dresden Pool)". Exh. 366 at 19. DELT percentage rates ranged from a low of 7.5% (downstream of Dresden Dam) to a high of 14.6% (Brandon Pool)". Exh. 366 at 19 and 20. He reported that additional surveys conducted from 1993 through 2005 were consistent with the data discussed above. The species present did not reflect a balanced indigenous population, despite slight improvements since 1993. Mr. Seegert concluded by stating "the preponderance of moderately tolerant and highly tolerant fishes reflects the degraded habitat of Dresden Pool, and not the effects of thermal discharges. It also reflects the limited availability of good quality habitat that is necessary to attain a balanced, indigenous species that equates to the attainment of the CWA aquatic use goals". Exh. 366 at 21.

Mr. Seegert opined "that irreversible physical and biological factors limit the biological potential of the CSSC and UDIP (conditions wholly unrelated to thermal effects) and prevent these waters from attaining CWA aquatic life use goals". Exh. 366 at 21 and 22. He further

stated that the "[I]EPA in developing the UAA Proposed Rules has completely ignored many attributes, constraints and habitat limitations of the UDIP that prevent this waterway from attaining CWA aquatic use goals". *Id*. He concluded that these conditions are irreversible, "with unmistakable negative impacts on the aquatic community which the UAA Proposed Rules will not and cannot change to the extent necessary to attain the CWA aquatic use goals". Exh. 366 at 22.

Allen Burton, on Behalf of Midwest Generation

At the time of his testimony, Allen Burton served as the Director of the National Oceanic and Atmospheric Administration's (NOAA) Cooperative Institute for Limnology and Ecosystems Research and a Professor in the School of Natural Resources and Environment at the University of Michigan. He stated his "research has focused on developing effective methods for identifying significant effects and stressors in aquatic systems where sediment and storm water contamination is a concern". Dr. Burton testified on behalf of Midwest Generation. Exh. 369 at 1.

Dr. Burton led an "evaluation of sediment quality on the Des Plaines River in support of the Upper Illinois Waterway (UIW) Task Force process" in the mid-1990s. Exh. 369 at 2. He provided testimony on the "chemical, biological, and physical stressors in the UIW, the role of these stressors in biological impairment, and the interrelationship with other key watershed factors that affect heavily human-dominated, effluent dominant waterway such as the UIW". *Id*. Dr. Burton testified to the "fatal flaws" of IEPA's proposed approach to the proposed UAA rules, particularly related to aquatic life designations for the UDIP. Exh. 369 at 2 and 3.

Dr. Burton opined that the "Des Plaines watershed is one of the most heavily urbanized and polluted rivers in the State and, due to the many significant stressors, certain segments will not achieve CWA aquatic life goals". Exh. 369 at 3. He stated that IEPA reported in 2004 that there were more than 800 causes or sources of impairment, including "municipal point source discharges, CSOs, urban runoff/storm sewers, contaminated sediments, channelization, flow regulation, hydro-modification, and habitat alteration." *Id*. He noted that thermal modifications were never reported as a source of impairment by IEPA. *Id*. He reported that the UDIP suffers the same impairments as the Des Plaines River, with some portions not supporting aquatic life or primary recreation uses due to a host of impairments. He stated that "the removal of one stressor alone will not be sufficient to restore a watershed to beneficial use attainment". Exh. 369 at 4. He noted further that wet weather impacts will continue into the future resulting in significant loadings of raw sewage with associated solids, nutrients and chemical contaminants. *Id*.

Dr. Burton summarized the results of a sediment survey of the UIW conducted in 2008, where exceedances of sediment guidelines for metals, PAHs and PCBs were documented at almost every sample location. He reported that some of the sediment contamination is attributable to historical discharges and human activities, but much of it is on-going and will continue due to existing point and nonpoint sources. Exh. 369 at 5. He reported that these contaminated sediments are located "in areas suitable as fish habitat, not in high current areas, such as the main channel", including the shallow waters below Brandon Lock & Dam. Exh. 369 at 6.

He discussed the major stressors for the CSSC and the UDIP, including turbidity resulting from suspended sediments, ammonia, and nutrient enrichment, particularly nitrogen and phosphorus. Exh. 369 at 7. Recent studies by the USGS have documented "elevated concentrations of ammonia and phosphorus, and the presence of organic wastewater contaminants such as disinfectants, pharmaceuticals and steroids, insecticides, and organochlorines", all of which have resulted in decreased numbers and diversity of pollution-sensitive species of fish and benthic invertebrates." In addition to these contaminants, Dr. Burton reported the continued discharge of endocrine disruptors by municipal wastewater plants. Exh. 369 at 8. He observed that there is "serious concern for the sustainability of wild fish populations in waterways receiving municipal wastewaters". Exh. 369 at 9.

Dr. Burton addressed the issue that thermal modification has never been identified by IEPA as a cause of impairment. He stated that the "sections of the LDPR UAA Report titled "Selection of the Temperature Standard" and "Critique of the Current Secondary Contact and Indigenous Aquatic Life Standard" contain inaccurate statements regarding temperature effects on riverine species and ecosystem processes" in that the report incorrectly implies and over-generalizes that high temperatures are always detrimental. Exh. 369 at 9. In the study he directed at Wright State University, he "documented that acute toxicity exists in short-term exposures for multiple species in waters and sediments of the UIW without any water temperature elevation". Exh. 369 at 12. He also noted that "outside the thermal discharge plume, temperature was not observed as a factor of *in situ* toxicity". Exh. 369 at 11.

Based on Dr. Burton's professional judgment, he concluded that "at least three of the six UAA factors set forth at 40 C.F.R. 131.10 apply in the present case, demonstrating that the UIW (including the CSSC and UDIP) does not meet CWA aquatic life goals". Exh. 369 at 13. He further stated that he did not believe it was possible to correct these limitations to meet CWA aquatic life goals, and as a result, the upgrading of use designations under the proposed UAA rules is not supported. Exh. 369 at 11.

Dr. Burton concluded by stating the "rationales used and conclusions reached by IEPA to support its proposed UAA rules are in my view detrimentally flawed". Exh. 369 at 15. He noted their biased interpretation of data, and the failure to provide a "scientifically balanced representation of previous UIW studies, peer-reviewed literature, and accepted approaches that reflect state-of-the-science". Exh. 369 at 13. He observed that the UDIP "is a highly modified, effluent-dominated waterway that receives massive amounts of pollutants from various regulated and unregulated discharges and is generally poor habitat. Acute toxicity of water and sediments, unrelated to temperature, is and will remain a major limitation on the potential of this water body to achieve CWA aquatic life goals". Exh. 369 at 15. Dr. Burton closed by stating the "development of new, modified standards, including thermal standards, will not address the key issue of excessive and pervasive pollution sources, excessive use impairments and limited habitats in this watershed." Exh. 369 at 13.

Ray Henry on Behalf of Midwest Generation

Ray Henry is a principal consultant with Sargent & Lundy LLC (S&L) and has worked for S&L for over 20 years. Exh. 440 at 1 S&L is a full-service architect-engineering firm dedicated to the electric industry, having designed approximately 80% of the large generating units in Illinois. *Id*. Mr. Henry has worked on studies and evaluation of cooling towers for new units and the conversion of existing once-through cooling systems to cooling towers, including sizing, performance and cost estimates. *Id*. In the past 30 years S&L has conducted at least 15 studies for the addition of cooling towers at existing plants that included conceptual design and accompanying cost estimates for conversion from open -cycle cooling to a closed-cycle cooling system. Exh. 440 at 1-2. The primary reason for potential conversion was to evaluate available options to Midwest Generation to reduce thermal loading. Exh. 440 at 2.

Mr. Henry's testimony focused on "describing and explaining" S&L's study for Midwest Gen including:

1) The review of potential options for the subject Midwest Generation electric generating stations to achieve and maintain compliance with the thermal water quality standards proposed in this rule-making proceeding;

2) The design criteria for each of the Midwest Generation stations developed by S&L for use as a basis for estimating the costs of achieving and maintaining such compliance; and

3) The estimated capital and operation and maintenance costs and estimated power loss revenues associated with the additional power demands caused by achieving and maintaining such compliance. Exh. 440 at 2.

Scope of the Project

Mr. Henry testified that IEPA's proposed thermal standard would apply to the receiving waters of five Midwest Generation plants, Fisk, Crawford, Will County, Joliet 6 (also known as 9), and Joliet 7 & 8 (also known as Joliet 29). Exh. 440 at 2. Midwest Generation asked S&L to examine technologies that could be installed at the five stations to meet IEPA's proposed thermal standards. IEPA's Aquatic Life Use B is proposed for wastewater discharges from Fisk, Crawford, and Will County, while UDIP standards apply to the waste water from the two Joliet stations. Exh. 440 at 3. Mr. Henry explained that the current applicable thermal water quality standard for the UDIP and CAWS is a daily maximum temperature of 93°F. That maximum temperature is not to be exceeded more than 5% of the time, and an absolute maximum 100°F applies. Exh. 440 at 3, citing SR at 11-12.

Mr. Henry stated IEPA's proposed thermal standards for the UDIP would reduce the daily maximum temperature to 88.7°F which is not to be exceeded more than 2% of the time and would establish period averages ranging from 85.1°F during most summer periods to 53.6°F during the month of February. *Id*, citing SR at 85. The proposed thermal standards for the Aquatic Life Use B waters would reduce the daily maximum to 90.3°F, which is not to be

exceeded more than 2% of the time and would establish period averages range from 85.1°F during most summer periods to 53.6°F during the month of February. *Id*. Mr. Henry stated that the only difference in the proposed period average standards between the UDIP and Aquatic Life Use B waters is during the summer months of July and August when the Aquatic Life Use B waters allowed maximum monthly average is 86.7°F versus 85.1°F for the UDIP. Exh. 440 at 3.

Mr. Henry testified that all five Midwest Generation stations are currently operating under an adjusted standard granted by the Board in Petition of Commonwealth Edison Company for Adjusted Standard from 35 Ill. Adm. Code 302.211(d) and (e), AS 96-10 (Oct. 3, 1996). Exh. 440 at 4. The limits in the adjusted standard must be achieved further downstream in the LDPR at the Interstate 55 Bridge. *Id*. The Interstate 55 Bridge is approximately seven miles downstream from the Joliet Stations. *Id*.

Description of S&L Cost Estimates Study

Midwest Generation's Stations. Mr. Henry described Midwest Generation's stations indicating that water is boiled to make steam which drives a turbine that powers the electric generator. Exh. 440 at 4. Midwest Generation's stations are "Rankine cycles", the most common method of generating electricity, that convert heat into a form of energy. Exh. 440 at 4-5. The exhaust steam must be condensed so that the water can be returned to the steam generator and the most common cooling source is water. Exh. 440 at 5. Mr. Henry testified that the amount of heat generated from condensing the turbine exhaust is greater than the amount of electricity generated; and thus, a large cooling system is required for these types of units. *Id*. Mr. Henry stated that the Midwest Generation stations were not designed and sites were not selected to attain the stricter thermal water quality standards proposed by IEPA. *Id*.

Mr. Henry stated that only Joliet Units 7 &8 have cooling towers and adding "helping" towers was not a part of the original design, but towers were installed in 1999. Exh. 440 at 5. These existing towers are insufficient to meet IEPA's proposed thermal standards. *Id*.

Technologies Considered by S&L. Mr. Henry testified that S&L applied several criteria to evaluate cooling technologies. Those criteria are:

1) A proven technology for large cooling systems (proven performance and reliability);
2) A design that would fit within existing site boundaries;
3) A system capable of operating during the range of expected weather conditions;
4) A technology that would produce minimal ground level fog or icing;
5) A cooling system that would have minimal impact on the efficiency and the net electrical output;
6) A design that would minimize construction and station outage time; and
7) A technology that would minimize capital and operating cost. Exh. 440 at 6.

Mr. Henry stated that, in applying these seven criteria, "it became apparent that several technologies were not feasible" for Midwest Generation's stations. Exh. 440 at 6. Some of those technologies were not feasible because of site area limitations, while others would not meet

the temperature levels during all weather conditions. *Id*. Mr. Henry stated that closed loop cooling technologies were eliminated because they either had not been proven on such a large scale or the costs were more expensive then wet and wet/dry mechanical cooling tower technologies. Exh. 440 at 6-7.

Mr. Henry explained that mechanical draft cooling towers (either wet or dry) are the most common type of cooling system used in a closed-cycle system for a large heat load. Exh. 440 at 7. Mr. Henry further explained that a cooling tower is comprised of several semi-independent modules referred to as "cells". Each cell consists of:

1) a structural steel, concrete or fiberglass frame;
2) walls (to confine the air and water flow);
3) piping near the top of the framework to distribute the water evenly;
4) a section of "fill" that enhances the contact between the air and water;
5) a large-diameter fan to pull air upward through the tower; and
6) an exhaust stack to help direct warm air upward and away from the sides of the tower. *Id*.

A group of cells is linked end-to-end to form a single cooling tower assembly, and is constructed inside a concrete basin that collects the cool water. The pumps which return the cool water to the condenser are installed on one end of the basin. *Id*.

Mr. Henry explained that wet cooling towers dissipate heat to the atmosphere by evaporating some of the cooling water, and the remaining cooling water is cooled. Exh. 440 at 7. Humidity in the air influence the effectiveness of a cooling tower in removing heat from circulating waters. Mr. Henry stated that cooling towers are more effective on cool, dry days than warm, humid days. *Id*. Dry cooling towers are not as effective and result in higher discharge water temperature than a wet cooling tower. Exh. 440 at 8. S&L determined that a combination of wet/dry cooling towers was the most cost effective for Midwest Generation's stations. *Id*.

Closed-Cycle Cooling Options for Midwest Generation's Stations. Mr. Henry stated that the wet/dry cooling towers selected for Midwest Generation were sized for closed-cycle operation for the range of weather conditions throughout the year. Exh. 440 at 8. Mr. Henry explained that Midwest Generation's five stations would have to be converted from a once-through cooling system into a closed-cycle system, which is a major undertaking for several reasons. Exh. 440 at 9. The problems include the size of the cooling system required and installation requiring a major construction project. *Id*.

Design Parameters for Estimating Closed-Cycle System Costs. Mr. Henry testified that the key elements of the system's conceptual design needed to be identified and included: 1) circulating water design flow rate, 2) design wet bulb temperature, and 3) circulating water pump size. Exh. 440 at 9-10. Mr. Henry stated that a complete detailed design was beyond the scope of the S&L study, so there may be items necessary that were not included in the S&L study. Exh. 440 at 10.

Mr. Henry indicated that the closed-cycle system conceptual design included redundancy that is consistent with normal industry practice. Exh. 440 at 10. For example, the towers have multiple cells, each with a fan, and the failure of one cell will only slightly reduce cooling. *Id*. Mr. Henry further indicated that the system would have multiple pumps, but all pumps are necessary. *Id*.

Mr. Henry stated that in addition to cooling towers, the closed-cycle system requires large pumps and piping to supply the circulating water to the cooling towers and to return the water to exiting circulating pumps. Exh. 440 at 10. Mr. Henry noted that the preliminary cooling tower design used to estimate costs is based on towers with a low drift design to minimize emissions of particulate matter. Mr. Henry also expressed concern that the installation of cooling towers at the stations may trigger requirements under the Clean Air Act, and those cost were not included in the estimates. *Id*.

Design Concepts For Each Midwest Gen Station

Mr. Henry testified that after identifying the design elements common to all five stations, S&L proceeded to evaluate each site specifically. Exh. 440 at 11. Mr. Henry stated that for cost-estimate purposes, design criteria were refined as appropriate for each site. *Id*

Fisk, Crawford and Joliet 6 Stations. Mr. Henry testified that Fisk Crawford and Joliet 6 presented similar conditions and the design was substantially the same for both stations. Exh. 440 at 11. Mr. Henry explained that two cooling towers were included, and the existing intake and discharge canals would be blocked with diversion walls and gates. *Id*. Mr. Henry stated that when the weather was favorable, the diversion gates could be opened to allow once-through cooling water operation. *Id*. The existing circulating water pumps would pump water through the condenser to the discharge and a new pump house and pumps would be installed in the discharge bay to pump water to the new cooling towers. *Id*. Makeup water would be taken from the exiting intake lake. Exh. 440 at 12.

Will County Units 3 and 4 Station. Mr. Henry stated that the Will County station's closed-cycle system would be similar to Fisk, Crawford and Joliet 6 stations. Exh. 440 at 12. However, the size of the cooling tower would need to be larger to provide for the necessary cooling. *Id*. Three cooling tower sections will be required. *Id*

Joliet 7 & 8 Station. Like Will County stations, three cooling towers will be required at this station, according to Mr. Henry. Exh. 440 at 12. Mr. Henry stated that at all of the stations the design includes the ability to operate in two possible modes; but Joliet 7 & 8 will have three. *Id*.

Cooling Systems Design Challenges and Constraints

Mr. Henry indicated that the new cooling system at all five stations requires installing large equipment in relatively small areas. These constraints affected the design, making it less than an optimal design(if space not limited). Exh. 440 at 12. Mr. Henry stated that "[m]ore specifically, the cooling tower arrangements included in the preliminary design are less than

ideal with respect to preventing recirculation of air between cooling towers." Exh. 440 at 12-13. Mr. Henry stated that the recirculation of air between cooling towers is typically something that is prevented or minimized in designing cooling towers because any such recirculation will reduce tower performance. Exh. 440 at 13.

Mr. Henry offered that, in addition to space limitations at the stations, additional design issues arise from existing structures and equipment that interfere with retrofitting them to closed-cycle operations. Exh. 440 at 13. For example, at Fisk, Crawford and Will County Stations, the available area for locating the cooling towers is also the location of existing high voltage transmission lines owned by ComEd. Mr. Henry cited another design consideration the noise that is generated from the operation of cooling towers. *Id*. Mr. Henry noted that S&L's review concluded that noise emissions from the cooling towers are expected to be below the regulatory limits for all of the units except for Joliet 7&8 due to the proximity of an existing office building west of the proposed cooling tower location. *Id*.

Estimated Economic Costs of Compliance with IEPA's Proposed Thermal Standards

Mr. Henry testified that S&L developed estimated costs for each of the five stations that included capital and operation and maintenance (O & M) costs as well as lost revenues. Exh. 440 at 13. The capital cost estimates are as follows:

UNIT	STATION TOTAL GROSS MEGAWATT (MW)	CAPITAL COST WET/DRY TOWER	WET/DRY CAPITAL COST PER KILOWATT (KW)
FISK 19	348	$137,100, 000	$394
CRAWFORD 7 & 8	585	$165,200,000	$282
WILL COUNTY 3 & 4	832	$257,100,000	$309
JOLIET 6	341	$115,700,000	$339
JOLIET 7 & 8	1,138	$300,900,000	$264
TOTALS	3,244	$976,000,000	$301 (average)

Exh. 440 at 14.

Mr. Henry explained that S&L based the capital cost estimates on a combination of budgetary equipment quotes, engineering material quantity estimates, and the use of S&L's database. Exh. 440 at 14. Mr. Henry stated that the physical cooling tower has the highest cost at approximately 15% to 25% of the total capital cost. *Id.* Mr. Henry testified that the cost estimates provide an "order of magnitude" and are reasonable. *Id*.

Mr. Henry testified that the Operation & Maintenance (O & M) cost estimates include: 1) cooling tower fan and circulating water system pump power costs, 2) preventative maintenance and repair of cooling tower fan and circulating water pump systems, and 3) chemicals for control of corrosion and biological growth. Exh. 440 at 15. Mr. Henry provided the following table O & M costs:

UNIT	STATION TOTAL GROSS MW	WET/DRY TOWERS
FISK 19	348	$2,127,000
CRAWFORD 7 & 8	585	$3,960,000
WILL COUNTY 3 & 4	832	$5,750,000
JOLIET 6	341	$2,660,000
JOLIET 7 & 8	1,138	$9,080,000
TOTALS	3,244	$23,577,000

Id.

Mr. Henry indicated that the operation of cooling towers requires a power supply that would require additional power from Midwest Generation. Exh. 440 at 15. Mr. Henry stated that the additional power demand is referred to as "auxiliary power use" and results in a loss of revenue for Midwest Generation. Exh. 440 at 15-16. The annual average of auxiliary power loss is between 2.2% and 3.1% of MW output. Exh. 440 at 16. Mr. Henry also indicated that there would be a loss of efficiency for the stations, with the estimated annual loss of revenue for all five stations is approximately $3,800,000. *Id*.

Mr. Henry described several potential additional costs for compliance. Exh. 440 at 16-17. Those items include noise abatement, additional cooling, changes in the cooling tower locations, a change in the type of cooling, and interference from underground utilities. *Id*.

Mr. Henry's Conclusion

Mr. Henry opined that, based on the S&L study, it is clear that IEPA's thermal standards would require new closed cycle cooling systems for all five Midwest Generation stations. Exh. 440 at 17. Mr. Henry further opined that Midwest Generation's stations were not designed nor were the sites selected or arranged to attain thermal water quality standards as strict as those proposed in this rulemaking. *Id*. Mr. Henry offered that the costs for converting all five Midwest Generation's stations to closed-cycle cooling systems would require an estimated total capital investment of nearly $1 billion and would result in over $23,000,000 per year in O & M costs, while efficiency would be lost. Exh. 440 at 18.

Kimberly Rice, Friends of the Chicago River

Ms. Rice is the policy and planning coordinator for Friends of the Chicago River (Friends). Exh. 475 at 1. Friends seek to improve fish habitat in CAWS, particularly by restoration of banks, improved vegetation, and physical structures in the waterway.

Statistics from the District show that fish populations have increased over the past thirty years, during which time the District ceased emitting chorine from its plants, constructed part of TARP, and constructed SEPA stations. Exh. 475 at 2. The District is working on a modification of the North Branch dam to allow fish access to better habitat. *Id.*

Other groups have also been working to improve fish habitat. First, the City of Chicago developed the *Chicago River Agenda* drawing from numerous sources to support improved habitat. Exh. 475 at 2. In line with the *Chicago River Corridor Design Guidelines and Standards* goal of restoring and protecting habitat, the City has already implemented a number of projects. Exh. 475 at 3-4. Further, the Chicago Park District has completed several projects, and is in the process of implementing or planning at least several more. *Id.* at 4.

Private entities have also worked to improve habitat. Fay's Point residential development has restored a wetland at the confluence of the Cal-Sag Channel and Little Calumet River. Exh. 475 at 4. The Lake Riverdale Sustainable Master Plan has improved habitat, and WRD Environmental has created a floating island that provides habitat to aquatic life. *Id.* Neighborhood and non-profit groups have also contributed. Riverbank Neighbors restored four blocks of riverbank. *Id.* at 5. Friends has completed or is currently engaged in a number of projects, including a proposal for a habitat project in downtown Chicago. *Id.*

Many entities seek to improve habitat in CAWS. *Id.* This not only helps fish, but also birds, birders, fishermen, and others. *Id.* at 5-6. The original purpose of the water way (*i.e.* shipping and waste) is no longer its sole purpose, as shown by the improvement of fish populations. *Id.* at 6.

Paul Botts, Wetlands Initiative

Paul Botts is the executive director of The Wetlands Initiative (TWI), which is a not-for-profit organization, dedicated to restoring wetland resources of the Midwest to improve water quality. Exh. 473 at 1. Mr. Botts stated that in its first decade TWI committed to two restoration projects in Illinois: the Hennepin & Hopper Lakes Project (now the Sue and Wes Dixon Waterfowl Refuge) and Midewin National Tall Grass Prairie. *Id*. Mr. Botts further stated that in TWI's second decade TWI remains deeply involved in restoration progress at those sites, while expanding its scope. Mr. Botts noted that TWI is working as conservation entrepreneurs to advocate, develop, and test innovative strategies for wetlands restoration. *Id*.

Mr. Botts testified about a new technology known as "active capping". Mr. Botts stated that this technology is a new treatment "approach for sediment remediation that offers long-term immobilization and the potential to break down or destroy pollutants with the use of degradation agents in an applied, multi-layer cap." Exh. 473 at 2. Mr. Botts described the differences between "active capping" and traditional capping or armoring techniques, indicating that active capping "involves thin layers of different materials that actively stabilize and sequester metal and organic contaminants." Further, Mr. Botts stated that "[i]n addition to isolating the contaminants from the overlying water, the active capping materials can stimulate the breakdown of the contaminants by microbes in the underlying sediments." *Id*.

Mr. Botts explained that two projects have been designed to test "active capping" in the Chicago River. Exh. 473 at 2. Mr. Botts further explained that both projects are designed and engineered; they await only implementation funding, final specifications and the relevant permits. Exh. 473 at 3.

The first is in Bubbly Creek and has been in development since 2000. Exh. 473 at 2. The Bubbly Creek project would further develop "active capping" and would test the water quality impacts of different contaminant-specific active capping materials in eight test plots. These plots would span 4 acres in a combination of open-flow and hydraulically-isolated conditions in conjunction with a constructed wetland. *Id*. The Bubbly Creek project "would demonstrate water quality improvement, increase wildlife habitat, and provide vital, high quality open space and recreational opportunities to a community in need of these amenities." *Id*. Mr. Botts explained that TWI has collaborated on this effort with the City of Chicago's Department of Environment, the University of Illinois at Chicago, the District, the Chicago Park District, and the USACE. *Id*.

The second project is located downstream from Bubbly Creek in the CSSC at the Collateral Channel, which is a dead-end slip containing sediments contaminated with large quantities of organic and inorganic pollutants from past municipal and industrial wastes. Exh. 473 at 2. Mr. Botts testified that this project would use active capping technology "to stabilize the contaminated sediments in the channel, improve water quality, control greenhouse and noxious gas emissions and create a high quality wetland on top of the protective cap." *Id*. According to Mr. Botts the Collateral Channel project is a one-acre project that will help demonstrate the ability of a wetland to clean polluted water including effluent from CSOs in an urban setting, while also providing habitat for native and migrating wildlife. Exh. 473 at 2-3. Mr. Botts indicated that TWI collaborated in the design and planning of this project with the District, Patrick Engineering, the University of Illinois at Chicago, the Boeing Co., and several private foundations. Exh. 473 at 3.

Testimony and Comments on Asian Carp

Terri Doyle on Behalf of Calumet River Fleeting Inc. (PC 552)

Terri Doyle is affiliated with the Calumet River Fleeting Inc. (CRF). PC 552[5]. It is a full service towing company in the Calumet River. *Id.* at 1. Doyle's testimony focuses on: 1) preserving navigation in CAWS, 2) the impact of potential strategies employed by federal and state agencies to limit the transfer of invasive species and the relationship between this proposal and that effort, and 3) the impact of increased recreational traffic in the waterways on safety. *Id.* Ultimately, Doyle testified in order to convince the Board not to amend water quality standards in CAWS. *Id.*

Doyle has the expertise to testify on such a matter because CRF services the area from O'Brien Lock north and across the lake to all local harbors, Indiana Harbor, Gray Harbor, Burns Harbor, and Milwaukee Harbor. PC 552 at 2. CRF also tows cargo from the Great Lakes south to the Gulf of Mexico, making the company reliant on CAWS. *Id.* CRF transports goods such as petroleum products, agricultural products, coal for local power plants, coke and various steel making products, road salt, water softener salt, cement, sand, slag, gypsum, gypsoil, and project

[5] Terri Doyle originally prefiled testimony along with others from American Waterway Operators; however Terri Doyle did not appear at hearing and the testimony was moved to a public comment.

cargo barges. *Id.* Doyle testified that those products are vital to the suppliers and their customers. *Id.* CRF's volume of cargo in 2008 was 12.4 million tons through the Lockport Lock, over 6 million tons through the Cal-Sag Channel, 1.3 million tons through the Chicago River, 1.1 million tons through Lake Calumet, and 16 million tons through the CSSC. *Id.* Doyle reiterated that interruptions to barge traffic in CAWS would be detrimental to CRF and its customers. *Id.*

Doyle cited studies by DePaul University and Ports of Indiana to support the argument that the economic impact of IEPA's proposed changes would be devastating to the barge industry and the area. PC 552 at 2. Doyle testified that the CAWS issue is not being examined from the point of view of the customer or supplier. *Id.* at 3.

Doyle reiterated that CRF and the barge industry move product along CAWS constantly, and they are already subject to weather. PC 552 at 3. Further restrictions would cripple the industry, and it would add to congestion on the Chicago area expressways. *Id.* Doyle stated that 70 trucks carry one shipment of dry cargo by barge and 144 trucks carry one shipment of liquid barge cargo. *Id.* Doyle added that replacing barges with trucks would increase pollution and safety hazards. *Id.*

Next, Doyle addressed the impact of potential strategies to limit the transfer of invasive species on companies engaged in waterborne commerce and the relationship between this proposal and that effort. PC 552 at 3. Doyle stated that the various federal and state agencies have led varied actions in response to the invasive species. *Id.* at 4. Some want to close the Chicago and O'Brien locks and some want to keep them open. *Id.* CRF and Doyle suggested an alternate way to stop the Asian carp, such as the electric fish barriers and acoustic bubble barriers. *Id.* Doyle also stated that IEPA's position is contradictory because the Asian carp must be deterred, yet the proposed use designation would make the area more attractive to fish. *Id.*

Doyle also addressed the impact of increased recreational traffic and safety on the waterways. PC 552 at 4. Doyle argued that an increase in recreational traffic would result in a "major safety issue" for all the mariners. *Id.* Doyle pointed out that recreational boaters are not required to be licensed but CRF's captains, engineers, and deckhands are "all licensed and trained to handle [their] equipment." *Id.* Doyle also opined that recreational boaters do not understand how to handle tow barges, and canoers and kayakers are not experienced around large commercial boats. *Id.* at 5. Doyle asserted that this inexperience and ignorance causes recreational boaters to be unsafe, which presents huge safety risks. *Id.*

In conclusion, Doyle stated that IEPA's proposed actions to amend water quality should not be allowed. PC 552 at 5. Doyle reasons that a decrease in economic, environmental, and quality of living standards would result from a decrease in barge movement. *Id.*

Darren Melvin on Behalf of Hanson Material Service

Darren Melvin is an employee at Hanson Material Service (Hanson) in the position of Marine Operations Manager, which is in Romeoville, Illinois. Exh. 434. He has been employed by Hanson in various capacities since 1989. *Id.* at 1. All of those positions have related to

commercial navigation within CAWS. *Id.* He is also an active member of the Illinois River Carriers Association and the American Waterways Operators (AWO). *Id.* He works primarily for development and safety along the waterways. *Id.* He testified as a representative of AWO, the national trade association for the tugboat, towboat, and barge industry, upon whose Board of Directors he sits. *Id.*

Mr. Melvin's testimony focused on the importance of preserving navigation in CAWS, the impact of potential strategies to limit invasive species on companies engaged in waterborne commerce and this proposal's effect on that effort, the impact of increased recreational traffic in the waterways on safety, and the federal requirement to protect navigation. *Id.* at 2.

The Importance of Preserving Navigation in CAWS to the Regional Economy, Environment, and Road Traffic. AWO represents 350 member companies. Approximately 20 of those navigate through or are based on CAWS; Mr. Melvin noted that at least six towing companies not affiliated with AWO rely on CAWS as well. *Id.* Those companies rely on the free flow of commerce in the waterways, as well as their customers and the greater Chicago region's citizens. *Id.* The towing companies transport products such as petroleum products, agricultural products, coal for power plants, road salt, steel, cement, and other raw materials for processing or manufacturing. *Id.* Some of those products are especially critical to the Great Lakes region, including road salt, home heating oil, and aircraft-deicing fluid. *Id.* at 2-3. Mr. Melvin testified that the least expensive and most environmentally-friendly method of transportation for those necessities is transport by barge and towing vessel. *Id.* at 3.

Mr. Melvin reiterated that the amount and impact of all the barge activity is substantial. The movement of that activity exists in different bodies of water within CAWS, making the system an integrated network incompatible with the type of fragmentation that would result from the adoption of IEPA's proposal. *Id.*

In support of his argument, Mr. Melvin included information from a study conducted by the Ports of Indiana, which found that 17,655 jobs and $1.9 billion in economic activity in northwest Indiana was attributable to barge movements through the O'Brien Lock alone in 2008. *Id.*, citing *Economic Impacts of Waterborne Shipping On the Indiana Lakeshore,* Ports of Indiana, Aug. 2010.

Mr. Melvin also evaluated the claims that the USEPA made in its letter of April 15 to the Board regarding UAA Factor 3. *Id.* at 4. The USEPA suggested that time and location restrictions be placed on the barge and commercial boat traffic, but Mr. Melvin pointed out that the USEPA's suggestion does not take into account pickups and deliveries of essential items such as coal, iron ore, concrete, and petroleum products. *Id.* Mr. Melvin stated that consumers and businesses across the country rely on the timely delivery of such items, and placing "arbitrary" restrictions on them will negatively impact the entire Midwest. *Id.* Mr. Melvin claimed that such an adverse effect occurred when the CSSC was closed for a week to test the electric barriers, and it cost hundreds of thousands of dollars per day in increased transportation costs. *Id.*

The USEPA's second statement was that barge traffic is occasionally less intense and less frequent, as during the holidays or weekends. *Id.* Mr. Melvin firmly rejected this assertion, stating "[t]here is no evidence to support this assertion and no reason to believe that it is accurate." *Id.* He explained that towing companies do not have the luxury of time to pause transit for certain days. *Id.*

Mr. Melvin testified that limiting navigation would harm Chicago's air quality and quality of life. *Id.* at 5. Barge traffic is more air-friendly than train or truck. *Id.* He quoted findings from a study that concluded that transferring the annual activity of waterborne commerce to rail or truck, the former mode would produce 2.1 million additional tons of carbon dioxide (CO2), and the latter would produce 14.2 million additional tons of CO2.[6] *Id.* The same study concluded that a restriction on waterborne commerce would increase St. Louis's traffic delays by almost 500% and increase injuries and fatalities on the region's highways by up to 45%. *Id.* Mr. Melvin stated that these figures demonstrate that barge traffic relieves traffic on the road and rail. *Id.*

Therefore, Mr. Melvin concluded that the economy, air quality, and automobile traffic flow of the Chicago region would be adversely affected. *Id.*

The Impact of Potential Strategies by Agencies to Limit the Transfer of Invasive Species on Companies Engaged in Waterborne Commerce, and the Relationship Between This Proposal and That Effort. The various measures for controlling Asian carp migration in CAWS have closed the waterways to vessel traffic. *Id.* at 7. The closures caused disruptions to pickups and deliveries. *Id.* Mr. Melvin mentioned that all the rotenone applications found only one carp, and that the industry had only limited warning before suffering the interruption to business. *Id.*

Mr. Melvin also found fault with the Asian carp Regional Coordinating Committee's (ACRCC) Framework and its plans to combat Asian carp. *Id.* He testified that physical separation of CAWS and Lake Michigan would be devastating to the towing industry and all those who rely upon it. *Id.* He also testified that closing the locks would severely limit the amount of barge transportation in the region. *Id.* at 8. He compounded his argument by stating that the locks would not effectively interrupt fish migration, and therefore the idea of closing the locks should be abandoned. *Id.*

Mr. Melvin, however, did include in his testimony methods of Asian carp management of which the AWO does approve. *Id.* Specifically, the AWO encourages commercial fishing and targeted fish sampling, increased law enforcement options to prevent invasive species importation, expedited completion of the third electric barrier, the discovery of the response of the carp to pheromone products, the identification of selective toxicants, and the introduction of acoustic bubble barriers. *Id.*

[6] The Board noted that the title of the study does not appear in Mr. Melvin's testimony, and therefore the citation for the study does not appear here.

Mr. Melvin expressed AWO's concern that the various government agencies contradict one another in proposing and implementing methods to eradicate the Asian carp in CAWS. *Id.* Therefore, the AWO respectfully suggested through Mr. Melvin's testimony that the various agencies employ more coordination between them regarding the Asian carp issue. *Id.* at 9.

The Impact of Increased Recreational Traffic on Safety in the Waterways. More recreational vessels on the CAWS and LDPR will severely compromise the safety of all those who travel on the waterways. *Id.* Increased traffic would negatively affect commercial vessels' ability to safely transport commodities. *Id.* Mr. Melvin insinuated in his testimony that recreators are not as safe at operating vessels as are towboat operators. *Id.* There is a discrepancy in training between the two groups, which presents risk. *Id.* Mr. Melvin also posited that recreational boaters are often unfamiliar with the ways of towboats and barges, which poses a danger. *Id.* at 10.

Federal Requirement to Protect Navigation in the Waterways. Mr. Melvin testified that state officials must comply with federal requirements. *Id.* Federal law prohibits the Agency's proposed changes because the CWA prohibits states from removing or downgrading "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." *Id.*, citing 40 CFR 131.3(e). Therefore, the waterways must continue to be used for navigational purposes. *Id.* at 11.

Second, Section 2.1.5 of the USEPA Water Quality Handbook states that a use designation for navigation was meant to protect the ships, their crews, and not restrict navigation. *Id.* Allowing recreational boaters to use CAWS would violate this regulation. *Id.*

Mr. Melvin's Conclusion. For the above reasons, Mr. Melvin testified that the IEPA's proposed actions to amend water quality standards in CAWS and LDPR should not be allowed. *Id.* He reiterated that the actions would cause a decrease in the economic, environmental, and quality of life standards in the Chicago region and nation due to a decrease in barge transportation, the government actions contradict one another in strategies to manage the waterways, the actions would create safety hazards due to increased water traffic, and the actions would violate federal law. *Id.*

John Kindra on Behalf of Kindra Lake Towing

John Kindra is the owner of Kindra Lake Towing, which is a barge transportation and towing service. Exh. 435. Mr. Kindra provided testimony on the importance of CAWS to his business, how the use designation issues greatly impact waterborne commerce and his business, how certain efforts to stop invasive species can have negative impacts on the region and his business, and how the conflict between government agencies can harm his business. *Id.* at 1.

The Importance of CAWS to Mr. Kindra's Business. Mr. Kindra testified that his business receives barges that use CAWS for navigation purposes daily. Exh. 435 at 1. The barges carry dry cargoes, such as salt, and raw materials for steel mills. *Id.* His business also ships barges with products such as finished steel and the byproducts of the steel-making process. *Id.* Other liquid products also travel through CAWS on tank barges. *Id.* His business moves the

barges for barge companies that do not have their own tugs to operate on Lake Michigan and the Calumet River. *Id.* Barges pass through the O'Brien Lock and travel through the Cal Sag channel and the CSSC to get to his facility. *Id.* DePaul University conducted a study that estimated that the economic value of the barging industry is approximately $4.7 billion. *Id.* at 2.

Use Designation and Impacts on Waterborne Commerce. Mr. Kindra testified that full recreation is not attainable on all segments of the CAWS and LDPR (LDPR). Exh. 435 at 2. He stated that allocating resources to attain recreational water quality in a commercial waterway used for barge transportation is a bad use of "limited resources." *Id.* He noted further that Lake Michigan has beaches and recreational areas in which the "public at large" can recreate if they want to swim. He felt that people would not want to swim in an "industrial waterway" anyway. *Id.*

Mr. Kindra expressed concern over the USEPA's conclusion that recreational use on CAWS would subject barge traffic to some navigation limitations. Mr. Kindra concurred that changing the use designation could adversely affect his business. Exh. 435 at 2. He asserted that the proposed UAA Factor 3 "would reduce, if not fully eliminate, all of the wonderful benefits derived from waterborne commerce." *Id.*

How Certain Efforts to Stop Invasive Species can have Negative Impacts on Mr. Kindra's Business and the Region. Mr. Kindra testified that increasing water quality in CAWS to meet recreational standards makes the waterways more attractive to Asian carp and other invasive species. Exh. 435 at 2. Mr. Kindra placed more importance on the Invasive Species Act (ISA) than the CWA, stating that the ISA should be given higher priority than the CWA. *Id.*

Mr. Kindra suggested that separating CAWS and Lake Michigan would work against efforts to stop the Asian carp invasion. Exh. 435 at 3. He stated that scientists and biologists need to stop the Asian carp by creating a water quality that will deter their migration. *Id.* He suggested adding nitrogen to the water to make a zone in which fish cannot survive, and then adding oxygen downstream to reinvigorate the water quality. *Id.* He stated that using the locks to control the migration of the Asian carp is "all wrong and will not work," and that CAWS needs an effective fish barrier such as the ones in Romeoville, Illinois. *Id.* Mr. Kindra testified that his business would be ruined if the locks were closed. *Id.*

Risk of Harm From Conflict Between Governments. Mr. Kindra testified that the USEPA and IDNR have different goals regarding CAWS. Exh. 435 at 3. The IDNR's efforts to control the Asian carp with application of rotenone has interrupted the flow of barges and harmed him. *Id.* He reiterated that the fish barriers in Romeoville are the best defense against the migration of Asian carp. *Id.* However, he stated that the slow construction, occasional closure, and maintenance on the barriers slow his business. *Id.*

Mr. Kindra testified that the Board must take into account all of the demands on CAWS, including barge transportation and invasive species control. Exh. 435 at 3.

Mr. Kindra's Conclusion. Mr. Kindra concluded that the proposed actions to amend water quality in the CAWS and LDPR should not be allowed. Exh. 435 at 3. He reasons that the

actions would result in decreased economic standards, which would harm his company, the Chicago area, barge transportation nationally, and therefore, the nation itself. *Id.* He identified a second harm in the form of contradiction among government agencies in their strategies for managing water quality and invasive species in CAWS. *Id.*

He also stated that he supports the testimony of American Waterways Operators (AWO). Exh. 435 at 3.

Greg Seegert on Behalf of Midwest Generation

This is Mr. Seegert's second set of testimony on behalf of Midwest Generation. Mr. Seegert has studied the aquatic life in the UIW for many years, and he has great familiarity with the region. *Id.* He worked with Midwest Generation to review and analyze information and data in order to assess the use designation issues relating to aquatic life goals of CAWS and the LDPR in relation to IEPA's proposed UAA rules. *Id.*

Mr. Seegert previously testified to say that IEPA's proposed goals are not attainable because of poor habitat, impoundment effects from the Dresden Island Dam, and poor sediment quality in the UDIP. Exh. 428 at 1. He testified again because the Asian carp situation has developed further. *Id.* at 1-2. He reiterated in his second testimony that IEPA's proposed goals are not attainable and stated that the use designation upgrade will no longer be attainable once the Asian carp are established in the UDIP. *Id.* at 2. Mr. Seegert testified that the Asian carp will bring significant, adverse impacts to the existing community. *Id.*

Asian Carp Basic Facts. "Asian carp" refers to four species of carp: bighead, silver, black, and grass. *Id.* at 3. They belong to the minnow family Cyprinidae. Exh. 428 at 2.

The bighead carp can grow up to 5 feet in length and weigh over 100 pounds. Exh. 428 at 2. They are filter-feeding fish that consume primarily zooplankton, and they can consume up to 20% of their own body weight in food daily. They would compete with native fish such as the gizzard shad and bigmouth buffalo fish. *Id.* They also spawn prodigiously. *Id.*

The silver carp are generally smaller than bighead carp, but they are similar in their feeding and spawning habits. However, silver carp consume phytoplankton rather than zooplankton. Exh. 428 at 2. They are "flying fish" in that they leap out of the water. This causes a danger to boaters. *Id*. Both silver and bighead carp prefer off-channel areas when plankton populations are high, except during spawning. *Id.* The UDIP contains numerous such areas. *Id.* However, bighead and silver carp are not especially discriminate in their eating habits and will also consume fish eggs, fish larvae, mussel larvae, and anything else they encounter during the filtering process, which makes them particularly dangerous to the Great Lakes. *Id.* at 4.

Black carp are different from bighead and silver carp in both diet and appearance. Exh. 428 at 4. They are darker in color and possess pharyngeal teeth for crushing mollusk shells. *Id.* The largest recorded black carp was more than 7 feet long and weighed 150 pounds. *Id.* Black carp were accidentally introduced in the U.S. inside shipments of grass carp. *Id.* They are a

deadly threat to the Great Lakes because they consume mollusks and snails; they can consume 3 to 4 pounds of mussels daily, or up to ten tons during one black carp's life. *Id.* However, they are not an immediate threat to the LDPR. *Id.*

Where Asian Carp Are Already Established Below the UDIP and How They Got Here. Bighead and silver carp were originally imported in the 1970s to keep retention ponds clean and to serve the food fish industry. Exh. 428 at 4. They have escaped through inadvertent releases, overland flooding events, and intentional releases. *Id.* Now there are an ecologically dangerous invasive species in the Mississippi River Basin. *Id.* They have been steadily expanding northward into the heartland rivers: the Ohio, Missouri, Wabash, and Illinois. *Id.* The Asian carp already have large reproducing populations in the Lower Illinois River, such as the Alton, LaGrange, and Peoria Pools, and those have possibly expanded into the Marseilles Pool immediately downstream of the UDIP. *Id.*

The Invasion of Asian Carp Into the UDIP and Its Significant Adverse Effects Upon the UDIP Aquatic Community. Invasion into the LDPR is inevitable because of degraded community structure, reduced food resources, reduced fish condition, reduced recruitment, changed community structure of the plankton communities, changes in benthic community structure, and like reductions of sensitive native species. Exh. 428 at 5.

Why the Invasion of Asian Carp is Inevitable in the UDIP and Brandon Pool. The invasion of Asian carp is a repetition of an oft-repeated scenario of invasive species into ecosystems. Exh. 428 at 5. Invasions continue until they are controlled by human intervention or an insurmountable ecological barrier. *Id.* Historic examples include the beetle carrying Dutch elm disease, purple loosestrife, reed canary grass, kudzu, starlings, house sparrows, rock doves or pigeons, fire ants, killer bees, rats, common carp, rainbow smelt, alewife, sea lamprey, round goby, white perch, zebra and quagga mussels, and the Asiatic clam. *Id.* at 5-6. Thus far, nothing has stopped the northward advance of the Asian carp. *Id.* at 6. Their ultimate advance into Lake Michigan is inevitable; over 5,000 Asian carp have been removed from the Marseilles Pool, which means they are currently at the doorstep of the UDIP. *Id.* Unfortunately, the current commercial netting in the Marseilles Pool will only slow the Asian carp advance but not stop it. *Id.*

Asian Carp Are Already Present in the UDIP. Mr. Seegert testified that Asian carp have already been documented in the UDIP. Exh. 428 at 7. An EA Engineering sampling crew performed an annual fish survey in the UDIP and collected six adult bighead carp, one of which was an egg-laden female. *Id.* Mr. Seegert testified that recent data collected by IDNR convinced him that more than those six are present in the UDIP. *Id.* For example, commercial fishermen have netted 94 Asian carp in the UDIP. *Id.*

Mr. Seegert testified that Asian carp have already passed through the UDIP because one was found in the Lockport Pool below the electric barriers. Exh. 428 at 7. Mr. Seegert stated that the DNA evidence supports this finding. *Id.* Finally, a bighead carp was collected in Lake Calumet, also upstream of the electric barrier by an IDNR commercial fisherman. *Id.* at 8.

Establishment of Asian Carp in the UDIP. EA collected a bighead carp full of eggs in the UDIP, demonstrating that Asian carp come into breeding condition in that area. Exh. 428 at 8. However, breeding in a particular area is not necessary for a species to become established there. *Id.* Mr. Seegert summarized Asian carp spawning habits, and stated that there is no true minimum length of time necessary for the spawning. *Id.* He cited Opusynski and Shireman's assertion that Asian carp alter their reproductive requirements to adapt to new environments. *Id.*, citing Opusynski & Shireman 1995. Mr. Seegert testified that it is currently unknown whether Asian carp larvae can develop successfully in the UDIP, but there is evidence that they can spawn in nearby areas. *Id.* at 8. Mr. Seegert testified that the Dresden Pool is likely ideal for Asian carp because they generally prefer such lentic waters, and it contains considerable food resources. *Id.* In fact, the UDIP and CAWS both provide nutrient rich conditions that support ample food supplies for the fish. *Id.* at 9. All of the various discharges into CAWS provide nutrients for the Asian carp. *Id.* Mr. Seegert stated that all of these reasons make it inevitable that the Asian carp will establish themselves in the UDIP. *Id.*

Adverse Effects and Destruction will Result from the Establishment of Asian Carp in the UDIP. Mr. Seegert testified concerning the consequences of the Asian carp dramatic invasion. Exh. 428 at 8. First, he stated that the Asian carp will degrade the fish community structure. *Id.* at 10. The bighead and silver carp could alter the fish community by impacting all species of larval fish and planktivorous adult fish. *Id.* at 10, citing USACE 2010a, p. 23-24. The technologies used to control Asian carp could have adverse effects on native fishes. For example netting, acoustic methods, and rotenone would all harm native fish and Asian carp indiscriminately. *Id.* at 10.

Second, Mr. Seegert testified that the Asian carp deprive native fish of food resources. Exh. 428 at 11. The carp are filter-feeders, and so they ingest a wide variety of food, including phytoplankton, zooplankton, fish eggs, and fish larvae. *Id.* Asian carp feed at the bottom of the trophic food chain, and so virtually all native fish species depend on this same level of the food chain. *Id.* This will further degrade the fish community, and ultimately work against the CWA goals of making UDIP and Brandon Pool "fishable." *Id.*

Third, Mr. Seegert testified that Asian carp will cause a reduced condition or plumpness in fish, by reducing food supplies. Exh. 428 at 11. Mr. Seegert cites studies that have documented this adverse effect in other rivers where Asian carp are numerous. *Id.* at 11-12. Poor fish condition, in turn, will lead to a reduced number of eggs and an increased susceptibility to disease and predation. *Id.* at 12.

Fourth, Mr. Seegert testified that Asian carp will cause reduced fish recruitment. He explains that "recruitment" describes the process by which fish move from the egg/larval stage to the juvenile/adult stage and it determines year class strength. Exh. 428 at 12. Fish must be "recruited" to becoming an adult from being an egg. *Id.* Asian carp would cause reduced recruitment for two reasons: first, Asian carp will ingest fish eggs and larvae in the water column. *Id.* The species whose eggs will be most at risk are gizzard shad, smalleye, sauger, and freshwater drum. *Id.* at 13. Second, because the Asian carp feeding habits would likely result in reduced fish condition, the native fish would produce fewer eggs and of poorer quality. *Id.*

Together, the fewer eggs produced, lower hatching success, and increased predation on the eggs will lead to lower recruitment of various native fish in the UDIP and Brandon Pool. *Id.*

Fifth, Mr. Seegert testified that the Asian carp will cause adverse changes in the phytoplankton and zooplankton communities, which are a source of food for native fish. Exh. 428 at 13. Plankton are at the bottom of the food chain, and many fish rely on them; they are particularly susceptible to Asian carp because some species of Asian carp are filter-feeders. *Id.* Besides reducing the sheer number of plankton, the Asian carp could also adversely affect the community structure by making zooplankters smaller and less nutritious. *Id.* This effect has been documented on the Missouri River, the Mississippi River, and the Illinois River. *Id.* This causes a population decline in predators. *Id.*

Sixth, Mr. Seegert testified that the Asian carp will cause adverse changes in the benthic community structure. Exh. 428 at 14. Many benthic invertebrates feed on phytoplankton and zooplankton, which are fed upon by other larger invertebrates. *Id.* Therefore, changes in the plankton population will affect the benthic organisms. *Id.* Further, benthic invertebrates feed on detrital material on the bottom of lakes and streams, and so do Asian carp. *Id.* Infaunal organisms would also be affected because they live in the mud. *Id.*

Seventh, Mr. Seegert testified that Asian carp will cause reductions in certain native species. Exh. 428 at 14. Specifically, some species will be far more at risk of harm from the Asian carp than others. *Id.* Those species are the gizzard shad, the bigmouth buffalo, other filter feeding fish, and benthic organisms. *Id.* Other affected entities include fish larvae that inhabit the water column, fish that are broadcast spawners, fish whose eggs are buoyant or semibuoyant, and most zooplankton and phytoplankton. *Id.*

The Asian carp Regional Coordinating Committee (ACRCC) is focused on keeping the Asian carp out of Lake Michigan, not out of the UDIP. Exh. 428 at 14. Only one strategy is proposed to take place downstream of the UDIP, and that may be detrimental to native fish populations in the UDIP. *Id.* Their control strategies are both long-term and short-term, and most of them long-term strategies are focused on research activities or monitoring efforts only. *Id.* at 15.

Short-Term Strategies for Trying to Control Asian Carp. Five of the short-term strategies are meant to halt or slow movement of Asian carp through CAWS. Exh. 428 at 15. They are targeted removal of Asian carp within CAWS, commercial fishing at "high risk" locations, construction of physical barriers in the Des Plaines River and I&M Canal to prevent carp from crossing the drainage divide during floods, expedited construction of the third electric barrier, and rotenone treatment during barrier maintenance. *Id.* They will all take place upstream of the UDIP. *Id.*

Long-Term Strategies to Trying to Control Asian Carp. Several long-term strategies are still at the research level. *Id.* One potential strategy is to create toxic zones upstream of the UDIP by the District plants; another is to physically separate the Illinois River and Lake Michigan basins. Exh. 428 at 15. Those two strategies would also be implemented upstream of the UDIP. *Id.* They are only designed to slow not stop the progress of Asian carp. *Id.*

However, one strategy that could be located downstream of the UDIP is modified operations of the locks, but it could not entirely halt the progress of Asian carp. *Id.* Another long-term strategy for slowing the progress of the Asian carp is commercial fishing for removal below Lockport. *Id.* at 16. Detrimental effects on native species are expected from commercial fishing. *Id.* Commercial netting has already taken place in the Marseilles, Dresden, Brandon, and Lockport pools. *Id.* However, netting will have only limited success because the deployment of nets in active shipping lanes is not possible. *Id.*

The ACRCC is also researching an acoustical sound barrier to repel Asian carp. Exh. 428 at 17. A study done by the USACE concluded that an acoustical barrier, strobe lights, and bubble curtains working in concert could effectively repel Asian carp but that any one technology alone would be unsuccessful. *Id.*, citing USACE 2010a. Again, however, this method would not completely halt the Asian carp advance. *Id.*

Another long-term strategy is to develop an Asian carp-specific piscicide, analogous to the chemical agent that now is keeping sea lampreys in check in U.S. waters. Exh. 428 at 17. However, it could take a long time to develop the piscicide and then for the piscicide to work. *Id.* at 18. Further, even if the piscicide did work, regular re-application would be needed. *Id.* The piscicide could also adversely affect other species, as the sea lamprey piscicide does now. *Id.*

In his testimony, Mr. Seegert expressed concern about harming native species. He stated that if the native fish were harmed, restocking would not be successful. Exh. 428 at 18. First, the system would be degraded for the new fish. *Id.* Second, reapplications of piscicide would continue to harm newly restocked fish. *Id.* Finally, there would be no ready sources for many of the native fish. *Id.* Hatcheries do not provide native minnows, darters, buffaloes, carpsuckers, gars, madtoms, and others that are part of the UDIP's fish community. *Id.* An unbalanced "restored" community would move the UDIP further from the CWA goals. *Id.*

There Will be a Negative Effects on the UDIP From a Proposed Physical Separation between CAWS and Lake Michigan. The only source of good quality water in the UDIP is from Lake Michigan, and if the separation is achieved, the source of "good" water will be eliminated. Exh. 428 at 19. Also, the UDIP is a low gradient waterway and experiences low flow, and eliminating more water from the UDIP would exacerbate those problems. *Id.* All of the effects on the UDIP of separating the UDIP from Lake Michigan would be negative. *Id.*

Mr. Seegert's Conclusion. The entire UIW system is habitat-limited. The presence of Asian carp will further limit the quality of the UDIP and CAWS, as well as the aquatic organisms that inhabit them. *Id.* at 20. None of the potential strategies will keep Asian carp out of the UDIP. *Id.* at 21. Many of the proposed controls will have adverse affects on native fish. For these reasons, Mr. Seegert stated that the UDIP will move further away from attainment of the CWA interim aquatic life goals than it is now. *Id.*

Testimony of Julia Wozniak on Behalf of Midwest Generation

Ms. Wozniak second set of testimony regarded the Asian carp issues. Exh. 425. Her testimony focused on: 1) the electric barriers within CAWS built to prevent the migration of Asian carp and their construction and operation, 2) other on-going efforts by state and federal agencies to stop the spread of invasive aquatic species into the Great Lakes, and 3) Midwest Generation's role in developing Asian carp control measures. Exh. 425 at 1. Her testimony essentially described the development of the various methods for controlling invasive aquatic species in the Ship Canal.

Overview of Participation in Asian Carp Control Efforts. Ms. Wozniak has devoted time to matters related to the migration of the Asian carp into the UAA waterway on behalf of both ComEd and Midwest Generation. Exh. 425 at 2. On behalf of Midwest Generation, Ms. Wozniak was a member of the Aquatic Nuisance Species Dispersal Barrier Panel (Panel), which guided the construction, operation, and maintenance of the first electric barrier in the CSSC. *Id.* at 2-3. The Panel's work has expanded to include review of the planning, installation, and operation of an additional barrier, and continues to date with the development and construction of a third barrier. *Id.* at 3. Midwest Generation is currently a member of the Panel, and Midwest Generation is also an official advisory/outreach group of the Asian carp Regional Coordination Committee (Committee). *Id.* Midwest Generation is also part of the U.S. Coast Guard's Safety Work Group, which is intended to identify safety concerns related to barrier operations. *Id.* Ms. Wozniak also participates in the Safety Work Group personally. *Id.*

Ms. Wozniak testified that in May 2009, the USACE began testing for Asian carp using a method of sampling for the presence of Environmental DNA (eDNA). Exh. 425at 4. When positive eDNA samples were found in the barrier zone and upstream of the barrier, it triggered action by natural resources agencies to actively try to minimize the number of Asian carp in the waterways. *Id.* In November 2009, the IDNR effected the first planned fish kill effort on the CSSC. *Id.* Midwest Generation participated in this effort, and Ms. Wozniak was integrally involved also. *Id.*

Midwest Generation also works with the USACE in the USACE's plans to install a hybrid bio-acoustic barrier near Midwest Generation's Joliet 29 Station, downstream of Brandon Road Lock and Dam. Exh. 425 at 5.

Background-the Invasive Species Threat to the Great Lakes. Ms. Wozniak testified that Asian carp are a group of invasive species of fish that grow up to four feet in length, weigh over 100 pounds, and leap out of the water. Exh. 425 at 5. A photo is attached as Attachment 1. Attach. 1. Asian carp are native to the rivers of eastern China. *Id.* at 6. They can cause significant damage to the native food chain and recreational sport fish industry in the Midwest. *Id.* The bighead carp (*Hypophthalmichthys nobilis*) and the silver carp (*Hypophthalmichthys molitrix*) pose a particularly great threat to the Midwest region because they are plankton feeders. *Id.* They directly compete with the native paddlefish, bigmouth buffalo and gizzard shad, and juvenile fish and mussels. *Id.* Anglers do not fish for them, and they have no natural predators. *Id.* Scientists are concerned that the bighead carp and the silver carp will devastate the Great Lakes commercial and sport fishing industries as well as the ecological balance of the lakes. *Id.*

The Aquatic Nuisance Species Dispersal Barrier. The second and more powerful electric barrier supplemented the original electric barrier. Exh. 425 at 7. The Panel meets with USACE, US Fish and Wildlife Service (USFWS), and other agencies on a semi-annual basis to discuss issues regarding the barriers. *Id.* The Panel's primary role is to provide input on barriers needs and concerts, assist in identifying acceptable barrier operational parameters, provide expertise on project planning and design, identify and utilize multiple funding sources for barrier-related needs and to advance the planning, construction, and safety testing of the barriers. *Id.* The Panel also reviews research related to invasive species monitoring and detection and explores methods to deter invasive species from entering or leaving the Great Lakes. *Id.*

2002: The CSSC Electric Barrier I Begins Operation. In 1990, the USACE was authorized to conduct a demonstration project to identify a method to prevent and reduce nonindigenous aquatic invasive species through the CSSC between the Mississippi and Great Lakes watersheds. Exh. 425 at 8. The USACE selected an electric barrier because it is a non-lethal deterrent that had proven effect in other situations, and it would not overtly interfere with navigation on the canal. *Id.* The USACE initiated an electrical barrier demonstration project in the CSSC. The first barrier was installed in 2002, and it remains in operation today. *Id.* The first barrier is located approximately 30 miles from Lake Michigan in Romeoville, Illinois and less than 1 mile upstream of Midwest Generation's Will County Generating station. *Id.* at 9. The first barrier uses a low-charge electrical current, approximately one volt per inch, to create an electric field in the water. The barrier is secured to the bottom of the canal with steel cables. *Id.* The first barrier was not intended for long-term use, so Congress authorized the USACE to complete a new barrier, upgrade the first barrier, and operate the barrier system with federal funding in 2007. *Id.*

2006-August 2009: The Construction and Operation of the Second Electric Barrier. The USACE completed the first phase of the second barrier in 2006. Exh. 425 at 10. It is located between 800 and 1300 feet downstream from the first barrier. *Id.* The second barrier can operate at up to four volts per inch. *Id.* The second barrier was first successfully operated in 2008 while the first barrier was taken down for maintenance. *Id.* The temporary operation resulted in heightened safety concerns and so the second barrier operated only at one volt per inch. *Id.*

August-December 2009: The Discovery of Asian carp in the CSSC, the Rotenone Fish Kill, and Plans for the Second Barrier. The USACE increased the voltage from one volt per inch to two volts per inch in 2009 based on eDNA testing results indicating that Asian carp were present above the barriers. Exh. 425 at 11. In October 2009, Asian carp eDNA was detected in the Cal-Sag Channel and Calumet River, upstream of the barrier zone. *Id.* at 12. Because the second barrier was shut down in December 2009 and the first barrier might not have been strong enough to deter the juvenile Asian carp, rotenone, a fish toxin, was applied to the canal between the first barrier and the Lockport Lock and Dam. *Id.* Midwest Generation participated. *Id.* One bighead carp was collected after the fish kill, and more were suspected to exist on the bottom of the canal but could not be retrieved. *Id.* at 13.

2010: Construction of the Third CSSC Electric Barrier. At the time of filing, the construction for the third barrier was underway. Exh. 425 at 13. It will supplement the first and second barriers. *Id.* The three barriers are meant to work in concert to deter the migration of invasive species through the canal. *Id.* The estimated total project cost, through completion of the second barrier and the upgrade of the first barrier, is $29.6 million at the time of filing. *Id.*

Other Changes in the CSSC Arising from the Electric Barrier Project. In addition to the three electric barriers, the USACE has also installed blasting mats at the bottom of the CSSC to draw down the effects of the extended electrical field generated by the barrier. Exh. 425 at 14. In 2010, the USACE proposed additional parasitic structures in the canal bottom to help draw down even more stray current from the barriers. *Id.*

The USCG and the USACE have promulgated rules to maximize safety. Exh. 425 at 14-15. The safety rules are meant to protect vessels and persons from the hazards associated with any of the efforts to control aquatic nuisance species. *Id.*

Midwest Gen's Role in the Electric Barrier Project and Discovery of Asian Carp in Upper Dresden Island Pool (UDIP). Midwest Generation has five electric generating stations (Fisk, Crawford, Will County, Joliet 9, and Joliet 29) located on the CSSC and the LDPR. Exh. 425 at 17. Midwest Generation's stations are uniquely and strategically located for purposes of monitoring aquatic nuisance species between the Great Lakes basin and the Mississippi River basin. *Id.* Midwest Generation sponsors seasonal fisheries monitoring of the LDPR from just downstream of the first and second barriers down to the confluence with the Kankakee River. *Id.* The monitoring is conducted twice monthly at 21 different locations from May through September. *Id.* Midwest Generation reports any sightings of invasive species to IDNR and the USFWS. *Id.*

Additionally, Midwest Generation's monitoring has captured some extremely large specimens of Asian carp, which has resulted in expedited work by regulatory and natural resources management agencies to improve the electric barrier system. Exh. 425 at 17-19.

Midwest Generation also participated in the Aquatic Invasive Species Summit (Summit). Exh. 425 at 18. The Summit identified various Asian carp control strategies for further consideration, which are now found in the 2010 Asian carp Control Strategy Framework (Framework). *Id.*

In 2010, Midwest Generation began working with the USACE on the USACE's investigation into the proposed installation and operation of a bio-acoustic bubble barrier (ABS system) in the UDIP. Exh. 425 at 19. The Water Resources Development Act granted the USACE authority to pursue this work. *Id.* This work studied a range of options and technologies meant to study methods for reducing the hazards that the electric barriers may present. *Id.* The USACE and Midwest Generation promulgated a report in April of 2010 called "Interim IIA, Fish Deterrent Barriers, Illinois and Chicago Area Waterways Risk Reduction Study and Integrated Environmental Assessment" (Environmental Assessment), and it considered whether technologies such as air bubble curtains, lights, and sounds can deter Asian carp movement. *Id.* The Environmental Assessment revealed that all three technologies cause

an avoidance response in fish. *Id.* at 20. The Environmental Assessment also studied how the ABS fish deterrent measure would work in tandem with other technologies such as the use of attractants to guide fish into certain control zones. *Id.* The Environmental Assessment favored downstream sites for those technologies because it is easier to prevent the upward movement of Asian carp from those locations. *Id.* The Environmental Assessment also identified eight potential sites for the placement of the ABS fish deterrent measure. *Id.* at 20-21. After further review, the USACE recommended that the ABS be placed at the Des Plaines River near the Brandon Road Lock and Dam. *Id.* at 22.

The proposed ABS consists of a cross section in the Des Plaines River downstream to the entrance of the Brandon Road Lock. Exh. 425at 22. Its placement would direct dispersing fish to the dam spillway area where they would be removed from the system by other means, including rotenone. *Id.* Midwest Generation owns the property on which the ABS would be constructed, specifically Midwest Generation's Joliet Station #29. *Id.* The ABS is not species-specific, however, and will impact any fish in the area while the Asian carp removal efforts are underway. *Id.* at 23.

Ms. Wozniak's Conclusion. The electric barriers are successfully eliminating the zone of passage through the CSSC for all independently motile (free-swimming) forms of aquatic life. Exh. 425 at 24. They will continue to do so into the future, and therefore, any attempt to upgrade the use designation of the canal system to enhance the ability of aquatic life to use the CSSC as a passage to a better habitat would directly conflict with recent federal government decisions aimed at preventing aquatic migration through the CSSC. *Id.*

Additionally, the development of the ABS deterrent system will make the Brandon Road site a dedicated location for Asian carp control measures. *Id.* at 25. That area will become more hostile to fish due to intensive sampling and eradication measures through chemical or physical means. This will affect both the Asian carp and any native fish. *Id.* Therefore, the control strategies, in conjunction with evidence demonstrating a lack of good habitat, contaminated sediment, flow issues, CSOs, and other urban impacts, demonstrate that the UDIP is not capable of attaining a higher use designation at this time. *Id.*

Testimony of Jennifer Wasik on Behalf of the District

Ms. Wasik has been involved with Asian carp management. Exh. 431 at 6. She was on the Aquatic Nuisance Species Dispersal Barrier Advisory Panel, participated in the USFWS Carp Corral, performed monthly Asian carp monitoring in the Lockport and Brandon Road Pools, and participated in the Asian carp Regional Coordinating Committee (ACRCC). *Id.* at 7. She also submitted an affidavit regarding Asian carp to the U.S. District Court for the Northern District of Illinois for the hearings that took place in early September of 2010. *Id.*

Brief Chronology of Major Asian Carp Related Events. Bighead and silver carp, or Asian carp collectively, are an invasive species that have been expanded throughout the Illinois River since the late 1990's. Exh. 431 at 6. The first electric dispersal barrier was placed in Romeoville and became operational in April of 2002. *Id.* Two more barriers have been constructed since. *Id.* Various measures to detect Asian carp have been developed by the

USACE, such as environmental eDNA, electroshocking and netting techniques, and rotenone application. *Id.* at 8. One bighead carp was collected 0.5 miles upstream of Lockport Lock after the rotenone application. *Id.*

Positive eDNA results from the Little Calumet River triggered another rotenone application in May of 2010, but no Asian carp were recovered. Exh. 431 at 6. In June of 2010, a commercial fishing operation collected one bighead carp in Lake Calumet at the behest of the IDNR. *Id.*

Summary of Recent Asian Carp Monitoring in CAWS. Enhanced electrofishing and netting efforts have been carried out by IDNR, USACE, the Illinois Natural History Survey, and the USFWS where positive eDNA have been reported. Exh. 431 at 9. The IDNR has hired commercial fishermen to use trammel nets and trawling techniques in targeted areas. *Id.* A subgroup of the ACRCC drafted a "Monitoring and Rapid Response Plan for Asian carp in the Upper Illinois River and Chicago Area Waterway System" (Plan), which mandated fixed site sampling biweekly and a reach sample of over 70 miles of waterways upstream of the barrier. *Id.* Those efforts consisted of approximately 3,200 hours of Asian carp monitoring in CAWS. *Id.* Those efforts will be carried out into the future. *Id.*

Summary of Asian Carp Control Strategy Framework. In 2010, the USACE, USFWS, IDNR, U.S. Coast Guard (USCG), and the USEPA released the "Asian carp Control Strategy Framework" (Framework), which contained short- and long-term options to prevent an Asian carp migration to the Great Lakes. Exh. 431at 10.

The short-term goals attempt to concentrate and confine Asian carp in areas that would be conducive to targeted removal by use of fish toxicants and netting. Exh. 431 at 10. They also focus on identifying high-risk areas in CAWS where enhanced eDNA, commercial fishing, and conventional fish monitoring techniques will be performed. *Id.* The Framework also stated that the first and second electric barriers will continue to operate and the third barrier's construction will be expedited. *Id.* Rotenone will be used following maintenance of the barriers. *Id.*

The long-term goals include using lights, sound, and bubbles as deterrent barriers. *Id.* Lock modifications are also being considered. Exh. 431 at 11. The District has also been asked to complete a study on the efficacy of using plant effluent to produce toxic zones in CAWS, which would focus mainly on the use of ammonia. *Id.* The ACRCC is also investigating seismic waves to divert or eradicate invasive Asian carp. *Id.*

Summary of Lawsuits Concerning Asian Carp and CAWS. The State of Michigan filed a motion for preliminary injunction with the U.S. Supreme Court seeking injunctive relief against the USACE, the State of Illinois, and the District on December 21, 2009. Exh. 431 at 11. The States of Indiana, Minnesota, New York, Ohio, Wisconsin, and the Commonwealth of Pennsylvania filed briefs in support of Michigan's motion. *Id.* The motion requested relief that Ms. Wasik testified would have adversely affected the District and millions of Chicagoans by preventing the District from preventing flooding. *Id.* at 11-12. Ms. Wasik testified that the relief would have eliminated the District's ability to take Lake Michigan water for navigational and water quality purposes. *Id.* at 12. Michigan alleged that the relief was meant to ensure that the

Asian carp did not make their way into Lake Michigan. *Id.* The District opposed the motion for public health and safety reasons. *Id.* The U.S. Supreme Court denied Michigan's motion on January 19, 2010. *Id.*

Michigan renewed its motion based on positive eDNA samples. The U.S. Supreme Court denied the renewed motion on March 22, 2010. Exh. 431 at 12.

On July 19, 2010, the States of Michigan, Wisconsin, Minnesota, Ohio, and the Commonwealth of Pennsylvania filed a complaint against the USACE and the District in the U.S. District Court for the Northern District of Illinois. Exh. 431 at 12. The motion for entry of a preliminary injunction concerned the prevention of the Asian carp from migrating to Lake Michigan. *Id.*

Asian Carp Monitoring. Ms. Wasik testified that the extensive monitoring activities in CAWS are likely to adversely affect the resident fish population, especially combined with the resultant rotenone use. Exh. 431 at 14. Further, the electric barriers prevent the fish from migrating upstream to escape the toxins. *Id.* The fish will also be stressed by exposure to repeated electrofishing and netting operations. *Id.* Those activities can lead to behavioral changes, excess predation, lactic acid build-up, and spinal injury. *Id.* at 15.

Fish Deterrent Barriers. The current electric barriers in CAWS and the proposed acoustic barrier are not species-specific. Exh. 431 at 15. They limit the native fish species as well as the Asian carp. *Id.*

Lock and Sluice Gate Operations. Michigan sought injunctive relief in the form of closure of O'Brien Lock and Dam and Chicago River Controlling Works, as well as installation of grates and screens on sluices gates at O'Brien Lock and Dam, Chicago River Controlling Works, and Wilmette Pumping Station. Exh. 431 at 15. Ms. Wasik testified that these actions could affect the District's diversion of Lake Michigan water into CAWS. *Id.* Ms. Wasik stated that her employer, the District, would find this problematic because portions of the river would be completely stagnant except for stormwater and CSOs. This would result in low DO levels, create a breeding ground for mosquitoes, and make a visible public nuisance. *Id.* at 16. Those conditions further limit aquatic life potential and lengthen effects of wet weather events. *Id.*

Impact of Current and Future Asian carp Management Activities on Recreational Use Potential in CAWS. Ms. Wasik testified that Asian carp management would affect recreators in several varied ways. Exh. 431 at 16. First, rotenone is used to kill fish, and it is considered safe for piscicide applications, but it should be avoided by recreators. *Id.* The presence of dead fish and the toxic chemicals will affect recreation. *Id.* Stopping diversion from Lake Michigan would result in loss of recreation due to algal growth and odors, as well as resultant stagnation from wet weather events. *Id.*

Ms. Wasik's Conclusion. Ms. Wasik testified that every precaution has been taken to prevent the Asian carp from moving into Lake Michigan, and now the Asian carp issue must be examined to see if any beneficial uses could come from the species. Exh. 431 at 17. All of the Asian carp control measures may harm the tolerant and moderately tolerant native species in

CAWS. *Id.* Further, the forced operational changes may affect lake diversion, which also presents serious consequences for aquatic life in CAWS. *Id.* Therefore, Ms. Wasik testified that the District is attempting to craft long-term aquatic life use for the Great Lakes system and to be prepared to implement the control measures quickly, due to the gravity of the Asian carp issue. *Id.* The District is being careful to take into account the aquatic life use because the District believes that adopting uses and standards for CAWS that do not reflect all relevant issues is unwise. *Id.* Because the Asian carp issue is so grave, the District feels that the Board must address it in these proceedings. *Id.*

SUMMARY OF PUBLIC COMMENTS

Agreement Between District and Environmental Groups

Before proceeding with a summary of the public comments, the Board notes that the District and the Environmental Groups filed on January 3, 2012 a joint status report (1/3/12 Report) that the District and Environmental Groups reached an agreement concerning the aquatic life use designations of certain segments in the CAWS. *See* 1/3/12 Report. On January 27, 2012, the District and Environmental Groups filed a Statement (1/27/12 Statement) and attached the agreement. On January 8, 2013, the District and Environmental Groups filed a report on the agreement (PC 1366). Before summarizing the public comment the Board will summarize the agreement. The District and Environmental Groups agree that the CSSC should be designated as ALU B and the remaining portions of the CAWS other than Bubbly Creek should be designated as ALU A. 1/27/12 Statement Attach. A; PC 1366 at 1. The District and Environmental Groups believe the record supports these designations. *Id*.

For Bubbly Creek, the District and the Environmental Groups ask that a new Subdocket be created to address Bubbly Creek. 1/27/12 Statement Attach. A; PC 1366 at 2. Also, the District will withdraw its request for a wet-weather aquatic life use. *Id*. A variance will be sought for the District to allow it the opportunity to comply with DO standards, and the Environmental Groups do not object to that request. *Id*. The agreement is also consistent with IEPA's proposed DO criteria to protect ALU A and ALU B uses. 1/27/12 Statement Attach. A; PC 1366 at 3.

Other parts of the agreement address habitat improvement projects and use of existing SEPA stations. PC 1366 at 2-3. The agreement also indicates support for the District's proposed standards for zinc. PC 1366 at 3.

Illinois Environmental Protection Agency (PC 286, 1275, 1289)

IEPA presented three comments relevant to this Subdocket. Each will be summarized below.

PC 286

On March 26, 2010, IEPA submitted into the record USEPA's comments on IEPA's October 2007 draft version of the proposed water quality standards for CAWS and LDPR.

USEPA's comments, submitted to IEPA on January 29, 2010, addressed designated uses, temperature/chemical criteria for the protection of aquatic life, and criteria for the protection of human health. USEPA intended IEPA to address the concerns raised in USEPA's comments before filing the proposal with the Board.

Regarding the designation of aquatic life use, USEPA comments related to the proposed designation for the UDIP. USEPA states "Illinois should confirm whether Illinois intends for the proposed use for that water body to be consistent with the uses specified in Section 101(a)(2) of the Clean Water Act (CWA) and, if not, to explain and justify an alternative position." PC 286, Attach. USEPA Letter dated 1-29-10. The Board notes that IEPA's post-hearing comments addressed USEPA's concerns. *See* PC 1275.

PC 1275

On March 5, 2012, IEPA filed its post-hearing comments on the aquatic life use designations for CAWS and LDPR. These comments start with a review of IEPA's initial proposal being considered in Subdocket C including the rule language proposed and suggested changes to that language. IEPA then continues with a summary of the testimony, exhibits and public comments pertaining to Subdocket C. Next, IEPA addresses provisions of its proposal where participants have reached consensus and where clear areas of disagreement still exist. Also, IEPA's comments address USEPA comments on the proposal. Additionally, IEPA presents arguments in favor of the proposed aquatic-life use designations and against the alternative proposals of Midwest Generation and Citgo/PDV. Finally, in accordance with the discussion in the Board's Final Opinion in Subdocket B, IEPA asks the Board to adopt bacterial water quality standards to protect those segments of the CAWS and LDPR that are designated as Primary Contact Recreation waters. *See*, R08-09(B)(Feb. 2, 2012) slip. op. at 7, 10. PC 1275 at 4. The relevant portions of IEPA's comments are summarized below.

IEPA's proposal includes three distinct aquatic life use designations for the segments of CAWS and LDPR: the Chicago Area Waterway System Aquatic Life Use A Waters, the Chicago Area Waterway System and Brandon Pool Aquatic Life Use B Waters, and Upper Dresden Island Pool Aquatic Life Use (UDIP ALU) waters. While the Aquatic Life Use A waters are capable of maintaining aquatic life populations predominated by tolerant or intermediately tolerant types adaptive to unique conditions of the CAWS, the Aquatic Life Use B waters are capable of maintaining tolerant aquatic life species. The UDIP ALU waters are capable of maintaining aquatic life populations consisting predominantly of tolerant, intermediately tolerant and intolerant species. PC 1275 at 7-9.

Regulatory Language. IEPA notes that the Board had already adopted some of its changes to Section 303.204 in Subdocket A, but some of the remaining proposed changes are properly considered in this docket for the first time. PC 1275 at 6. IEPA recommends that Section 303.204 be amended to read:

Section 303.204 Chicago Area Waterway System and Lower Des Plaines River

The Chicago Area Waterway System and Lower Des Plaines River Waters are designated to protect for incidental contact or non-contact recreational uses (except where designated as non-recreational waters) and commercial activity (including navigation and industrial water supply uses) and the highest quality aquatic life and wildlife that is attainable, limited only by the physical condition of these waters and hydrologic modifications to these waters. These waters are required to meet the secondary contact and indigenous aquatic life standards contained in 35 Ill. Adm. Code 302, Subpart D, but are not required to meet the general use standards or the public and food processing water supply standards of 35 Ill. Adm. Code 302, Subpart B and C. Designated recreational uses and aquatic life uses for each segment of the Chicago Area Waterway System and Lower Des Plaines River are identified in this Subpart.

In addition, IEPA asked that in its proposed definitions of each of the aquatic life use designations, minor changes be made. In CAWS ALU A, IEPA suggest that the phrase "of tolerant or intermediately tolerant" be changed to "of tolerant and intermediately tolerant". PC 1275 at 8. In the definition of UDIP ALU, IEPA recommends two changes. The first is the phrase "shall be" be changed to "is" and the second is adding "of" between "capable" and "maintaining". PC 1275 at 10.

USEPA Concerns. USEPA submitted comments to IEPA expressing concerns regarding two aspects of the proposed aquatic life use designations. First, USEPA wanted a confirmation from IEPA that the proposed aquatic life use designation for UDIP is consistent with the uses specified in CWA Section 101(a)(2). PC 1275 at 19 citing PC 286. IEPA resolved this issue by informing USEPA that the proposed designation is intended to meet the uses specified in Section 101(a)(2) of the CWA. PC 1275 at 19-20. Next, USEPA wanted clarification whether the proposed designation is protective of human health through fish consumption. IEPA notes that even though the proposal is intended to protect fish consumption throughout the system, the proposal is not intended to protect drinking water use. *Id.* IEPA states that the issue of fish consumption will addressed further in Subdocket D.

Areas of Agreement. Next, IEPA's comments address the areas of agreement reached by the District and the Environmental Groups. IEPA states that of the eight items listed in the January 27, 2011 agreement (Agreement) submitted to the Board, four items pertain directly to the decision before the Board in Subdocket C. PC 1275 at 20-21. First, IEPA notes that the District and the Environmental Groups support the proposed Aquatic Life Use B designation for the CSSC. However, IEPA observes that designation for CSSC needs to be discussed because an industrial discharger has proposed an alternative designation for portions of CSSC.

Second, both the District and the Environmental Groups support Aquatic Life Use A designation for all portions of CAWS other than the CSSC and Bubbly Creek. *Id.* at 21. Further, IEPA notes that the Agreement recommends an upgrade of the proposed Aquatic Life Use B designations for certain segments: North Branch Chicago River from south end of North Avenue

Turning Bridge Basin to its confluence with South Branch Chicago River and Chicago River; Chicago River; South Branch Chicago River; Calumet River from Lake Michigan to Torrence Avenue; and Lake Calumet Connecting Channel. *Id.* at 21-22. Except for the South Branch Chicago River, IEPA states that it does not object to the upgrading from Aquatic Life Use B to Aquatic Life Use A for the four segments listed in the Agreement even though IEPA continues to affirm the scientific basis of its original proposal. Regarding the South Branch Chicago River, IEPA notes that an upgrade from Aquatic Life Use B to Aquatic Life Use A may impact Midwest Generation, which was not a party to the discussion that led to the Agreement. Therefore, IEPA does not support the upgrade of South Branch Chicago River without any new scientific information to change the initial conclusions. *Id.* at 22.

Third, IEPA notes that even though designation of Bubbly Creek was adequately addressed in IEPA's proposal, IEPA supports the District and the Environmental Groups request for deferring decision on this segment while the USACE completes an ecosystem restoration study. PC 1275 at 23. Finally, IEPA notes that the District's withdrawal of its proposal for wet weather aquatic life use designation limits the issues to be briefed for the Board. *Id.*

Upper Dresden Island Pool Aquatic Life Use Designation. IEPA states that it has proposed an aquatic life use designation for the UDIP portion of the LDPR that is consistent with the CWA's interim aquatic-life goal for balanced populations of fish and other aquatic-life. PC 1275 at 24. However, IEPA contends that an alternative use designation proposed by Midwest Generation for UDIP represents a less natural condition than the CWA goal. *Id.* IEPA argues that Midwest Generation's proposed aquatic life use designation "is not sufficiently supported and is thus inappropriate." *Id.* Based on a review of the information submitted by Midwest Generation, IEPA argues that the alternative proposal fails to meet the CWA burden specified by the factors at 40 CFR §131.10(g). *Id.* Further, IEPA contends that Midwest Generation's proposal fails to show that sediment contamination is preventing CAWS or LDPR from attaining IEPA's proposed aquatic life use designations.

UAA Factor 2. IEPA contends that Midwest Generation's Report (Report) (Exh. 2 to Exh. 366) and testimony (Exh. 366 - Greg Seifert's pre-filed testimony) do not provide sufficient evidence to conclude that UAA Factor 2[7] prevents the attainability of the proposed designation for UDIP. PC 1275 at 25 citing Exh. 366. Specifically, IEPA notes "aspects of water levels that are addressed in the Testimony and Report do not directly pertain to Factor 2 - namely, "artificial, controlled" flow (Exh. 366 at Exh. 2 pg. 2), "peak flows" (*Id*.), "highly variable" flow (Exh. 366 at 3), "high flow regime" (Exh. 366 at 3), "water level alterations" (Exh. 366 at Exh. 2 pg. 6), or lack of "seasonality" (*Id*.)." *Id.* at 25. Instead, IEPA argues that when it comes to insufficient amounts of water, UAA Factor 2 deals with "natural" flow, "ephemeral" flow, "intermittent" flow, and "low" flow. *Id.* IEPA maintains that Midwest Generation did not provide evidence to show that the types of flow considered in UAA Factor 2 prevent the attainability of CWA aquatic life goal in UDIP. Further, IEPA asserts that it did not rely on

[7] "Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met." [40 CFR §131.10(g)(2)]. PC 1275 at 25.

UAA Factor 2 because the flow conditions associated with that factor are not relevant to LDPR or the CAWS. *Id.* at 26.

Additionally, IEPA argues that Midwest Generation did not provide adequate evidence to show that the insufficient flows in UDIP cannot be countered or compensated by managing flows in UDIP in "new ways that may help alleviate potential detrimental effects of insufficient flow on aquatic life." PC 1275 at 26. Finally, IEPA notes that the Report contains conflicting information on the effect of flow conditions in UDIP on the attainability of a balanced fish community. Specifically, IEPA observes that Midwest Generation's contention that flow conditions in UDIP hinder nest-building species is contradicted by the presence of abundant nest-building sunfish. *Id.*

UAA Factor 3. IEPA asserts that Midwest Generation's testimony and Report(Exh. 2 to Exh. 366) do not provide sufficient evidence to show that UAA Factor 3[8] prevents the attainment of CWA aquatic life goals in UDIP. PC 1275 at 27. First, IEPA asserts that the Midwest Generation's Report (Exh. 2 to Exh. 366) does not provide evidence that some species of fish are prevented from living in UDIP due to fish being killed by barge propellers. *Id.* at 28. IEPA notes the Report "(Exh. 2 to Exh. 366) found it 'impossible' to determine how mortality due to barge-propeller strikes affected the population of (*i.e.*, 'stock') of each of the few species tested." *Id.* at 29. Further, IEPA argues that Midwest Generation did not provide evidence that water level changes caused by barge traffic prevent the presence of a balanced fish community in UDIP.

Next, IEPA takes issue with Midwest Generation's contention that presence of excess sediment prevents the attainment of a balanced fish community in UDIP. *Id.* IEPA states that documenting the amount of sediment present in UDIP lacks context for justifying that excess sediment prevents a balanced fish community from living in that segment. PC 1275 at 30. IEPA observes that the habitat data from the Midwest Generation's Report (Exh. 2 to Exh. 366) does not provide justification as to why UDIP cannot attain CWA goals, since at least 40% of the sampled area meets or exceed the analogous threshold that indicates the likely ability to attain a balanced fish community. *Id.* at 31.

Finally, IEPA notes that Midwest Generation's testimony and Report (Exh. 2 to Exh. 366) do not address the issue of why the "human caused conditions" preventing the attainment of CWA goals "cannot be remedied or would cause more environmental damage to correct than to leave in place", as required by UAA Factor 3. *Id.* IEPA asserts Midwest Generation's contention that the urban setting and the presence of sediment deposition prevents UDIP from achieving the CWA goals does not meet the burden of UAA Factor 3. *Id.* at 31-32.

[8] "Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place" [40 CFR §131 .1 0(g)(3)]. PC 1275 at 27.

UAA Factor 4. IEPA states that Midwest Generation's testimony and Report (Exh. 2 to Exh. 366) do not provide sufficient evidence to show that UAA Factor 4[9] prevents UDIP from attaining CWA goals. First, IEPA states that Midwest Generation fails to clearly establish the extent to which dams have detrimentally affected portions of CAWS and LDPR. PC 1275 at 32. Further, IEPA notes that Midwest Generation's testimony and Report (Exh. 2 to Exh. 366) do not address how biological potential in UDIP is affected by dams when compared with other rivers with dams that attain CWA goals. *Id.* 32-33. IEPA observes that information in the Report (Exh. 2 to Exh. 366) indicates that 13 of the 27 sites impacted by dams were rated as "good" or "excellent" based on fish IBI scores. *Id.* at 33 citing Attach. C.

Next, IEPA contends that Midwest Generation did not adequately address the ways in which dams, diversions, or other types of hydrological modifications may be preventing UDIP from attaining the CWA goals. Specifically, IEPA notes that Midwest Generation did not provide evidence on possible changes in the future operation of locks and dams affecting UDIP to alleviate the potential detrimental effects on aquatic life. PC 1275 at 33. IEPA argues that a mere statement that the dams are destined to remain in place does not meet the burden required of using UAA Factor 4. *Id.* at 33-34. Finally, IEPA maintains that Midwest Generation's Report (Exh. 2 to Exh. 366) "over generalizes or otherwise misapplies the information that it cites from published literature." *Id.* at 34. In particular, IEPA questions Midwest Generation's assertions that fish species that require riffle habitat, hard substrate, and fast water are negatively affected by the effects of impoundment.

IEPA contends that Midwest Generation's Report (Exh. 2 to Exh. 366) fails to "acknowledge that some low-gradient rivers can naturally have little riffle habitat, have small amounts of cobble/boulder substrate, and lack fast water much of the time and yet support a fish community that is consistent with the Clean Water Act aquatic life." PC 1275 at 34-35. IEPA notes that even before the construction of Dresden and Brandon locks and dams, a large part of UDIP was lake-like lacking riffles, hard substrate and fast water. *Id.* at 35 citing 1908 publication of "Fishes of Illinois" by S.A. Forbes and R.E. Richardson – Citation No. 135, References of Appendix A in Attachment LL to IEPA's Statement of Reason. Therefore, IEPA argues that Midwest Generation's Report (Exh. 2 to Exh. 366) lacks evidence to support its premise that impoundments are responsible for the reduction or elimination of a large segment of fish. *Id.* at 35. IEPA also notes that Midwest Generation's Report (Exh. 2 to Exh. 366) uses information in Lyons *et al*. (2001) out of context to surmise that reductions in diversity of fish community are greatest when spacing between the dams are the least. *Id.* at 36. IEPA indicates that information in Lyons *et al*. (2001) merely suggests that spacing between dams "may" be a factor influencing fish communities and does not support Midwest Generation's over generalized claims. *Id.* at 36-38.

[9] Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use. [40 CFR §131.10(g)(4)].

UAA Factor 5. IEPA states that Midwest Generation's testimony and Report (Exh. 2 to Exh. 366) fail to provide sufficient evidence to show that UAA Factor 5[10] prevents UDIP from attaining CWA goals. PC 1275 at 37. IEPA argues that Midwest Generation relies on generalities rather than clear evidence to claim that present and foreseeable habitat conditions in UDIP prevent the attainability of CWA goals in UDIP. Regarding "cobble and boulder" substrates in UDIP, IEPA notes that Midwest Generation did not provide a benchmark for judging how much "cobble and boulder" is necessary for the attainment of CWA goals in a stream like UDIP. IEPA maintains that Midwest Generation's overall conclusion is unfounded without such a benchmark. Further, IEPA notes that several species of fish identified by Midwest Generation's Report (Exh. 2 to Exh. 366) such as minnow, sucker, and darter that require coarser substrates do not necessarily require substrates as large as cobble (size of a tennis ball up to a basketball) and boulder (basketball or larger size). *Id.* at 39. IEPA notes that of the 16 fish species mentioned in the Midwest Generation Report (Exh. 2 to Exh. 366) none of them are known to require spawning substrates as large as cobble or boulder, and only three of them require "fast water". PC 1275 at 39 citing Proposal Attach. LL.

Regarding Midwest Generation's contention that UDIP lacks suitable substrates, IEPA maintains that substrate data from UDIP indicate the presence of suitable substrate conditions. PC 1275 at 40 and Attach. B. In addition, IEPA asserts that inconsistency between the testimonies of Greg Seegert presented to the Board on September 8, 2008 (Exh. 366) and on October 8, 2010 (Exh. 428) regarding habitat conditions in UDIP undermines Midwest Generation's contention that UDIP cannot attain CWA goals. *Id.* at 40-41. IEPA notes that while Seegert's initial testimony characterizes UDIP as having a "small fraction" (around 7%) of good habitat, his later testimony characterizes UDIP as having an "abundance" of backwater and side-channel areas that provide preferred habitat for Asian carp. *Id.*

Finally, IEPA states that Midwest Generation over generalized results from cited published reports and interpreted them out of context to claim that urbanization prevents attainability of the CWA goals. PC 1275 at 41. Specifically, IEPA notes that Midwest Generation supports it assertions by applying published results from small streams to UDIP without justification. *Id.* at 41-42. IEPA maintains that smaller streams respond differently to human impact than larger rivers. IEPA also observes that it may not be valid to apply results from streams in the state of Washington or the Canadian province of Ontario to a river in Illinois. *Id.* at 42.

Sediment Contamination. IEPA maintains that Midwest Generation has not provided sufficient data and testimony to support its argument that UDIP is unable to meet the CWA goals because of sediment contamination. PC 1275 at 42. IEPA contends that the data submitted by Midwest Generation is mostly limited to bulk chemistry that is compared with only one of several available sediment quality guidelines. IEPA argues that Midwest Generation's approach constitutes a single line of evidence, which is contrary to the multiple line of evidence necessary "to demonstrate sediment contamination qualifies as a UAA factor in preventing the attainment

[10] "Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses" [40 CFR §131.10(g)(5)].

of CWA goal aquatic life use." *Id.* at 43. IEPA notes that Midwest Generation's sediment survey lacked concurrently performed bioassays and benthic invertebrate surveys. *Id.* IEPA contends that sediment bioassays of benthic aquatic organisms and benthic organism population surveys are necessary to construct a weight of evidence evaluation. *Id.* at 44-45.

Further, IEPA argues that the Board should not give weight to Dr. Burton's testimony provided on behalf of Midwest Generation. IEPA contends that Dr. Burton's position that advanced chemical analyses are unnecessary in the case of sediments contaminated by petroleum and combustion products contradicts Dr. Burton's previous findings. PC 1275 at 46 citing 1/13/10Tr. at 87-89. In this regard, IEPA notes that sediment bioassays performed by Dr. Burton in the 1990s in LDPR indicate that the effect on test organisms could be attributed to elevated temperature. *Id.* at 45

Asian Carp. IEPA states that there is limited evidence to support Midwest Generation's speculation that Asian carp will disrupt the ecology of UDIP to prevent the attainment of the CWA goals in foreseeable future. PC 1275 at 47. IEPA claims that Midwest Generation's testimony does not provide any evidence to show that waters that are already inhabited by the Asian carp species are unable to attain CWA goals. *Id.*

CAWS Aquatic Life Use A, CAWS and Brandon Pool Aquatic Life Use B and Citgo/PDV's Alternative Proposal for Aquatic Life Use C. IEPA states that the Board can adopt the IEPA's proposal for CAWS Aquatic Life Use A designations without any disputes from the participants in the proceeding, including Midwest Generation, since the Environmental Groups and District have reached an agreement to support IEPA's proposal. PC 1275 at 47-48. In addition, IEPA notes that it has no objections to the Board designating the following segments as CAWS Aquatic Life Use A in accordance with the agreement reached by the Environmental Groups and the District: North Branch Chicago River from the south end of the North Avenue Turning Basin to its confluence with South Branch Chicago River and Chicago River; Chicago River; Calumet River from Lake Michigan to Torrence Avenue; and Lake Calumet Connecting Channel. *Id.* at 48.

However, IEPA does not support the Environmental Groups and the District's agreement to move South Branch Chicago River from CAWS Aquatic Life Use B to CAWS Aquatic Life Use A without input from Midwest Generation or the introduction of technical information that questions IEPA's proposed use designation. PC 1275 at 49. IEPA notes that while Midwest Generation concluded UAA Factors 2, 3, 4 and 5 apply to the South Branch Chicago River and CSSC, IEPA found UAA Factors 3, 4, and 5 are applicable. Therefore, IEPA argues that the proposed use designations, which are less than CWA goals, are justified for the Use A and Use B waters, including the South Branch Chicago River and CSSC. *Id.*

Additionally, IEPA notes that Citgo/PDV proposed a designation of Aquatic Life Use C (ALU C) for the Lower CSSC to recognize the presence of the electrical barrier and high chloride levels resulting from de-icing activities. PC 1275 at 49-50. IEPA contends that the proposed alternative designation of ALU C is unwarranted and must not be adopted by the Board. *Id.* at 50. IEPA argues that the proposed CAWS and Brandon Pool Aquatic Life Use B already addresses the issues raised by Citgo/PDV. Further, IEPA asserts that Citgo/PDV has not

provided sufficient evidence to show that IEPA's proposed use designation cannot be attained in the 1.7 mile section of CSSC for which Citgo/PDV proposes a different, less natural use. *Id.* Lastly, IEPA agrees the Environmental Groups and the District that the South Fork of the South Branch Chicago River(Bubbly Creek) must be addressed in a separate docket or subdocket. *Id.* at 51.

Technical Feasibility and Economic Reasonableness. IEPA states that the technical feasibility of the proposed aquatic life use designations is "inherent in the UAA conducted to develop these proposed designated uses." PC 1275 at 51. IEPA notes that it relied on three UAA factors to propose the aquatic life use designations: UAA Factors 3 (human caused conditions or sources of pollution); UAA Factor 4 (dams, diversions or other types of hydrologic modifications); and UAA Factor 5 (physical conditions related to natural features of the waterbody). IEPA states that the application of the UAA factors means that it is technically infeasible to overcome the factor at issue. As such, IEPA conclusion that the proposed uses are attainable in light of the applicable UAA factors means that the designations are technically feasible.

Regarding economic reasonableness, IEPA states that the proposed use designations have no economic impact because the aquatic life use designations by themselves do not require implementation of new technology. PC 1275 at 52. IEPA maintains that the technological changes would come into play with the adoption of water quality standards in Subdocket D. IEPA notes that several participants, including the District, Stepan, Citgo/PDV, and Midwest Generation, have presented information pertaining to the cost of complying with the water quality standards proposed by IEPA. *Id.* at 53. IEPA states that it will address the compliance cost data in Subdocket D. *Id.*

Criteria for Protecting Primary Contact Recreation Use Waters. In response to the Board's second notice opinion in Subdocket B that changes concerning recreational use criteria would be addressed in Subdocket C, IEPA "recommends that the Board adopt regulatory language that applies the existing General Use fecal coliform bacteria standard to primary Contact Recreation waters in CAWS". PC 1275 at 53-54. IEPA notes that the General Use ambient water quality standards at 35 Ill. Adm. Code 302.209 prohibit fecal coliform levels that exceed a geometric mean of 200 per 100 ml and also prohibit more than 10% of the samples during any 30-day period from exceeding 400 per 100 ml. *Id.* at 55.

IEPA recognizes that the existing numeric bacteria standard is out of date and will have to be updated after USEPA finalizes any planned revisions to the 1986 National Criteria Document. However, IEPA asserts that it is necessary and appropriate to apply the federally approved existing General Use bacteria standard to the six segments of the CAWS that are designated by the Board for Primary Contact Recreation. *Id.* at 55. Further, IEPA observes that it is appropriate to rely on the adoption of water quality criteria for segments designated as Incidental Contact Use and Non-Contact Recreation Use until adequate science becomes available. *Id.* at 54.

Summary. IEPA urges the Board to proceed to first notice in Subdocket C and adopt the aquatic life use designations for all segments CAWS and LDPR, except for the South Fork of

South Branch Chicago River. Also, IEPA asks the Board to adopt recreational use water quality criteria for protection of waters designated for Primary Contact Recreation in Subdocket A.

PC 1289

On March 19, 2012, IEPA filed its response to post-hearing comments from other participants. IEPA responds to alternative use designations, new language proposals or suggestions submitted by the Environmental Groups, Corn Products, Citgo/PDV, Exxon Mobil, and Midwest Generation. Without reiterating the issues already addressed in its post-hearing comments, IEPA addresses issues concerning the alternative language and use designations, technical feasibility and economic reasonableness, and requests for delaying the decision in Subdocket C. IEPA's response is briefly summarized below.

IEPA's Response to Alternative Language, Use Designations and Comments . IEPA responds to several comments regarding alternative language. The Board will summarize these responses below.

Environmental Groups' Alternative Use designation. IEPA notes that the Environmental Groups for the first time raise the argument that Brandon Pool must be designated as CAWS Aquatic Life Use A waters. PC 1289 at 2-3. The Environmental Groups rely on data collected by the District in CSSC to argue for a higher use in Brandon Pool. However, IEPA maintains that the similarities between Brandon Pool and CSSC support IEPA's position to retain the same designation for both segments. *Id.* Additionally, IEPA disagrees with the Environmental Groups' argument that the record does not support invoking the UAA factors for the North Shore Channel, Calumet River and Chicago River.

ExxonMobil Comments on Intolerant Species. IEPA disagrees with ExxonMobil's contention that the designated aquatic life use for UDIP must be based on existing, achievable habitat conditions, rather than "aspirational" uses that are unsupported by available field data. PC 1289 at 3-4 citing PC 1282 at 5. IEPA contends that the CWA and regulations "specifically require an analysis of aspirational uses that are attainable in foreseeable future and prohibits a focus on only existing uses." PC 1289 at 4. Further, IEPA notes that Midwest Generation's data show that at least 16 species currently found in UDIP fall under the categories of "intolerant or moderately tolerant species." Thus, IEPA urges the Board not to accept ExxonMobil's request to remove the term "intolerant" from IEPA's proposed use designation for UDIP.

Midwest Generation's Comments on UDIP. IEPA's response addresses two points relied upon by Midwest Generation to argue that UDIP cannot attain CWA aquatic life goals. First, IEPA notes that Midwest Generation relies on an unsubstantiated opinion that a stream requires 50% or more of its area to be "good" habitat to attain CWA goals. PC 1289 at 5 citing 11/09/09Tr. at 147. IEPA points out that Midwest Generation defines "good" as having an Ohio EPA habitat-index score of 60 or more. *Id.* at 5. While IEPA agrees that a variety of habitat types must be present in sufficient amounts to support a fish population consistent with CWA goals, IEPA disputes Midwest Generation's contention that there needs to approximately 50% or more of good habitat to attain CWA goals. IEPA maintains that scientific evidence in the record does not support Midwest Generation's benchmark for the attainment of CWA goals.

IEPA argues that even though riffles, fast water, and coarse substrates are sparse for large and flat rivers like LDPR, other localized habitat conditions are important for fish. PC 1289 at 6-7. IEPA contends that in large rivers, the relative ecological importance of a particular habitat type can be much greater than the relative amount of habitat type. *Id.* at 7. IEPA maintains that in a large river a relatively small, localized amount of critical habitat can provide a large influence in sustaining overall fish community. Further IEPA asserts that biological (Ohio EPA fish index of biological integrity) and habitat (Ohio EPA habitat index) indicators relied upon by IEPA supports the proposed aquatic life use designation for UDIP. While a habitat-index score of 60 or more indicates "good" habitat conditions with likely ability to attain the CWA goals, IEPA contends that "fair" habitat conditions with habitat-index score between 45 and 60 also have the ability to support CWA goals. *Id.* at 8. IEPA states that Midwest Generation relies on the worst-case perspective to argue that CWA goals are unattainable if less than 50% of the habitat area scores or less than 60. *Id.*

Citgo/PDV and Corn Products Proposals. IEPA notes that Citgo/PDV recommends three options for the Board to consider regarding aquatic life use designation for Lower CSSC: suspend further consideration of Subdockets C and D until a decision is made on a physical barrier between the Mississippi River and the Lake Michigan Basins to address migration of Asian carp; recognize the presence of existing and future electrical fish barriers; and include a process to add stream segments to the list of designated uses to address aquatic invasive species. PC 1289 at 9. As discussed in its final comments, IEPA maintains that the Board must reject Citgo/PDV's recommendations. IEPA argues that the proposed CAWS and Brandon Pool Aquatic Life Use B designation already addresses the issues raised by Citgo/PDV concerning the uniqueness of Lower CSSC. Further, IEPA asserts that Citgo/PDV has not provided sufficient evidence to show that IEPA's proposed use designation cannot be attained in the Lower CSSC for which Citgo/PDV proposes a different, less natural use. *Id.* at 10. Finally, IEPA notes that issue related to problems with meeting water quality standards are beyond the scope of Subdocket C and may be addressed in Subdocket D. *Id.* at 10-11.

Comments on Technical Feasibility and Economic Reasonableness. While noting that the technical feasibility issues were dealt with in its final comments, IEPA addresses participants' concerns regarding the economic impact of the proposed aquatic life use designations. First, regarding IERG's contention that a use attainability analysis must be performed for chlorides before the designation of aquatic life use, IEPA asserts that IERG misinterprets the scope of Subdocket C. IEPA maintains that the chloride water quality standard must be evaluated under Subdocket D to determine the appropriate standard and its implementation cost. PC 1289 at 11. Similarly, IEPA notes that Corn Products' concerns regarding the cost of complying with IEPA's proposed temperature standard for CAWS and Brandon Pool Aquatic Life Use B designation is also misplaced because the temperature standard will be addressed in Subdocket D. *Id.*

Next, IEPA disagrees with ExxonMobil's position that the proposed aquatic life use designation for UDIP would result in widespread social and economic impacts. IEPA contends that ExxonMobil did not support its assertions by performing a UAA Factor 6 analysis. Further, IEPA disagrees with ExxonMobil's contention that drastic changes, such as elimination of

commercial navigation or removal of dams would be necessary to attain the proposed use designations. Finally, IEPA asserts that the argument made by Stepan and Midwest Generation that the Board must consider the cost of compliance with the proposed water quality standards in revising the use designation is beyond the scope of Subdocket C. *Id.* at 13.

Delay of Decision in Subdocket C. IEPA notes that the District and Citgo/PDV have asked the Board to delay or suspend action in Subdocket C for different reasons. While the District asks for a delay to accommodate the ongoing negotiations with the Environmental Groups, Citgo/PDV wants the Board to suspend any action on Subdockets C and D with regard to Lower CSSC. PC 1289 at 13. IEPA argues that Subdocket C is ripe for Board's decision, and a delay is unnecessary. IEPA suggests that the Board propose the designated uses for first notice and then proceed with the adoption of water quality standards in Subdocket D. *Id.* at 14.

Illinois Environmental Regulatory Group (PC 495, 1280 and 1284)

The IERG submitted three separate public comments relevant to this Subdocket, which the Board summarizes below in order of filing.

PC 495

IERG is a not-for-profit Illinois corporation composed of 51 member companies, a number of which have facilities located along and discharging to one or more segments of CAWS. PC 495 at 1. IERG submits comments on the potential impact of federal activities to mitigate the migration of Asian carp into Lake Michigan on the use designations and water quality standards for CAWS and LDPR proposed by IEPA. *Id.* IERG understands that the outcome of ongoing litigation and the "Great Lakes and Mississippi River Interbasin Study" being conducted by the USACE could have a significant impact on both the CAWS and LDPR waterways. *Id.* at 2.

IERG opines that recent federal activity demonstrates that preventing the migration of the Asian carp into Lake Michigan is a priority; although it is unclear what measures will be employed in the future to prevent the Asian carp from entering Lake Michigan and what impact these possible measures will have on the CAWS and LDPR. *Id.* As a result, IERG states that it is important for the Board to recognize that federal measures will be implemented as a result of ongoing litigation, USACE activities, and/or legislative action. IERG further surmises that these measures will likely impact the present nature of the waterways, including reduced or reversed flow or repeated application of piscicides. IERG contends that it would be imprudent to assign a use designation or water quality standard based on the current conditions in the waterways when there is a very real possibility that these conditions will change dramatically in the near future. IERG, therefore, asks the Board to carefully consider the possible future impacts of federal activities on the nature of the waterways subject to this ruling.

PC 1280 and 1284

IERG submits final pre-first notice comments regarding the proposed aquatic life use designations by IEPA. IERG raises the potential for violations of the proposed chloride water

quality standard in the winter months that could result in noncompliance for dischargers subject to this rulemaking. PC 1280 at 1. IERG notes that the UAA analyses for both CAWS and LDPR provide significant detail regarding how bacteria, temperature, and DO impact recreational and aquatic life use, and IEPA proposes corresponding water quality standards it believes are needed to protect the proposed aquatic life use. *Id.* at 4. IERG states that the water quality standard for chloride did not undergo the same level of analysis in either the CAWS or LDPR UAA study. Chlorides were not identified as a major water quality constraint until later in the UAA process. *Id.* IERG points to the pre-filed testimony by IEPA in which it stated that violations of the chloride standard are expected during the winter months when road salting occurs. *Id.* at 5. IERG members have also raised concerns regarding compliance with the proposed water quality standard of 500 milligrams per liter. *Id.*

IERG asserts that if chlorides had been included in the UAA, it is possible that it would have led to a different conclusion regarding the attainability of the proposed designated aquatic life use. IERG suggests that linking the chlorine problem to use of road salt for public safety would implicate UAA factors 3 and 6, dealing with human-caused pollution and widespread social and economic impact. PC 1280 at 5.

IERG contends that applying the General Use water quality standard for chloride will result in compliance issues for point sources discharging to the CAWS and LDPR during the winter months when de-icing activities occur. PC 1280 at 6. IERG further notes that without having included chlorides in the UAA, the Board has no basis for determining whether the proposed aquatic life use are attainable or whether the proposal is technically feasible and economically reasonable. IERG identifies a number of ways that the issue of chlorides could be addressed, including opening another Subdocket or revisiting the chloride standard. IERG is focusing on the latter option. *Id.*

In final pre-first notice comments, IERG notes that on January 27, 2012, the District and Environmental Groups filed an updated status report indicating they had tentatively reached agreement on eight specific issues. No details were provided regarding these tentative agreements. PC 1284 at 2. IERG opines that because no other participants have been privy to the issues being addressed, it is not known if other dischargers might be impacted. As a result, IERG requests that should the District and Environmental Groups reach agreements that the Board allow other participants the opportunity to review and comment, and if necessary, provide additional testimony. *Id.* at 3.

Illinois Department of Natural Resources (PC 505)

The IDNR submits comments in support of IEPA's proposed amendments to the designated uses and water quality standards for CAWS and LDPR. PC 505 at 1. IDNR presents new observations and data gathered during two Asian carp monitoring and control operations. The first sampling was conducted in December 2009 on the CSSC near Romeoville and the second in May 2010 on the Little Calumet River downstream of the O'Brien Lock and Dam. Both of these sampling operations resulted in more detailed observations of resident fish assemblages than the data collected with conventional electro-fishing and netting collection gear,

which can be effective in sampling native fish communities but has limitations for sampling large, deep draft channels, particularly those with steep, artificial banks. *Id.*

IDNR reports that the species richness and abundance of the existing fish community in the CSSC and Little Calumet River were unexpected given the historical information available and "poor" habitat rating identified in the UAA prepared for CAWS in 2007. PC 505 at 1. IDNR states that the 2009 sampling of the CSSC resulted in 39 fish species being identified. Twelve of these native species were not reported in the CAWS UAA. Similarly, results of sampling the Little Calumet River show a total of 38 fish species, 10 of which were not recorded in the UAA. Among the species unique to the areas sampled with Rotenone were flathead catfish, black buffalo, and smallmouth buffalo, with ghost shiners being very common yet not recorded for any other area of CAWS. *Id*. at 2.

IDNR notes the presence of several sport fish species in the CSSC, including smallmouth bass, which is considered to be an intolerant species. PC 505 at 2. IDNR also notes that while tolerant species comprised most of the biomass of the 2009 sampling of the CSSC, only one-third of the total species were considered to tolerant according to the IBI. With the exception of the intolerant smallmouth bass, the remaining two-thirds were classified as moderately tolerant. *Id*. at 3.

IDNR reports that game fish were commonly observed in the Little Calumet River, with 13 of the 38 total species being game fish. Channel catfish and rock bass were the two most abundant species identified. While tolerant species were numerous, they comprised only 9 of the 38 total species recorded for this river. PC 505 at 3.

The sampling of both the CSSC and the Little Calumet demonstrate that the condition of the bodies of most individual fish species was good. In areas with poor water quality, it is common to find fish with external anomalies known as DELTS, such as sores, eroded fins and barbells, and even tumors. IDNR also reports having found a very high abundance of young-of-the-year channel catfish in the CSSC. IDNR opines that this indicates the existing water quality and habitat are sufficient to support larval stages of this species and that spawning is occurring. Presence of young emerald shiner, bluegill, and largemouth bass suggest these species are successfully reproducing in the CSSC and LDPR as well. PC 505 at 3. IDNR did not observe many young-of-the-year in the Little Calumet River but reports that sampling was conducted in the spring prior to spawning for many catfish, sunfish, and minnow. *Id. at 4.*

IDNR concludes their comments by stating the CSSC is capable of supporting a diverse, healthy, and reproducing population of fish, including a high percentage of moderately tolerant species in adult and early life stages. PC 505 at 4. The Little Calumet River also was found to support a diverse assemblage of fish species, including the intolerant smallmouth bass. IDNR opines that this data is not in agreement with statements made in the UAA. As a result of their sampling results, IDNR suggests that the current proposal of "Aquatic Life Use B" for the Lower CSSC and Brandon Pool could be upgraded to "Aquatic Life Use A". IDNR further suggests that other proposed "Aquatic Life Use B" waters in the CAWS, with similar or better habitat, may be currently supporting a higher aquatic life use than the "Use B" category as defined. *Id.*

Dr. David Thomas (PC 560)

David Thomas submits comments regarding the "Potential impacts of Asian carp on fish populations in the Upper Dresden Pool and implications for Water Quality Standards". PC 560 at 1. Dr. Thomas questions the conclusions drawn in Greg Seegert's testimony regarding the likelihood of increased carp populations in the UDIP, resulting in a greater consumption of the plankton population and reduced fish condition, poor spawning, and degradation of native fish populations. *Id*. Dr. Thomas opines that rather than concluding that the UDIP will be unable to meet CWA Standards, he believes that the presence of the carp may make it even more important to take all practical steps to improve water quality to enhance native fish populations to allow them to better complete with invasive species such as the carp. *Id.*

Dr. Thomas provides the results of various studies by researchers to support his position. Research has shown that the spawning grounds of bighead carp are characterized by rapidly flowing waters, and that large lakes connected to rivers often serve as nursery areas for silver carp. In both species, the fry hatch in one day and float, where after seven days they migrate toward shore. This aspect of their early life history suggests the carp may need a long stretch of river for their larvae to survive. PC 560 at 1. Based on the biology of these species in the Yangtze River in China, only select spawning sites are used each year, 36 sites in 1700 km of river. As a result, Dr. Thomas opines that without significant local spawning, the population of Asian carp within the UDIP may be composed of mostly transient individuals, making it unlikely that they would reach population densities to negatively affect local fish populations. *Id. at 2.*

Dr. Thomas addresses the conclusions drawn by Mr. Seegert regarding the potential adverse impacts of Asian carp on plankton. Based on an examination of feeding behavior, Dr. Thomas reports that research has shown that while the potential for competition for food with native fishes was a possibility for young fish, direct overlap of food between adult silver carp and other fishes behind Mississippi River structures was probably low. *Id.* Other research provides growing evidence of declines in native fishes that are planktivorous as adults once Asian carp are introduced, although potential confounding factors that may have contributed to the decline in native fishes. Dr. Thomas reports that the effects of silver carp on food web structure occur in seasonally isolated backwaters, where native fishes and Asian carp migrate during early life stages and directly complete for food resources. *Id. at 3.* Dr. Thomas also states that there is evidence to suggest that predators such as the largemouth bass were able to successfully reproduce and increase in abundance despite the presence of Asian carp. *Id. at 4.*

Dr. Thomas argues that the conclusions drawn by Mr. Seegert that attainment of CWA aquatic life standards are not achievable after the Asian carp are established are based on speculation. This assumes that the Asian carp will become established and that degradation of the fish and plankton populations will result. Dr. Thomas opines that if it is assumed that the Asian carp will stress native fish populations, then there is an even greater reason to improve water quality, including reducing thermal pollution, to help native fishes have a competitive advantage against invasive species such as the Asian carp. *Id.*

District (PC 284, 1031, 1276, 1292)

The District has presented four comments relevant to this Subdocket. Each will be summarized below.

PC 284[11]

During the course of this rulemaking, the District commissioned a study of aquatic habitat in CAWS by LimnoTech (LimnoTech Study). A LimnoTech representative, Mr. Bell (Exh. 447) testified at hearing concerning the LimnoTech Study and findings. The LimnoTech Study objectives were to:

1) Determine physical habitat characteristics for all reaches of CAWS, using applicable physical habitat metrics and data collected from CAWS.

2) Use a multi-metric habitat index to evaluate physical habitat conditions in CAWS.

3) Use physical habitat data and the multi-metric index to assess the relative importance of physical habitat to fish in CAWS.

4) Determine, to the extent possible, a system of classifying or categorizing reaches within CAWS according to their physical habitat. PC 284 HER at ES-1.

LimnoTech collected detailed physical habitat data, and the entire CAWS area was characterized. Physical habitat impairments were identified, and major conclusions were drawn from the habitat evaluation and data analysis conducted by LimnoTech. Those conclusions are:

1) Aquatic habitat is inherently limited in CAWS by the system's form and function. Habitat in CAWS is significantly limited by the design of CAWS, most of which is manmade. The manmade reaches of CAWS were built to support wastewater effluent conveyance and commercial navigation. The reaches that were once natural streams have been heavily modified to serve these purposes and the changes are unlikely to be reversed as long as the CAWS needs to serve these functions. The form and uses of CAWS impose severe limitations on physical habitat in the system.

2) Physical habitat is more important to fish in CAWS than DO. When key physical habitat variables and DO metrics are statistically compared to fish data collected between 2001 and 2008 in CAWS, it is apparent that habitat is much more important to fish than DO. Multiple linear regression shows

[11] The Board is not providing a detailed summary of PC 284 here, but where relevant, material is cited and discussed later in the opinion. PC 284 contains two reports, the first is the "Habitat Evaluation Report" which will be cited as "PC 284 HER at". The second is the "Habitat Improvement Report" which will be cited as "PC 284 HIR at".

that the dominant habitat variables identified in LimnoTech Study had an r-squared of 0.48 with fish, indicating that these habitat variables explain as much as 48%, or about half, of the variability in the fish data.

3) The ability of physical habitat to explain about half of the variability in fish data is excellent, considering the natural variability in the fish data itself. As stated above, about half of the variability in fish data in CAWS is explained by physical habitat, in particular certain key habitat variables identified in the LimnoTech Study. Of the half of fish data variability not explained by the key habitat variables, most is explainable by natural variation in the fish data from one sampling event to another at each location. In other words, fish samples exhibit large temporal variability at any given location in CAWS, and when the portion of fish data variability not explained by habitat is statistically analyzed, it is most related to the variation at sampling locations over time, independent of habitat changes.

4) DO is relatively poor at explaining variability in fish data in CAWS. DO does not, for the most part, have a statistically significant relationship with fish in CAWS. Various measures of DO were tested, including compliance with existing and proposed water quality standards, average and minimum DO, and percent of time below various DO concentration thresholds. The strongest relationship identified between any of these metrics and the combined fish metric had an r-squared value of 0.27, which is about half as good as the key habitat variables identified in LimnoTech Study. The other four DO measures tested had r-squared values ranging from 0.02 to 0.08. This indicates that physical habitat, not water quality, is the most limiting factor for fish in CAWS today. PC 284 HER at ES-1-ES-2.

Using a process of sequentially reducing the habitat variables and multiple linear regression with CAWS fish data, LimnoTech identified six key habitat variables that are critically important to fish in CAWS. The key habitat variables are: 1) maximum depth of channel, 2) off-channel bays, 3) percent of vertical wall banks in a reach, 4) percent of riprap banks in a reach, 5) manmade structures in reach, 6) percent macrophyte cover in reach. PC 284 HER at ES-2. The LimnoTech Study explains that statistical analysis of habitat data with fish data from the CAWS showed that 48% of the variability of fish data collected from 2001-2007 can be explained by these key habitat variables. *Id*. The LimnoTech Study opines that DO alone can only explain between 2% and 27% of the variability in the same fish data set. *Id*.

The LimnoTech Study states that the relative importance of physical habitat to fish in CAWS was determined through statistical analysis of habitat, fish, and water quality data. PC 284 HER at ES-3. Placing a key water quality metric, such as percent of time DO is less than 5 mg/L, in the multiple linear regression with the key habitat variables, increased the explanatory power of the regression by only four percent. *Id*. LimnoTech created a CAWS-specific habitat index using the six key habitat variables along with other important variables. *Id.* The CAWS-specific habitat index was used to score individual sampling stations as well as the major reaches

in CAWS, in order to determine whether the findings of the LimnoTech Study can help classify the reaches according to the physical habitat variables that are most important to fish in CAWS. When applied to fish data averages over the period of 2001- 2008, the CAWS habitat index indicated that the index is good indicator of habitat suitability for fish in CAWS. *Id*.

The LimnoTech Study concludes that the aquatic habitat is inherently limited in CAWS by the form and function of the system. PC 284 HER at 141. Specifically the manmade reaches of CAWS were built to support wastewater effluent and commercial navigation and the areas that were once natural have been heavily modified to meet those purposes. *Id*. Another conclusion is that physical habitat is more important to fish than DO and in areas where the physical habitat does not limit the variability of fish, the variability of the fish is excellent. *Id*.

The objectives for the habitat improvement portion of the LimnoTech Study are:

1) Given the habitat impairments identified, determine what if any physical habitat improvements can be implemented in CAWS.

2) Determine to the extent possible what the potential benefit of habitat improvements in CAWS would be to fish.

3) Estimate the potential cost of habitat improvement. PC 284 HIR at ES-1

The LimnoTech Study notes that the habitat impairments identified included some where improvement was possible while others were not able to be improved. PC 284 HIR at 31. The habitat impairments where some potential for improvement exists are: lack of off-channel refuge, vertical wall banks, riprap banks, lack of macrophyte cover, limited overhanging vegetation, limited bank pocket areas, limited tributary access, lack of submerged structure, lack of littoral zones. *Id*. Areas of impairment that are not improvable according to the LimnoTech Study are: maximum channel depth, manmade structures, lack of large substrate, organic sludge, lack of channel complexity, lack of seasonal hydrologic pattern, lack of floodplain connectivity, high commercial navigation, low water clarity. *Id*.

The LimnoTech Study indicates that the potential for habitat improvement varies from reach to reach of CAWS. PC 284 HIR at 57. LimnoTech notes that the reaches with the highest habitat scores have the lowest potential for improvement. *Id*. However, LimnoTech found no "clear and reliable way to define the potential biological benefit of habitat improvement." *Id*. As to the costs of the improvements, the total is more than $460 million over the system. *Id*. at 61.

PC 1031

As an alternative to IEPA's proposal for aquatic life use and criteria, the District submitted proposed language and testimony for a modified proposal entitled: "Proposed Aquatic Uses and Dissolved Oxygen Water Quality Standards and Implementation Procedures." PC 1031. The Board notes that although this Subdocket C is reserved for only the proposed aquatic life use, the District's complete proposal is presented here below.

303.230 Chicago Area Waterway System Category 1 (Modified Warm-water Aquatic Life) Waters

Waters designated as Chicago Area Waterway System Modified Warm-water Aquatic Life (MWAL) Waters are capable of maintaining intermediately tolerant and tolerant aquatic-life populations dominated by species that are adaptive to one or more of the following stressors: habitat modifications, periods of low DO during and following wet weather, widespread siltation, and toxic sediment. MWAL Waters are artificially constructed or channelized but may have limited physical habitat attributes such as natural banks, relatively shallow areas, and instream shelter for aquatic life. The following waters are designated as Chicago Area Waterway System MWAL Waters and must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D:

a) North Shore Channel;
b) North Branch Chicago River from its confluence with the North Shore Channel to Addison Street Bridge;
c) Calumet River;
d) Little Calumet River from its confluence with Calumet River and Grand Calumet River to its confluence with Cal-Sag Channel; and
e) Lake Calumet.

303.232 Chicago Area Waterway System Category 2 (Limited Warm-water Aquatic Life) Waters

Waters designated as Chicago Area Waterway System Limited Warm-water Aquatic Life (LWAL) Waters are capable of maintaining tolerant aquatic-life populations dominated by species that are adaptive to several of the following stressors: habitat modifications, periods of low DO during and following wet weather, widespread siltation, and toxic sediment. LWAL Waters are artificially constructed or channelized that generally lack significant physical habitat attributes such as natural banks, shallow areas, and instream shelter for aquatic life. Anthropogenic conditions such as commercial navigation and toxic sediments are more prevalent in LWAL Waters. The following waters are designated as Chicago Area Waterway System LWAL Waters and must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D:

a) North Branch Chicago River from the Addison Street bridge to its confluence with South Branch Chicago River and Chicago River;
b) Chicago River;
c) South Branch Chicago River;
d) Chicago Sanitary and Ship Canal;
e) Cal-Sag Channel; and
f) Lake Calumet Connecting Channel.

303.234 Chicago Area Waterway System Category 3 (Severely Limited Aquatic Life) Waters

Waters designated as Chicago Area Waterway System Severely Limited Aquatic Life (SLAL) Waters are capable of maintaining transient populations of tolerant aquatic-life dominated by species that are adaptive to several of the following stressors: habitat modifications, extended periods of low DO, widespread siltation, and toxic sediment. SLAL Waters are isolated quiescent waters that often exhibit very low to no flow. They are subject to variable DO concentrations resulting from stagnant low-flow conditions and, in some cases, high-velocity flow patterns during wet weather pump station discharges designed for flood control. The following waters are designated as Chicago Area Waterway System SLAL Waters and must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D:

a) South Fork of the South Branch Chicago River (Bubbly Creek);
b) Grand Calumet River;
c) North Branch Canal;
d) Collateral Channel; and
e) Other off-channel slips.

303.236 Wet Weather Limited Use Designation

The DO standards in Section 302.405 will not apply during wet weather periods with events of specified magnitude in Chicago Area Waterway Segments receiving or impacted by combined sewer overflows (CSOs) or other wet weather flows..

a) The wet weather limited use (WWLU) designation is applicable to CAWS Category 1 and 2 Waters, listed in Sections 303.230 and 303.232.

b) The WWLU designation shall be triggered in a given waterway segment by precipitation of 0.25 inches per day or more in the drainage basin to that segment. The WWLU designation shall remain in effect during the rain event and for no more than two to six days after the rain event ends, depending on the amount of precipitation measured by Metropolitan Water Reclamation District of Greater Chicago rain gauges. Precipitation triggers and maximum duration to apply the WWLU designation will be as follows:

    1) Two days for 0.25 – 0.49 inches rain per day
    2) Four days for 0.50 – 0.99 inches rain per day
    3) Six days for 1.0 inches or more rain per day

c) In instances when a wet weather event has multiple consecutive trigger days, or when consecutive wet weather events result in overlapping WWLU durations, the end of WWLU designation shall be decided by the last day of the latest of the overlapping time periods.

d) In instances where the WWLU is triggered but the DO concentration is below the appropriate water quality standard for a waterway segment immediately before the WWLU trigger occurred, the WWLU shall not be applied, and DO values occurring during the WWLU time period shall be considered as WWLU-excluded under the procedures in Section 302.406. While the WWLU designation is in effect, NPDES permittees discharging to or upstream of these waters shall comply with applicable requirements in their permits, including: biochemical oxygen demand, ammonia, DO effluent limitations, and operation and maintenance requirements. The following water quality-based requirements shall also apply during that same time period:

1) CSO discharges shall comply with the provisions of the approved CSO Long-term Control Plan, as incorporated into the applicable NPDES permits; and
2) Municipal separate storm sewer (MS4) discharges shall comply with best management practices (BMPs) and other requirements of the applicable NPDES permits.

e) Waters must not exhibit toxic conditions to resident aquatic communities when the WWLU designation is in effect.

f) The Metropolitan Water Reclamation District of Greater Chicago will analyze their continuous DO monitoring and rain gauge data according to the procedures identified in Section 302.406 to determine the number of hours in which the WWLU designation should be applied in each waterway segment. This information will be reported annually to IEPA by March 31 of the following year in electronic and report format. Upon request by the Agency, the District will also make preliminary continuous DO monitoring data available no later than one month after it has been downloaded from the monitoring equipment, and rain gauge data available on a quarterly basis.

302.405 Dissolved Oxygen

Dissolved oxygen concentrations shall not be less than the applicable values in subsections (a), (b), (c), and (d) of this Section.

a) (Upper Dresden Island Pool)

b) For the Chicago Area Waterway System MWAL Waters listed in Section 303.230: 4.0 mg/l at any time

c) For the Chicago Area Waterway System LWAL Waters listed in Section 303.232: 3.5 mg/L at any time

d) For the Chicago Area Waterway System SLAL Waters listed in Section 303.234: Waters must maintain sufficient DO concentrations to prevent offensive

conditions as required in Section 302.203 of this Part. Quiescent and isolated sectors listed in this Section must maintain sufficient DO concentrations to support their limited ecological functions and transient aquatic communities.

302.406 Procedures for Calculating Compliance with Dissolved Oxygen Standards in the Chicago Area Waterways System (CAWS)

a) The District will maintain a continuous (hourly) DO monitoring (CDOM) network and a continuous (15 minute) monitoring rain gauge network in the CAWS. Proposed modifications to a network will be reported to the Agency at least sixty (60) calendar days prior to implementation. The District may implement these changes after the 60-day period unless the Agency objects.

b) The District will apply standard quality assurance/quality control (QA/QC) procedures to finalize the data and will store these data in a database. The database will include information on the location of the CDOM stations and rain gauges, the applicable CAWS segment(s), and the applicable DO criteria and WWLU triggers. The database will also include the cumulative daily rainfall for each rain gauge.

c) The District will assess the CDOM and rain gauge data by applying the provisions of in Section 303.236(a) through (d). The hourly DO data will be flagged as either a dry weather value or a wet weather value based on the provisions of Section 303.236(b) and (c).

d) To calculate compliance during dry weather conditions, the District will evaluate all the dry weather values at each CDOM station during a calendar year. The District will compare these values to the applicable criterion in Section 302.405. If the criterion is met, the value will be flagged in the database as "Dry Hour above the WQC". If the criterion is not met, the value will be flagged in the database as "Dry Hour below the WQC".

e) The District will then evaluate the wet weather DO values at each CDOM station to determine if the value occurred during an hour that is a WWLU excluded or a WWLU-candidate. For each wet weather event (defined in Section 303.236(b) and (c)), the District will determine if the hourly dry weather DO value immediately preceding a WWLU trigger precipitation is less than the applicable criterion in Section 302.405. In these instances, the DO values for that wet weather event (or over-lapping wet weather events) shall all be flagged as WWLU-excluded. All other wet weather DO values will be flagged as WWLU-qualified.

f) The District will then evaluate all of the WWLU-excluded values to determine the number of hours in violation of the criteria in Section 302.405. If the values are less than the criterion, these values will be flagged as "Wet Hour below the WQC" and will be considered in violation of the applicable water quality

standards. All other values will be flagged as "Wet Hour above the WQC, WWLU Excluded" and will be considered in compliance with the applicable water quality standards.

g) The District will then evaluate all of the WWLU-qualified values to determine when the WWLU is actually needed. These values will be compared to the DO criteria that are listed in Section 302.405. If the value was greater than or equal to the DO criterion applicable for that CAWS segment, the District will flag the DO value as "Wet Hour above the WQC". If the value was less than the criterion, the value will be flagged as "Wet Hour below the WQC, WWLU Needed".

h) As identified in Section 303.236(g), the District will evaluate the continuous DO monitoring data and daily rain gauge data applying the procedures identified in Section 303.236(a) through (g) to produce the annual report for submittal to the Agency.

PC 1276

The District filed its comments on the proposed aquatic life use designations for CAWS on March 5, 2012. The District states that the testimony of Ms. Wasik and Ms. Nemura explain the District's concerns with IEPA's proposed aquatic life use for various reaches of the CAWS. PC 1276 at 1 citing Exh. 461 and 465. Further, the District notes that it has submitted an alternative proposal with different aquatic use designations along with a "wet weather designated use." *Id.* citing PC 1031. The District has also proposed water quality criteria for DO that would apply to the CAWS reaches.

In addition, the District notes that it has been engaged in discussions with the Environmental Groups and IEPA to resolve the aquatic life use issues. PC 1276 at 1-2. These discussions, the District notes, have resulted in a tentative agreement, which was filed with the Board on June 27, 2012. *Id.* at 2. However, the District notes that discussions are still ongoing between the participants, including both IEPA and USEPA to reach a final resolution. The District is hopeful that an agreement can be reached by all participants involved in the discussions in the very near future. *Id.* at 2-3. In light of this, the District recommends that the Board postpone its decision in this matter by a few months. However, if the Board decides to move to first notice with the proposed aquatic life use designations, the District urges the Board to address the issues and concerns raised by the District regarding IEPA's proposal. Specifically, the District asks the Board to address testimony of Ms. Wasik (Exh. 461) and Ms. Nemura (Exh. 465), and the District's alternate proposal (PC 1031) submitted on June 17, 2011. *Id.* at 2.

PC 1292

The District filed its response comments on the proposed CAWS aquatic life use designations on March 19, 2012. The District notes that its ongoing discussion with the Environmental Groups and IEPA has resulted in a tentative agreement on the proposed aquatic life use designations. PC 1292 at 1. Briefly, the District and the Environmental Groups agree that the record supports Aquatic Life Use B designation for the CSSC, and Aquatic Life Use A

designation for all segments of CAWS other than CSSC and Bubbly Creek. In addition, the tentative agreement calls for the creation of a Subdocket to address the aquatic life use designation for Bubbly Creek pending the completion of a study being conducted by the USACE; and the withdrawal of the District's wet weather aquatic life use designation. The agreement also addresses issues pertaining to compliance with the proposed DO standard for CAWS, including a 5-year variance allowing the District to work towards compliance with the DO standard. PC 1292, Exh. A.

While a tentative agreement has been reached on aquatic life use, the District notes that discussions are still ongoing between the participants, including both IEPA and USEPA. The District states that an agreement between all participants would need to be submitted to the District's Board of Commissioners for formal approval before being submitted to the Board. *Id.* at 2. In light of this, the District recommends that the Board postpone its decision in this matter by a few months. *Id.* at 3. However, if the Board decides to move to first notice with the proposed aquatic life use designations, the District urges the Board to address the issues and concerns raised by the District regarding IEPA's proposal. Specifically, the District asks the Board to address testimony of Ms. Wasik (Exh. 187, 431) and Ms. Nemura (Exh. 116, 465), and the District's alternate proposal submitted on June 17, 2011 (PC 1031). *Id.* at 2 citing PC 1031.

Midwest Generation, L.L.C. (PC 1277 and 1286)

Midwest Generation is an independent power producer that operates seven electric generating stations in Illinois, all of which are coal-fired. PC 1277 at 11. Five Midwest Generation stations discharge into the CAWS or LDPR, each requiring the use of large volumes of surface water to cool steam produced by the electric generating process. Water that is discharged is at a higher temperature than that of the surface water. The Fisk, Crawford, and Will County stations are located on CAWS and discharge into the South Branch of the Chicago River and CSSC, and Joliet 9 and Joliet 29 stations, discharge into the UDIP. Midwest Generation has announced the closure of both the Fisk and Crawford facilities. *Id.*

One of the five Midwest Generation stations has cooling towers. These towers operate on an as-needed basis and are not designed for long-term continuous use. PC 1277 at 11. These "helper" cooling towers minimize the potential thermal impacts on the river and maintain compliance with thermal water quality standards. Midwest Generation states that based on an expert report they had prepared, the costs to install equipment needed to meet the proposed use designations and thermal water quality standards would approach $1 billion. *Id.* at 12. Midwest Generation opines that this exorbitant compliance cost is not justified or economically reasonable. *Id.*

Midwest Generation discusses aquatic life designated uses as defined by the CWA, which states that "use" is the fundamental articulation of its role in the aquatic and human environment. PC 1277 at 12. Water quality standards follow from the designated use. *Id.* at 12 and 13. Midwest Generation opines that the presumption that a waterbody can attain the fishable/swimmable goal is a rebuttable presumption, meaning a specific use can be overcome by the introduction of contrary evidence. Midwest Generation contends that the fishable presumption for both the UDIP and the CAWS segments where Midwest Generation's stations

are located has been rebutted. *Id.* at 13. IEPA has the responsibility to demonstrate that a waterbody is capable of attaining the CWA aquatic life goals, and Midwest Generation argues that IEPA has not met this burden for the UDIP. Midwest Generation further states that existing uses are required to be protected, which for CAWS and LDPR include navigational, urban drainage, and flood control uses. *Id.* at 14.

Currently, both CAWS and LDPR are designated as Secondary Contact and Indigenous Aquatic Life Use, which means they are unable to attain CWA aquatic life goals. PC 1277 at 17. In order to determine whether this existing use should be retained or upgraded, a UAA was conducted. *Id.* at 16. Midwest Generation reports that USEPA stated that the UAA can lead to changes in use that may provide more or less protective criteria, with the goal being to ensure that the new use is more accurate. *Id.* As a result of the UAAs conducted, IEPA proposed to change the classifications of CAWS and segments of the LDPR to either Aquatic Life Use A or B, which are considered lower than the CWA fishable goals. *Id.* at 17.

In its filings, IEPA stated that the Aquatic Life Use A and Aquatic Life Use B waters were unable to attain the CWA goals because of three UAA Factors: UAA Factor 3, Human caused conditions or sources of pollution; UAA Factor 4, dams, diversions or other types of hydrological modifications; UAA Factor 5, physical conditions related to the natural features of the waterbody. PC 1277 at 17 and 18.

Midwest Generation reported that IEPA proposed to classify UDIP with a new ALU designation, UDIP ALU, which indicates that this portion of the LDPR is capable of minimally meeting the CWA fishable goals. PC 1277 at 18. Midwest Generation opines that the proposed UDIP ALU, as well as how it was determined as appropriate for the UDIP is vague and incomplete. *Id.* In addition, Midwest Generation notes that it is not clear how IEPA determined that none of the six UAA Factors applied to the UDIP and why it concluded that it was capable of "minimally" meeting the CWA goals, assuming this even can be defined. *Id.* at 19.

Midwest Generation contends that UDIP is not capable of meeting the CWA's fishable goal in that the locks and dams irreversibly impair the waterways' abilities to support essential habitat for a balanced aquatic community. Other evidence of the inability of these waterways to meet the CWA goals include barge traffic, sedimentation, contaminated sediments, siltation, reduced habitat diversity, and the urbanized nature of the surrounding area. PC 1277 at 19. Midwest Generation reports there is a strong inverse relationship between the amount of urbanization and various biological measures, such as the IBI. *Id.* at 77. Studies have shown that biological measures decline significantly when the percent impervious area reaches 10-20% or the percent urban area is 8-50%. In 1997, the percent of impervious area for the Des Plaines River Basin ranged from 30.1-56.4%, and in 1990, 58.7% of the area in the Des Plaines River Basin was classified as urban. Both of these values exceed the threshold negative impact on biological measures. *Id.*

Further, Midwest Generation notes that the UDIP has other significant impairments and stressors such as metals, excessive turbidity, synthetic organics such as pesticides and PAHs, pharmaceuticals, flow regime alteration, municipal point source discharges, and CSOs. PC 1277 at 24. All of these conditions mean that this waterway is unable to support a healthy and diverse

aquatic habitat. As a result, Midwest Generation opines that the UDIP in no way can attain even "minimally" the CWA aquatic life goals as proposed by IEPA. *Id.* at 25.

Midwest Generation contends that the UDIP meets various UAA factors that support a lesser aquatic life use designation than that proposed by IEPA. UAA Factor 4 is satisfied because dams and other hydrologic modifications prevent the establishment of the kind of habitat needed to support fish populations. PC 1277 at 28. The operation of the locks and dams result in significant flow fluctuations, extensive sedimentation, and habitat degradation. *Id.* Dams exist at both ends of the UDIP, creating an impoundment, which creates conditions that adversely impact all aquatic species. Midwest Generation references the 2005 Fox River Study that documented the adverse conditions on the Fox River due to impoundments. *Id.* at 29 and 30. Midwest Generation opines that because the impounded conditions on the Fox are not as bad as those on the UDIP, this study provides persuasive evidence to support the conclusion that the UDIP satisfies the requirements of UAA Factor 4. *Id.* at 30. Midwest Generation also notes that IEPA did not consider the evidence concerning the adverse effects of the UDIP flow fluctuations on aquatic life, and therefore erroneously concluded that the UDIP could "minimally" attain CWA goals. *Id.* at 34.

Midwest Generation suggests that the UDIP also meets UAA Factor 3, human caused conditions or sources of pollution that prevent the attainment of CWA goals. Sedimentation in the UDIP was moderate to severe in the areas evaluated in 2003 and in 66% of the areas evaluated in 2008. PC 1277 at 39. Midwest Generation states that this clearly shows there has been little improvement in the amount of sediment in the UDIP, which IEPA had concluded without any supporting documentation. *Id.* Turbidity was also identified as a significant problem for the UDIP in the LDPR UAA Final Report. *Id.* at 40. Midwest Generation reports that the District data from 2005 and 2008 for the UDIP show turbidity levels sufficient to cause adverse effects to some aquatic life, zooplankton in particular. Contaminated sediments also pose problems for the UDIP, according to Midwest Generation. Sediments are contaminated with metals, synthetic organics, and nutrients. *Id.*

Midwest Generation notes that contaminated sediments in CAWS are well documented. PC 1277 at 41. Given the ability of sediments to resuspend and travel downstream, Midwest Generation opines that the toxicity data on the upstream CAWS water segments is indicative of the sedimentation of the UDIP. *Id.* Midwest Generation notes studies done by the former owner of Midwest Generation, ComEd, that demonstrated that sediments in the UDIP are highly contaminated with organics such as PCBs and PAHs, cyanide and metals, including zinc, nickel, cadmium, chromium, copper, lead, and mercury. *Id.* at 43. Similar results were found by EA Engineering in a contamination study conducted in 2008. *Id.* at 44. Midwest Generation notes that IEPA admitted that it did not thoroughly consider whether contaminated sediments in the UDIP precluded it from attaining CWA aquatic life goals. IEPA reportedly believed that the sediment quality was improving, although Midwest Generation states that an IEPA expert conceded in testimony that this assumption was not based on any data. *Id.* at 45.

According to Midwest Generation, other UAA Factor 3 issues that affect the UDIP include nutrient enrichment and ammonia, the latter of which is particularly toxic to certain aquatic species. PC 1277 at 47 and 48. Wastewater from wastewater treatment plants and

nonpoint sources, such as inputs from urban and agricultural runoff, are also documented as problems in the UDIP. *Id.* at 48 and 49. Midwest Generation states that the presence of Asian carp in the UDIP further qualifies as human caused pollution under UAA Factor 3. *Id.* at 52. The Asian carp were documented in the UDIP in 2010 by the IDNR. *Id.* at 55. The establishment of the Asian carp adversely affects the native aquatic life in UDIP by causing a degraded fish community structure and reduces certain native species. *Id.* at 54. Midwest Generation opines that all of these factors provide evidence that the requirements of UAA Factor 3 have been satisfied to support finding that the UDIP cannot attain CWA goals. *Id.* at 58.

Midwest Generation states that the physical conditions related to natural features in both the CAWS and UDIP preclude attainment and therefore satisfy UAA Factor 5. PC 1277 at 58. Midwest Generation opines that there is nothing natural about the physical conditions or features of the manmade segments of the CAWS or the impounded and channelized features of the UDIP. *Id.* at 58 and 59. Midwest Generation notes that there is a lack of adequate habitat in UDIP, which is the primary factor precluding attainment of CWA goals. *Id.* at 59. To attain CWA goals, there must be a sufficient quantity of a variety of habitats, and these habitats must have fast water, riffles, hard substrates, and consistent water levels, none of which exist in the UDIP. *Id.* Midwest Generation further notes that the permanent and irreversible habitat limitations in the UDIP make it incapable of supporting viable populations of a broad spectrum of fish. *Id.* at 62.

Midwest Generation provides additional support for the habitat limitations in the UDIP with the 2003 and 2008 QHEI field survey results conducted by EA Engineering. PC 1277 at 63. The results of both studies show that the conditions in the UDIP do not support IEPA's proposed aquatic life designation. *Id.* Most sites surveyed in the UDIP had a QHEI score of below 60, and many sites scored below 45, meaning almost all of the UDIP is not good habitat for a healthy fish population. *Id.* at 65.

Midwest Generation notes that IEPA relied on QHEI scores generated by the Midwest Biodiversity Institute (MBI) in concluding that the UDIP was "minimally" able to attain CWA goals. PC 1277 at 70. Midwest Generation contends that a closer look at MBIs work reveals that it is seriously flawed and unreliable. First, the MBI QHEI field survey was too limited to provide an adequate assessment of the UDIP, with only three of the survey sites being in the UDIP. *Id.* Second, Midwest Generation reports that MBI made numerous mistakes in calculating the QHEI and IBI scores, all of which are documented in a report by EA Engineering. *Id.* at 71. Midwest Generation opines that the requirements of UAA Factor 5 have been met, and therefore, the proposed UDIP ALU should be rejected and replaced by Midwest Generation's proposed use designation that accurately describes the lower, but actually attainable aquatic life use for the UDIP. *Id.* at 80.

Midwest Generation contends that the record demonstrates that the limiting physical and biological conditions, as well as sediment contamination and protected commercial navigation prevent the UDIP from attaining CWA goals. All of these conditions, it notes, are unrelated to the thermal discharges by Midwest Generation. PC 1277 at 80. Midwest Generation states that IEPA's contention that by reducing thermal point source discharges, the UDIP will be able to attain CWA goals is contrary to the weight of the evidence presented in this rule-making and

unsupported by credible and reliable technical and scientific data. *Id.* at 81. For example, Midwest Generation notes that results of extensive fish surveys in the UDIP from 1993 to 2008 found no evidence that the thermal discharges from the power plants were the cause of the limited fish diversity present. *Id.* at 83. Further, Midwest Generation states that the physical and biological limitations of the UDIP waters show that even if the power plants' discharges were not there, the aquatic communities would not be meeting the CWA ALU goals. *Id.* at 88.

Midwest Generation reports that the possibility of remediation to address UAA factors preventing attainment of CWA goals must be considered when a proposed ALU falls below the CWA goals. Midwest Generation contends that the conditions satisfying the UAA factors for CAWS and UDIP are not reversible, and remediation of habitat limitations is not feasible. The primary limiting factor is the locks and dams. Remediation would require the removal or substantial modification of these locks and dams. PC 1277 at 88. A related irreversible and limiting condition is the lack of fast water and riffles on the UDIP; however, creating riffle areas is not feasible because it would require significant construction to create the necessary gradient to increase the speed of the water flow. *Id.* at 89 and 90. Further, Midwest Generation notes that navigation, a protected use, precludes the establishment of riffles because this would require shallow areas with fast waters. Such conditions would prevent use by commercial vessels as well as limit transit of recreational crafts, both protected uses adopted by the Board in Subdocket A. *Id* at 90.

Once a state designates aquatic life use, it is required to adopt water quality criteria to support those uses. PC 1277 at 92. Midwest Generation contends that while proposed thermal standards will be addressed in Subdocket D, their economic impact is relevant now. In order to achieve and maintain compliance with IEPA's proposed thermal standards, Midwest Generation would have to install closed-cycle cooling through the use of cooling towers at its stations. The cost of doing this is not economically feasible. *Id.* Midwest Generation reports the findings of Sargent & Lundy LLC, a firm hired to estimate the costs of thermal compliance. *Id. at 93.* The firm concluded that it would cost approximately $559 million to $790 million to install the cooling technology to control the temperature of the effluent from Midwest Generation's five stations. A second study was conducted by Sargent & Lundy based on the thermal standards proposed by IEPA. Midwest Generation states that this report concluded that helper cooling towers and open cooling would not be able to achieve the proposed thermal standards. *Id.* Additional technologies would be required, with a cost estimate of nearly $1 billion. *Id.* at 94. In addition, the estimated costs for operation and maintenance were over $17 million for three of Midwest Generation's facilities. These costs represent the low end of the range of potential costs because they do not include all of the potential compliance costs. *Id.* Midwest Generation finds that the record shows that any minimal environmental benefit that may be realized is greatly outweighed by the accompanying economically unreasonable compliance costs that would be incurred to achieve the new standards. *Id.* at 95. Midwest Generation suggests that IEPA and the Board should create use designations that reflect a realistic and accurate description that the water segments can attain. *Id.*

Midwest Generation states that it does not disagree with IEPA's proposed Aquatic Life Use B designations for the South Branch of the Chicago River, the CSSC, and the Brandon Road Pool. It does, however, suggest that the language of Aquatic Life Use B should be improved

upon to better convey the limiting factors that are present in these waters, including its highly modified and man-made features. PC 1277 at 95 and 96. As a result, Midwest Generation proposes alternative language for the Aquatic Life Use B designation in Section 302.235. *Id.* at 96. Midwest Generation also proposes language for the UDIP Aquatic Life Use Waters in Section 302.237 to more accurately reflect the conditions of the UDIP. *Id.* at 101. Midwest Generation asks that the Board adopt its proposed UDIP ALU. *Id.* at 5.

Midwest Generation notes that IEPA proposed a change to their UDIP ALU definition that references the applicability of water quality standards for the UDIP, which are part of the pending Subdocket D rulemaking. PC 1286 at 3. Midwest Generation contends that IEPA failed to consider the scientific evidence in determining that the UDIP should be capable of meeting the CWA's fishable goal. *Id.* at 4. Midwest Generation opines that this unrefuted scientific evidence clearly satisfies one or more of the UAA Factors 3, 4, and 5. *Id.* Midwest Generation contends that neither IEPA nor the Environmental Groups have refuted the findings and conclusions they presented to demonstrate that UAA Factors 3, 4, and 5 have been satisfied for the UDIP. Similarly, Midwest Generation contends that the Environmental Groups have failed to support their proposal that the Brandon Road Pool and South Branch of the Chicago River should be an Aquatic Life Use A instead of Aquatic Life Use B. *Id.* at 6. Midwest Generation reiterates many of the arguments presented earlier to demonstrate that UAA Factors 3, 4, and 5 have been met for the UDIP.

According to Midwest Generation, IEPA presented an argument to support their claim that the UDIP contains habitat to maintain healthy fish populations, which Midwest Generation contends has no scientific basis. PC 1286 at 17. IEPA advanced the theory that because 40% of the UDIP 2008 QHEI individual substrate scores are greater than or equal to 12, out of a possible substrate metric score of 20, attainment of the CWA fishable goal is possible. *Id.* at 18. Midwest Generation explains that the QHEI is a habitat scoring system consisting of six individual metrics, which are scored and then summed to determine the total QHEI score for an individual survey site. *Id.* at 17. Streams with a QHEI score of greater than 60 are said to be capable of supporting fish communities consistent with the CWA goals, and those with values of below 45 are said to not have good habitat for healthy fish communities. *Id.* at 17 and 18. Midwest Generation opines that there is no scientific evidence to support IEPA's single metric theory. *Id.* at 18. One QHEI metric does not provide a complete and accurate picture of habitat conditions. *Id.*

Midwest Generation provides evidence to support its argument that Brandon Road Pool should be designated as Aquatic Life Use B and not Aquatic Life Use A. PC 1286 at 43. Midwest Generation notes that the Environmental Groups based their recommendation for the Aquatic Life Use A designation for Brandon Road Pool on a single QHEI score of 68.5, mistakenly believed to be in the Brandon Road Pool when it is actually in the Upper Des Plaines River. In addition, scores of above 60 are inconsistent with the poor physical conditions in the Brandon Road Pool, providing further evidence that the appropriate ALU for the Brandon Road Pool is Aquatic Life Use B. *Id.* at 46.

Another issue Midwest Generation addresses is the IDNR public comment related to the IDNR fish survey that IDNR contends supports the Aquatic Life Use A designation for the

Brandon Road Pool. PC 1286 at 46. IDNR found intolerant species in their catch, although Midwest Generation notes that the predominate number of fish collected, 66.5%, were intolerant, and that the mere presence of fish provides little information about the condition of the stream. *Id.* at 47. Midwest Generation also notes that nearly 50% of the IDNR catch was comprised of exotic species, providing further evidence that the Brandon Road Pool does not contain quality habitat. *Id.*

Midwest Generation opines that it has presented scientific evidence that has not been refuted to demonstrate that the UDIP cannot attain the CWA fishable goal because UAA Factors 3, 4, and 5 have been satisfied. PC 1286 at 53. As a result, Midwest Generation asks that the Board designate the South Branch of the Chicago River and the Brandon Road Pool as Aquatic Life Use B, and adopt the revised UDIP Use Designation proposed by Midwest Generation in Exhibit A. *Id.* at 53 and 54. These designations more accurately describe the attainable aquatic life use for the UDIP and its protected existing navigation and flood control uses. *Id*. at 54.

CITGO Petroleum Corporation and PDV Midwest, LLC (PC 1278 and 1287)

CITGO Petroleum Corporation (Citgo) operates the Lemont Refinery and PDV Midwest, LLC (PDV) is the owner. The Lemont Refinery is located at river mile 296.8, just upstream of the Regulated Navigation Area (RNA) and the Safety Zone as established by the Coast Guard. PC 1278 at 1. Citgo/PDV urges the Board to recognize the threat of Aquatic Invasive Species (AIS) in the Lower CSSC, and argue that the record does not support the proposed upgrade of the designated uses for this segment of CAWS. *Id.* The Lower CSSC is defined as the reach from the Lockport Locks upstream to the confluence with the Cal-Sag Channel. *Id.* at 2. Citgo/PDV opines that the Lower CSSC cannot meet the CWA general water quality standards, and further, the Aquatic Life Use B category proposed by IEPA is not consistent with the facts related to the Lower CSSC. *Id.* at 3. Citgo/PDV also urges the Board to recognize the unique role that the Lower CSSC plays in preventing AIS from spreading into Lake Michigan. Citgo/PDV reviews the record and provides evidence to support its recommendations. *Id.* at 4.

Citgo/PDV states that the threat to the Lower CSSC from AIS includes the Asian carp, as well as the ongoing efforts to achieve an ecological or even a physical separation between the Great Lakes and Mississippi River System. PC 1278 at 5. The Lower CSSC is central to this effort in that the massive electric fish barrier is located immediately downstream of the Lemont Refinery. Citgo/PDV notes that this barrier exposes the Lemont Refinery to the dangers of the Coast Guard-designated "Black Zone", also known as the Safety Zone, located at its outfall. Citgo/PDV contends that these threats that exist today will continue for decades to come. *Id.*

Citgo/PDV argues that the record regarding the adverse impacts of AIS and the electric barrier are unrefuted, providing support for its proposal for the measures to control AIS in CAWS to be a recognized use. PC 1278 at 6. The Lemont Refinery reportedly had to move its boat dock to a new location because it was located in what became the Coast Guard-designated Safety Zone. *Id.* at 8. This electric barrier poses a risk to aquatic life but also to human life should a person become immersed in the Safety Zone or "Black Zone". *Id.* Ms. Garibay of ENVIRON recommended in testimony at the November 8, 2010 hearing that the control measures for AIS migration should be recognized as a designated use for the Lower CSSC. *Id.*

at 9. James Huff also testified at this hearing as to the adverse effects to aquatic life posed by the electric barrier and the use of rotenone for the control of AIS. *Id.* Citgo/PDV further notes that Mr. Huff testified that IEPA's proposed rules would group the RNA along with the remaining CSSC as Aquatic Life Use B, which conflicts with the local, state, and federal use of these waters as a barrier to halt the movement of AIS. *Id.* at 10.

A recommendation by the Great Lakes Commission to provide a physical barrier between Lake Michigan and the Illinois River System is discussed by Citgo/PDV as further evidence of the impacts to the Lower CSSC from the control of AIS. PC 1278 at 11. Citgo/PDV urges the Board to consider what a physical separation in the CAWS would mean for the hydrology of the Lower CSSC, as well as for the uses of the Lower CSSC and the corresponding water quality standards. *Id.* at 12. Citgo/PDV notes that while uncertainty remains as to the preferred ecological or physical barrier to be used, the electric barrier will remain the principal tool used to control AIS, with other temporary measures such as the use of rotenone. Thus, Citgo/PDV opines that the use of a portion of the Lower CSSC for a barrier for AIS is a key part of the uses of the CAWS. *Id.* at 13. Citgo/PDV expresses frustration at the failure of IEPA to acknowledge this. *Id.* at 14.

Citgo/PDV contends that the uses of the Lower CSSC for AIS control, including but not limited to the electric fish barrier are required to be considered by the Board by both federal and state law. PC 1278 at 14. Federal law requires the electric barrier to be addressed under the UAA, where Citgo/PDV agrees with IEPA in finding UAA Factors 3, 4, and 5 apply to the Lower CSSC. *Id.* at 14 and 15. IEPA concluded that human caused conditions, hydrological modifications, and natural physical conditions all prevent the Lower CSSC from supporting aquatic life. Citgo/PDV agrees and therefore concludes that there is no reason to upgrade uses of the Lower CSSC. *Id.* According to CITGO/PDV, Illinois law also requires the electric barrier to be considered. Because this barrier is designed to kill fish to prevent AIS from migrating to Lake Michigan, Citgo/PDV finds it to be economically unreasonable to require increased water quality to support aquatic life while applying lethal doses of electricity to destroy it. *Id.* at 16. Citgo/PDV recommends the Board follow its analysis in Subdocket A where it concluded that the Lower CSSC should have a use that recognizes the ongoing efforts of federal, state, and local agencies to control AIS throughout the CAWS. *Id.*

In addition to the adverse impacts of the electric barrier, Citgo/PDV restates testimony from the November 8, 2010 hearing by Ms. Garibay regarding the hydrological modifications and natural physical conditions of the Lower CSSC that do not support aquatic life. PC 1278 at 18, *citing* Exh. 420 at 4. Ms. Garibay reported on the poor habitat for aquatic species, including the absence of riffle-run characteristics, the rapid changes in flow velocity and water levels to accommodate flood control, the poor substrate, and the presence of suspended sediments from navigation, stormwater runoff, and treated effluents. *Id*. Citgo/PDV discusses the data from reports prepared in 2007 and 2010 regarding habitat and biological assessments. *Id.* In 2007, QHEI scores of 27 to 40.5 were reported, with scores of less than 30 being indicative of very poor ability to support aquatic life. Scores of between 30 and 45 indicate a poor ability to support aquatic life. *Id.* at 19. Further, the IBI score reported in 2007 was 17. *Id.* at 20. An IBI score of greater than 41 is indicative of a fully supported fish community, and scores of less than 20 are classified as very poor. According to CITGO/PDV, Ms. Garibay stated that sediment

quality for the CSSC exceeds published sediment threshold effect concentrations for 7 metals and 2 organic chemical families. *Id.*

Citgo/PDV states that IEPA is proposing to designate the Lower CSSC as an Aquatic Life Use B water, despite the fact that Lower CSSC uses are demonstrably different from the uses of other segments of the CAWS. PC 1278 at 23. Citgo/PDV contends that most of the other Aquatic Life Use B waters are natural waterways, unlike the effluent dominated Lower CSSC. *Id.* Citgo/PDV originally proposed a separate ALU C for the Lower CSSC, where the electric barrier and RNA are located, a designation it continues to support. *Id.* at 25. However, Citgo/PDV notes that because the entire Lower CSSC may become the location of a permanent physical barrier, the Board should consider this potential dramatic change into its rules. *Id.* Citgo/PDV suggests the Board has three options: 1) suspend consideration of Subdockets C and D related to the Lower CSSC until more is known about the potential physical barrier; 2) recognize the electric fish barrier as a designated use of the Lower CSSC to control AIS; and 3) add a process where future stream segments can be added to the list of designated uses of the CAWS in controlling AIS. *Id.* at 26. This would include not only adding the use but also adjusting water quality standards accordingly. Citgo/PDV supports any of these three options. *Id.*

Citgo/PDV states that it is IEPA's responsibility to demonstrate that the waterbody is capable of attaining the aquatic life use it sets out, yet failed to present information or evidence that the aquatic life use it proposes can be met in the area of the Lower CSSC with the electric barrier. PC 1287 at 4. Therefore, Citgo/PDV requests the Board designate ALU C for the Lower CSSC, or as an alternative, designate the RNA and "Black" or Safety Zone as a separate ALU C segment. *Id.* at 27. Citgo/PDV opines that this designation would recognize the existing use of this portion of the CSSC and prevent actions that might negatively impact the efficacy of the electric barrier. *Id.*

Stepan Company (PC 1279)

Stepan Company (Stepan) is a global producer of specialty and intermediate chemicals used in consumer products and industrial applications. Since 1954, Stepan operated a plant in Millsdale, Illinois, which is located in the southern half of Will County. PC 1279 at 1. Stepan notes that their plant has a direct power line from Midwest Generation's coal-fired power plant in Joliet. Stepan constructed and operates a complex wastewater treatment system that uses "beyond best technology". *Id.* at 1 and 2. The effluent from this treatment system discharges into the LDPR approximately 2-3 miles upstream of the Interstate 55 Bridge. Stepan explains that this discharge occurs in the portion of the LDPR referred to as UDIP. Stepan states that its plant has an NPDES permit that authorizes the discharge of wastewater that is monitored for 68 parameters, noting that DO is not one of them. *Id.* at 2.

Stepan discusses the CWA goals and notes that Congress recognized that uses of water for industrial and navigational purposes must be protected. PC 1279 at 3. Stepan opines that Congress did not create a presumption that CWA goals were to be achieved for all water bodies or that all other uses of waters were to be subservient to these goals. As a result, the CWA does not create any "rebuttable presumption" favoring recreational or aquatic life goals. Stepan

indicates that the Environmental Groups and IEPA view the CWA goals differently than Stepan. PC 1291 at 2 and 3. Stepan points to IEPA's argument that opponents of its proposal have a burden to demonstrate that the use is not possibly attainable even if all reasonably reversible impacts were reversed within the foreseeable future. Stepan argues that this is not supported by federal regulations. *Id.* at 3. Stepan opines that the CWA assigns the primary responsibility of balancing water uses to the states. PC 1279 at 3. As a result, Stepan argues that USEPA must remain open to hearing any explanation given by a state for adopting a particular use for a water body, regardless of whether it fits into a category that USEPA conceived of thirty years ago. PC 1291 at 12.

Stepan explains that in 1972, the Board adopted the Secondary Contact and Indigenous Aquatic life use for the LDPR upstream of the Interstate 55 Bridge because of the significant costs associated with meeting the aquatic life temperature standards. PCB 1279 at 5. In a later decision, the Board found that the area north of the Interstate 55 Bridge corresponds to the physical and environmental changes that occur in the LDPR. Stepan opines that even if some of the conditions of the LDPR have changed in the years since 1972, there is no logic in applying a rebuttable presumption that any portion of the LDPR can attain CWA goals. Whatever marginal improvements may have been made since the early 1970s, the fundamental characteristics of LDPR between the CSSC and the Interstate 55 Bridge have not changed. *Id.* Stepan concludes that there is little support for a General Use designation for waters that cannot attain CWA aquatic life goals. *Id.* at 6.

Stepan describes the current conditions of the LDPR, including UDIP to illustrate that the conditions do not provide adequate support for the type of aquatic community advocated by IEPA. Flow in the LDPR is comprised primarily of wastewater effluent, and it is heavily used for navigation, which is a protected use under the CWA. The effluent dominated conditions of the LDPR have led to degraded sediments that are not improving, because of impacts by a host of contaminants, including metals, pesticides and PAHs. PC 1279 at 6. Stepan also notes the threat of the Asian carp and the failure by state and federal agencies to take steps to prevent these invasive species from entering the UDIP. *Id.* at 7. Stepan opines that the inevitable presence of the Asian carp will adversely affect the fish community by reducing food resources for native fish, and result in negative changes to fish recruitment and fish community structure. *Id.* at 8.

The LDPR and UDIP are also impacted by existing locks and dams that create a lentic or lake-like system rather than a free-flowing river. PC 1279 at 8. These conditions provide less suitable habitat for fish species that prefer fast-moving waters, which are essential to creating a diverse community. *Id.* In addition, Stepan points to studies presented to the Board that illustrate the UDIP does not have sufficient substrate, flow or other physical features to attain aquatic life goals. *Id.* at 9. The QHEI scores for the LDPR are well below 60, which is the score recommended to define warm water habitats consistent with CWA goals. Stepan notes that based on work conducted by IEPA's contractor, the major cause of degraded habitat in the LDPR was considered irreversible. *Id.*

Stepan reports that the only area that QHEI scores are high enough to possibly attain CWA goals is the area immediately downstream of the Brandon Road lock and dam, which comprises only 7% of the UDIP. PC 1279 at 10. Stepan points to testimony by Greg Seegert

(Exh. 366) who stated that the characteristics of this limited area did not justify concluding that the UDIP could achieve CWA aquatic life goals. The dams on the LDPR prevent the UDIP from functioning as a normal river system. Mr. Seegert reports that these waters are impounded, have poor macroinvertebrate populations, and lack the fish species diversity of unimpounded rivers. *Id.* He further states that habitat studies do not support a conclusion that the LDPR and UDIP can attained the CWA aquatic life goal. *Id.* at 11.

Stepan argues that the likely costs of complying with IEPA's aquatic life use designations are economically unreasonable. However Stepan notes that the Board's segmented approach to this proceeding makes it difficult to assess economic reasonableness. For example, Subdocket C addresses the aquatic life use designations without considering the numeric water quality standards such as DO and temperature standards. Accordingly, Stepan cannot fully assess the costs associated with the use designations in this Subdocket. PC 1279 at 11. The current Secondary Contact and Indigenous Aquatic Life Use standards have temperature and DO standards that are constant throughout the year, which are generally met in the UDIP. However, IEPA has proposed different DO standards for different periods of the year and even during a given month. These standards require significantly higher DO levels and lower temperatures. *Id.* As a result, Stepan surmises that IEPA's proposed standards will not be met in the UDIP. *Id.* at 12. Stepan believes that any change to the designated aquatic life use could have an impact on the numeric criteria; therefore, the Board should consider the costs of complying with new proposed criteria in considering whether the designated use should be revised. *Id.* at 13 and 14.

Stepan points to information provided by Adams and Garibay and states that these costs are likely to be significant. PC 1279 at 14. Seven alternatives for reducing the temperature of Stepan's discharge were examined. The combined costs of the efforts to comply with the proposed requirements would be $1.665 million in capital costs and annual operating costs of $1.95 million. Stepan concludes by saying these costs are unreasonable, particularly given the other evidence provided showing that the UDIP has degraded habitat and navigational impacts such that CWA aquatic life goals cannot be met. *Id.* at 14 and 15.

Stepan opines that compliance costs are not the only negative consequences of revising the designated aquatic life use for the LDPR and UDIP. PC 1279 at 15. The technologies required for Stepan and other dischargers to meet the new standards have indirect environmental side effects, including the transference of heat in the water to another media, most likely the air. These mechanical processes used to transfer heat from the water to other media also use energy, thus creating even more heat, and in the case of the Stepan plant, there will be an increase in the burning of coal. This will generate annual incremental increases in emissions of carbon dioxide, sulfur oxides, nitrogen oxides, and mercury. *Id.* Stepan urges the Board to consider these environmental side effects. *Id*. at 16.

In post-hearing comments, Stepan discusses the quality of the evidence presented by IEPA, which it contends is weak. PC 1291 at 5. Stepan noted that several sources of data on which IEPA relied in their aquatic life use designations were not called as witnesses. For example, the habitat analysis of Edward Rankin was entered into the record, but he was not called as a witness. *Id.* Stepan also questioned the quality of the habitat assessment analysis that IEPA presented as compared to the excellent work provided by Mr. Seegert and his team at EA

Engineering. According to Stepan, IEPA ignored the QHEI data developed by Mr. Seegert and his team. *Id.* at 6.

Stepan raises similar concerns with the testimony provided on the quality of the sediment and level of siltation of the UDIP. PC 1291 at 6. IEPA staff testified that both the sediment and siltation in the UDIP were improving, although the authors of this work were not called to testify. *Id.* at 7. In addition, Stepan contends that IEPA did no real studies of how facilities would comply with the proposed thermal standards for the UDIP. IEPA merely assumed that cooling towers could be used, with no consideration as to whether such facilities could be permitted under applicable air regulations. *Id.* Stepan opines that as the proponent of the regulations, IEPA has the burden to provide the persuasive evidence supporting their proposal. *Id.* at 7 and 8.

Stepan raises other objections to the conclusions drawn by the Environmental Groups and IEPA (*see* PC 1283 and 1289). First, Stepan reports that IEPA recommended using a subcomponent of the QHEI scores related to substrate conditions to argue that CWA aquatic life use goals could be attained. PC 1291 at 8. Stepan strongly objects to this argument, contending that there is no scientific basis for looking at one component of the QHEI to make a determination about meeting CWA goals. All other witnesses testified on the basis of correlations between total QHEI scores and the ability to attain CWA aquatic life use goals. Second, IEPA argued that Mr. Seegert relied too much on the general effects of the impoundment of the UDIP, including that fish species are negatively affected by the impoundment of streams. Stepan opines that it is a well-established fact that impoundment of streams reduces its biological integrity. *Id.* at 9.

Finally, Stepan disputes the argument made by the Environmental Groups regarding the possibility of fish migration to the UDIP from the DuPage River. PC 1291 at 10. The Environmental Groups argue that fish sampling of the DuPage River, which discharges to the LDPR below the Interstate 55 Bridge, has shown good fish communities exist there. They use this as evidence to justify setting aquatic life use goals, despite the lack of sufficient habitat to support a diverse aquatic community. *Id.*

Stepan finds unreasonable a suggestion by the Environmental Groups (*see* PC 1283) that the Board should consider changes that might occur to improve habitat over the next 10-20 years in setting water quality use designations now. PC 1291 at 15. Stepan argues that because the CWA requires States to review water quality standards every three years, there is no reason to believe that IEPA will not comply with this requirement or that the length of the studies that were necessary to support this rulemaking will always need to be repeated in full. Stepan opines that to the extent that habitat conditions change, these factors can be added to the base of studies for a particular water segment to consider its appropriate designation at that time. Despite the concerns raised by the Environmental Groups, Stepan argues that neither CAWS nor the LDPR will be doomed to maintaining the status quo in perpetuity. *Id.*

Stepan points to a change in regulatory language proposed by IEPA, which they argue has several deficiencies. IEPA proposes adding a new phrase to Section 303.204, “the highest quality aquatic and wildlife that is attainable”, to describe in general terms the use designations

for CAWS and the LDPR. PC 1291 at 16. Stepan argues that using this term for the first time with regard to waters that are severely degraded without more comprehensive terminology is inappropriate. *Id.* at 17. This phrase could be misinterpreted to suggest that aquatic life use must be continually modified to the highest attainable even if there is no modification to the sections related to implementation. *Id.* Stepan states that Section 303.204 is a general introductory statement and should be revised to refer to later sections of the regulations where the uses can be adequately discussed. *Id.* at 17 and 18.

Stepan notes that IEPA has proposed an entirely new Section 303.237 to designate aquatic life use for the UDIP, which includes the addition of tolerant aquatic life populations. PC 1291 at 19. Stepan raises concerns with using undefined terms such as tolerant, intermediately tolerant, and intolerant species. Rather, it suggests using a description that references some understood measure of the health of the aquatic community. *Id.* at 20. Stepan is not certain that there is sufficient evidence to support using a separate aquatic life use category for the UDIP, but if one is to be used, it prefers the one proposed by Midwest Generation because it more accurately describes the UDIP and the type of aquatic community it can and cannot support. *Id.* at 19 and 20.

The major difference between IEPA's proposed language and that of Midwest Generation is whether to include "intolerant species" in the use designation. PC 1291 at 20. Stepan suggests that IEPA is not proposing to include intolerant species as an existing use based on the testimony provided at hearing. For example, the IBI scores for the UDIP were consistently low, and IEPA's contractor found that intolerant species were very rare. *Id.* Stepan also points to Mr. Seegert's testimony where he reported the UDIP was dominated with a few tolerant fish species that have elevated levels of DELT. *Id.* at 20 and 21. In addition, Stepan notes that IEPA's argument that UDIP could attain better fish populations is also without merit. *Id.* at 21. IEPA asserts that there is a small amount of good habitat for some intolerant species, but Stepan raises the point that no expert provided testimony as to how much good habitat is sufficient to sustain viable populations of these intolerant species. Stepan points out that Mr. Seegert testified that a system requires at least 50% good habitat to sustain viable populations of intolerant species, and the UDIP has less than 10% of such habitat. Stepan summarizes by stating that inclusion of intolerant species in the aquatic life use designation for the UDIP is unwarranted. *Id.*

Stepan concludes its comments by recommending that the Board should either make no changes to the existing designated uses or adopt the modifications to Sections 303.204 and 303.207 as it has suggested. PC 1291 at 22.

Corn Products International, Inc. (PC 1281)

The Corn Products' Argo Plant is located in Bedford Park, Illinois where it has operated for over 100 years. It processes products such as corn sweeteners, starches, edible oils, and animal feeds. PC 1281 at 2. The Argo Plant uses the CSSC as a source for non-contact cooling water. Corn Products contends that this use is not addressed in IEPA's proposed aquatic life use designation for the CSSC. *Id.*

Corn Products provides additional information about the operation of their Argo Plant. The Argo Plant withdraws water from the CSSC for use as non-contact cooling and returns the warmed non-contact water back to the CSSC pursuant to its NPDES permit. The use of non-contact cooling water is fundamental to the design and operation of the processes at the Argo Plant. PC 1281 at 3. Peak design capacity of the pumps allows withdrawal of 65 million gallons of water per day, with an average of 36 million gallons per day. Of the amount of water withdrawn, approximately 99.4% is returned to the CSSC. *Id.*

Corn Products added additional equipment in the 1990s that increased the heat load and cooling needs, so Corn Products chose to install a dedicated-use cooling tower to avoid adding thermal load to the CSSC. PC 1281 at 4. This cooling tower allowed Corn Products to remain in compliance with their NPDES permit, which leads it to contend that the Argo Plant operates near the approximate limit of its allowable thermal discharge to the CSSC. Any change in the use designation and tightening of thermal water quality standards threatens the use of the CSSC water for cooling at the Argo Plant. *Id.*

Examining past data indicates that the CSSC does not meet the thermal water quality standards corresponding to aquatic life use B. PC 1281 at 5. Corn Products reports that the water temperature at the Argo Plant intake between January 2004 and November 2007 often equals or exceeds the proposed thermal water quality standards of Use B. IEPA indicated that a noncomplying water body is not allowed the use of a mixing zone to attain compliance with water quality standards. Corn Products opines that if the CSSC marginally met the Use B thermal water quality standards, a mixing zone would be allowed; however, because the receiving waters are at or near a thermal water quality standard, there would be insufficient capacity to assimilate additional heat. *Id.* Thus, Corn Products states that the proposed Use B designation would deprive the Argo Plant of its current use of the CSSC. *Id.* at 6.

Corn Products contends that the fisheries of the CSSC are subject to habitat limitations and other non-thermal stressors. Corn Products points to testimony by Mr. Huff to suggest that designating the CSSC as CAWS Use B will provide no meaningful improvement to fisheries, and that temperature is not the limiting factor to the quality of fisheries. PC 1281 at 6.

According to Corn Products, the unique uses and characteristics of CSSC justify an alternative use designation. PC 1281 at 7. The CSSC is an artificial manmade channel created by mining and excavating limestone bedrock. It was created mainly to reverse the flow of the Chicago River to move human waste away from Lake Michigan. Therefore, from a functional and physical perspective, Corn Products suggests that the CSSC is more like an engineered aqueduct than a natural river.

Corn Products points to testimony provided by Mr. Huff, who confirms these assertions. PC 1281 at 10. Mr. Huff identified an absence of underlying aquatic life use to justify non-summer water quality standards. The man made characteristics creates a harsh environment and provides poor physical habitat, limiting the diversity of aquatic life that can be supported by the CSSC. *Id*. at 11. Corn Products also discusses testimony by Mr. Huff regarding the presence of an electric field barrier system that exists within the CSSC to prevent aquatic invasive species

from entering Lake Michigan. This barrier also prevents movement of native species, thus from a biological perspective, Mr. Huff opines that the CSSC ends at the fish barrier. *Id.* at 12.

In addition, the CSCC allows navigation and receives discharges from industrial facilities, particularly thermal discharges from electrical generating stations located upstream. PC 1281 at 8. The District also discharges treated wastewater into the CSSC from its Stickney WRP, which is upstream of the Argo Plant. Municipal treatment plants contribute 70% of the total flow of the CSSC annually. *Id*.

Corn Products reports that IEPA testified that its proposed thermal water quality standards are economically reasonable because they can be met through the use of cooling towers. PC 1281 at 9. Corn Products opines that this option for the Argo Plant is not economically reasonable. Corn Products summarizes the testimony of Mr. Idaszak of Ambitech (Exh. 305), who performed a study to determine the technological options for the Argo Plant to meet the proposed thermal standards. *Id.* at 10. Constructing a cooling tower alone is not adequate to allow the Argo Plan to continue its current use of the CSSC. Corn Products reports that Ambitech determined that chillers costing well over $23 million would be necessary to meet Use B water quality standards at a. Corn Products states that it would be required to build and operate both a cooling tower and chillers at a cost of over $43 million to meet the new standards. *Id.*

Corn Products concludes by citing Mr. Huff's observations that fisheries in the CSSC are not limited by the current thermal environment, and thus, the proposed Use B designation and its water quality standards will have no meaningful benefit on fisheries, but will impose a serious financial hardship to Corn Product's Argo Plant. PC 1281 at 22. Corn Products opines that IEPA did not properly evaluate how its proposed use designation would result in improvements to fisheries or the economic impact to dischargers. Corn Products believes it has demonstrated that applying a Use B designation to the CSSC is inappropriate and unwarranted. As a result, Corn Products proposes the creation of a "Use C" category to recognize the unique features of the CSSC. *Id.* Corn Products provides language for the new "Use C" designation that distinguishes the CSSC as a unique waterway with aquatic life that is primarily tolerant species. *Id.* at 23.

ExxonMobil Oil Corporation (PC 1282 and 1290)

ExxonMobil owns and operates a petroleum refinery in Channahon, Illinois that discharges treated process wastewater and stormwater to the UDIP of the LDPR. ExxonMobil states that any changes to existing designated uses and applicable water quality standards for the UDIP could have technical and economic impacts on their refinery operations. PC 1282 at 1. As a result, ExxonMobil suggests that any revisions to the designated uses for the UDIP be based on sound science that reflects the uses attainable in the LDPR. In these comments, ExxonMobil addresses the reasons that warrant the adoption of an aquatic life use designation for the UDIP that is less than the CWA goals. *Id.*

ExxonMobil cites the proposed definition for aquatic life use for the UDIP to include intolerant types of aquatic life, which it contends is not achievable. The inclusion of intolerant

species in this definition is based on assumptions made in the UAA for the LDPR. PC 1282 at 1. The UAA recommended that the UDIP be assigned an aquatic life use of General Use, with specific standards for DO and copper, which is not scientifically supported and unachievable. *Id.* at 2. IEPA modified the description of the aquatic life use for the UDIP but retained the assumption that intolerant species could develop into sustainable reproducing populations despite the habitat limitations that are present. ExxonMobil opines that the authors of the UAA relied on artificial substrate data to conclude that water quality in the UDIP is suitable for diverse macro-invertebrates. *Id.* at 3. This is not scientifically justified. Benthic organisms live on the bottom, thereby requiring the bottom habitat to have the physical and chemical characteristics necessary to maintain sustainable populations. *Id.* ExxonMobil notes that the UAA found the UDIP to have impounded pool depths, minimal ambient velocities, homogeneous fine-grained sediments, sediment pollutant concentrations, and sediment disturbances by barge traffic, which are all limiting factors for benthic macroinvertebrates. *Id.* at 3 and 4.

Testimony provided to the Board demonstrated the irreversible habitat limitations in the UDIP would prevent the attainment of a higher aquatic life use category. PC 1282 at 4. ExxonMobil notes flaws in IEPA's evaluation of the aquatic life use of the UDIP, including the evaluation of data related to sediment and habitat quality. *Id.* at 5. IEPA cites QHEI scores of 45-80, which correspond to fair to excellent biological potential. This conflicts with data presented by Mr. Seegert in 2008, where he cited QHEI scores of below 45, suggesting the habitat is only fair. In addition, ExxonMobil notes that the navigational channel was not evaluated due to barge traffic. As a result, ExxonMobil opines that IEPA's modified QHEI scores are not scientifically supportable. *Id.*

According to ExxonMobil, the UDIP cannot achieve CWA aquatic life use goals because of irreversible existing conditions, including the physical modifications to CAWS and LDPR that have permanently altered their hydrology, hydraulics, and aquatic habitat. PC 1282 at 6. ExxonMobil contends that four of the six factors that justify establishing subcategories of uses that do not meet the CWA goals apply to the UDIP. *Id.* The first is factor three, human caused conditions or sources of pollution that prevent attainment of the use. The majority of the flow in the UDIP is treated wastewater, CSOs, and urban runoff. ExxonMobil states that these human caused impairments and sources of pollution prevent attainment of CWA goals. *Id.* at 7.

The second is factor four, the presence of dams, diversions or other hydrologic modifications. ExxonMobil notes that almost the entire length of the LDPR now designated as Secondary Contact and Indigenous Aquatic Life Use is impounded. PC 1282 at 8. In addition, the UIW, including the UDIP is one of the busiest navigational systems in the nation, and because navigation is a protected use, there will be continued impacts on the habitat of these waterways that will preclude attainment of CWA goals. The third is factor five, physical conditions related to the natural features of the water body that preclude attainment of CWA goals. ExxonMobil notes that the impoundment of the LDPR by the locks and dams creates a deep pool environment that lacks a coarse substrate, channel diversity, riffle habitat, and gradient. *Id.* ExxonMobil concludes that these poor aquatic life habitat features are irreversible and therefore attainment of CWA goals is not possible. *Id.* at 9. The last factor demonstrating that meeting CWA goals is not possible is factor six, the resulting substantial and widespread economic and social impacts that would occur if more stringent controls were required. *Id.*

ExxonMobil contends that in order to remediate aquatic habitat to a condition that fully supports the General Use aquatic life category it would require the elimination of commercial navigation on the LDPR, removal of the existing dams and contaminated sediment, and treatment of all wastewater and urban runoff. ExxonMobil states that while these costs have not been estimated, they could begin the billions of dollars and would affect thousands of jobs that are dependent on commercial navigation. *Id.* at 10.

As a result of these factors, ExxonMobil proposes that the Board revise the aquatic life use definition to delete reference to intolerant species as a criterion. PC 1282 at 10. ExxonMobil further recommends that IEPA provide guidance as to how tolerant, intermediately tolerant, and intolerant species are defined and categorized. *Id.* at 11. This includes referencing the scientifically supported methods for classifying vertebrates and invertebrates that will be used to assess attainment of the designated use categories. ExxonMobil objects to the inclusion of intolerant aquatic species in the description of the UDIP because the UAA and other available data do not support this. *Id.*

ExxonMobil states that if you examine the record in its entirety, it leads to a different conclusion than that of IEPA. PC 1290 at 7. IEPA selectively used subsets of available habitat data to support its proposed aquatic life use, while the totality of data in the record does not support the position that the UDIP can achieve the proposed aquatic life use that will allow sustainable, balanced populations of tolerant, intermediately tolerant, and intolerant aquatic species. *Id.* at 8. ExxonMobil notes that other dischargers, including Stepan Company and Midwest Generation, submitted comments that consider the totality of data when determining the appropriate use designation for the UDIP. *Id.* ExxonMobil also agrees with IERG that impacts due to the application of road salt should be considered in determining the appropriate aquatic life use. *Id.* at 9. ExxonMobil concurs that seasonal elevation of chloride levels due to the application of road salts provides additional support to revise the aquatic life use designation for the UDIP. *Id.*

Environmental Groups (PC 1283 and 1293)

The Environmental Groups largely support IEPA's proposal for aquatic life use designations; however they do disagree with certain segments' designations. PC 1283 at 1. Specifically, the Environmental Groups maintain that the aquatic life use that are supported by the record are:

UDIP	UDIP Aquatic Life Use
Brandon Pool	Aquatic Life Use A
Chicago Sanitary and Ship Canal	Aquatic Life Use B
Calumet-Sag Channel	Aquatic Life Use A
Little Calumet River	Aquatic Life Use A
Grand Calumet River	Aquatic Life Use A
Lake Calumet	Aquatic Life Use A
Lake Calumet Connecting Channel	Aquatic Life Use A
Calumet River up to O'Brien Locks	Aquatic Life Use A
Calumet River between O'Brien Locks and	General Use

Lake Michigan	
South Branch of the Chicago River	Aquatic Life Use A
South Fork of South Branch Chicago River (Bubbly Creek)	New Subdocket
Chicago River	General Use
North Branch Chicago River	Aquatic Life Use A
North Shore Channel below North Side WRP	Aquatic Life Use A
North Shore Channel above North Side WRP	General Use

PC 1283 at 3.

The Environmental Groups present their positions by first addressing the legal and factual considerations in developing the proper designation of the stream segments. Next, the Environmental Groups apply those factors to the UDIP and then the remaining segments of the CAWS and Brandon Pool. Finally, the Environmental Groups discuss the issue of Asian carp. The Board will summarize each of those positions below.

Legal and Factual Basis for Designations

The Environmental Groups opine that the narrow scope of Subdocket C as well as the narrow scope for consideration of economic factors in the UAA limits the relevant issues here to: 1) existing habitat and aquatic life, and 2) possible future habitat and aquatic life for the various segments. PC 1283 at 4. The Environmental Groups point out that there is a rebuttable presumption that all waters are fishable/swimmable and the states must review use designations that fall short of those goals to try to reach the fishable/swimmable goal. *Id*. The Environmental Groups argue that states must upgrade water quality standards to the extent possible to protect aquatic life, unless through a UAA, the states demonstrate that one of the UAA factors prevents achieving the aquatic life use goal of fishable. *Id.* at 4-5. Existing uses, even those which fall short of fishable, must be protected. *Id.* at 5.

The Environmental Groups believe that the central issue in this Subdocket is the habitat in each segment and whether the habitat is so poor and cannot be improved that the aquatic life use should be designated less than fishable. PC 1283 at 5. The Environmental Groups note that IEPA used the QHEI as a tool for assessing habitat and agree that the QHEI is a useful tool. *Id*. However, the Environmental Groups opine that the QHEI understates the potential habitat conditions in the system for two reasons. First, QHEI does not sufficiently account for the fact that fish can swim and habitat need not be present in every portion of the water. *Id*. And second the QHEI does not take into account habitat improvement. PC 1283 at 8.

Potential habitat. Connected bodies of water can provide habitat, and it is not possible to draw firm conclusions based on particular sites within a connected system. *Id*. The Environmental Groups urge that the Board should consider the total system and how that complete system could function with improvements. *Id*. at 6.

The Environmental Groups point to the testimony of Dr. Thomas (Exh. 327) which opined that the QHEI underestimated the system. PC 1283 at 6, citing 8/14/09Tr. at 64-66. The Environmental Groups contrast Dr. Thomas' testimony with the opinion of Mr. Seegert (11/9/09Tr. at 28) and the LimnoTech Study (PC 284). *Id*. The Environmental Groups opine that using the logic of Mr. Seegert and the LimnoTech Study "one might conclude that the Pacific Ocean is not good habitat for Pacific Salmon because salmon do not breed or hatch in the ocean." *Id*. at 6-7.

The Environmental Groups maintain that as a result of the narrow interpretation of habitat data by the District, the record does not include an accurate characterization of the potential for "Jackson Creek, Hickory Creek, Spring Creek, the Kankakee River and the Upper Des Plaines River" to serve as nursery for fish that could live in the UDIP. PC 1283 at 7. The Environmental Groups also feel that the discussion of aquatic life use for CAWS have not included the possibility of waters that could be connected to the CAWS, such as the North Branch of the Chicago River above the confluence with the North Shore Channel, Little Calumet River, and Lake Michigan. *Id*.

The Environmental Groups believe that the Board should also consider the use designations of the CAWS and LDPR in association with the waters that are connected to the CAWS and LDPR. PC 1283 at 7. The Environmental Groups express concern that if poor water quality is allowed in a water body, waters connected to that water body could be harmed ecologically. *Id*. The Environmental Groups opine that poor water quality in the LDPR has the potential to harm species in Jackson Creek and other waters. *Id*. Further, the Environmental Groups believe that water temperatures or low DO in the LDPR outside the tolerance limit of stream species will leave no place for the species to go in the case of drought. *Id*.

Habitat Improvement. The Environmental Groups state "there is no doubt that habitat, like water quality, can be improved over time." PC 1283 at 8, citing 8/14/09Tr. at 93. The Environmental Groups agree that some evidence of habitat improvements have been included in the record; however, they believe that the record fails to establish that substantial habitat improvements are infeasible. *Id*. The Environmental Groups point to the testimony of Dr. Thomas and Mr. Seegert that habitat could be improved. *Id*. at 9, citing 8/14/09Tr. at 47, 11/9/09Tr. at 22. The Environmental Groups note that the LimnoTech Study (PC 284) shows potential for habitat improvement as well. *Id*.

The Environmental Groups provide examples of "cooperatively-developed proposals" to achieve habitat improvement. PC 1283 at 9, Exh. 1. The Environmental Groups raise the question as to the relevant timeframe for habitat improvement. *Id*. The Environmental Groups believe that three years is too short and feel that a more realistic timeframe is 10 to 20 years. *Id*.

Economic Considerations. The Environmental Groups state that IEPA did not rely on the UAA factor which would allow a water body to be classified as less than fishable if the designation would cause widespread economic or social impacts. PC 1283 at 10, citing 40 CFR § 131.10(g)(6). The Environmental Groups opine that economic factors are "irrelevant" to Subdocket C as the use designation does not require any particular pollution technology or controls. *Id*.

In response to concerns raised by Midwest Generation (PC 1277), Exxon Mobil (PC 1282) and Stepan (PC 1279) about the economic hardship that will result to these companies if IEPA's proposal is adopted, the Environmental Groups reiterate that the concerns are premature. PC 1293 at 17. Specifically, the Environmental Groups take issue with Midwest Generation's alternative proposal, arguing that adoption of the alternative proposal "is illegal" and that the use designations do not have a cost attached to them. *Id*. at 19. The Environmental Groups assert that there is no economic impact from use designations and discussions about economic impact do not belong in Subdocket C. *Id*.

Upper Dresden Island Pool Aquatic Life Use

The Environmental Groups note that IEPA has not attempted to characterize the UDIP as less than fishable, and they support this decision. PC 1283 at 11. The Environmental Groups state that "it is generally agreed that QHEI scores above 60 indicate" that the water body can support general aquatic life use. *Id*. The Environmental Groups note that the Brandon Road Tailwater scores above 60 according to multiple analyses. *Id*. at 12, citing Pet. Attach R, Exh. 32. Because fish do not need to be able to breed everywhere in the pool to be present in the pool, the Environmental Groups claim that the fact that there is good habitat in the pool settles the question. PC 1283 at 12. The Environmental Groups further claim that the vegetation beds in the UDIP make the habitat better than many other rivers in Illinois and there is potential back-water habitat available in streams and rivers connected to the UDIP. *Id*.

The Environmental Groups opine that while the fishery is affected by water quality issues, it generally meets the full fishable use. PC 1283 at 12. Citing to the studies provided by Midwest Generation, the Environmental Groups offer that most of the UDIP now designated less than fishable scores better than much of the UDIP designated for General Use. *Id*., citing Exh. 368. The Environmental Groups also note that Dr. Thomas' testimony indicated that the assemblage of fish in the UDIP indicates the potential to meet General Use goals. *Id*., citing 8/14/09Tr. at 63, 98, and 114.

The Environmental Groups discount concerns about contaminated sediment in the UDIP, stating that the presence of contaminated sediment "does not appear" to be any reason to believe that General Use cannot be achieved. PC 1283 at 13. The Environmental Groups also question the use of the Interstate 55 Bridge as the divider between General Use and the designation of "indigenous aquatic life". *Id*. The Environmental Groups opine that "it is ecologically unwise to try to treat water body segments not separated by dam or other barrier as though they were somehow distinct ecological systems." *Id*.

In response to Midwest Generation's alternative proposal for the UDIP, the Environmental Groups maintain that the practical distinction between IEPA's proposal and Midwest Generation's proposal is unclear. PC 1293 at 3. The Environmental Groups state:

> To the extent there is a real difference in meaning, it is that IEPA definition states that the UD[I]P is "capable of maintaining aquatic-life populations consisting of individuals of tolerant, intermediately tolerant and intolerant types" while the

> [Midwest Gen] designation states that the waters have "populations consisting primarily of lentic species or tolerant and intermediately tolerant types." Neither facts in the record nor applicable CWA requirements, however, support this altered meaning. *Id*.

The Environmental Groups maintain that Midwest Generation's own experts provided evidence that over a 12-year period "intermediately intolerant", "moderately intolerant", and "intolerant" fish were collected in the UDIP. PC 1293 at 4, citing Exh. 366 at Exh. 2, pg. 18. Based on these collections, the Environmental Groups argue that this is an "existing use" which must be protected under the CWA. *Id*.

The Environmental Groups comment that there is ample evidence that indicates the UDIP ecosystem is in fair condition and conditions for aquatic life can improve. PC 1293 at 5-8. Further, the Environmental Groups opine that the current low species populations in the UDIP are not "demonstrably" attributable to poor habitat. PC 1293 at 10. The Environmental Groups reference several studies in support of this opinion, noting fish species richness has improved in segments of the waterway. *Id*. at 11.

The Environmental Groups also take issue with Midwest Generation's suggestion that habitat can only be improved by removal of dams. They instead point out that sediments can be removed to improve habitat. PC 1293 at 12, citing PC 1277 at 89. The Environmental Groups also point out that areas around Tread Island, below the Joliet power plants, could be the subject of rehabilitation projects to improve habitat. *Id*.

The Environmental Groups disagree that the heat discharges by Midwest Generation have not affected aquatic life and point to evidence that a fish kill did occur at Joliet 7 and 8 when Commonwealth Edison operated the power plants. PC 1293 at 13-14, citing Exh. 365.

Other Segments Where Sub-Fishable Aquatic Life Use is Not Supported

The Environmental Groups note that IEPA cited three UAA factors as supporting a less than fishable designation for parts of the CAWS and the small portion of the LDPR above the Brandon Road Lock and Dam. PC 1283 at 14. Those UAA factors are:

> 3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place [40 CFR § 131.10(g)(3)];
>
> 4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use [40 CFR § 131.10(g)(4)]; or
>
> 5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the

> like, unrelated to water quality, preclude attainment of aquatic life protection uses [40 CFR § 131.10(g)(5)]. *Id*. at 15.

The Environmental Groups support IEPA's designation of waters as Aquatic Life Use A and believe the record does not support downgrading the uses. *Id*. Conversely, the Environmental Groups believe that the record does not support designating Brandon Pool of the Des Plaines River, any Branch of the Chicago River, or any part of the Calumet River or the Lake Calumet Connecting Channel for uses less than "Aquatic Life Use A." PC 1283 at 15-16.

Water Body Segments Connected to Lake Michigan. The Environmental Groups concede that the Main Branch of the Chicago River and the Calumet River between the O'Brien Lock and Lake Michigan do not generally have good habitat. PC 1283 at 16. However, those waterways are connected to Lake Michigan and the water quality is generally very high. These waters are now designated as General Use waters because of the high water quality. *Id*. Further, the Environmental Groups maintain that the Calumet River and Lake Calumet act as a surge basin for Lake Michigan during wind-driven fluctuations in Lake Michigan levels. *Id*., citing SR at 30.

The Calumet System. Species that are uncommon in the rest of CAWS are found in the northern portion of the Calumet River, and the southern portion of the Calumet River has aquatic habitat unique to the CAWS. PC 1283 at 17, citing Exh. 461 at 6. The Environmental Groups also note that the Calumets are unique because of Lake Calumet which exhibits several shallow areas, instream cover consisting of woody debris and extensive overhanging vegetation near the shoreline. *Id*. The Lake Calumet connecting pool is directly connected to high quality waters and has the potential to act as off-channel habitat for the Calumet River. *Id*. The Environmental Groups opine that protecting the water quality in the channel connecting the Calumet River to Lake Calumet is essential to help realize the potential for fish species. *Id*. at 18..

The Environmental Groups state that there is a dominant fish community that occurs throughout the Calumets including multiple trophic levels, an abundant and diverse prey base, and predator-prey relationships. PC 1283 at 18. The Environmental Groups opine that the ubiquity of the dominant community suggests that the Calumet Rivers are supporting a structurally complete and regionally appropriate fish community even with the current water quality levels. *Id*. at 18-19. To support this opinion, the Environmental Groups point to documents, comments, testimony, and reports of multiple participants. *See generally Id*. at 19-20.

The Environmental Groups believe that the evidence before the Board establishes that the Calumet Rivers support a well-structured regionally appropriate community with evidence of even more diversity. PC 1283 at 21. The Environmental Groups argue that this evidence suggests aquatic life use potential for the Calumets is significant and must be protected. *Id*. The Environmental Groups opine that with the completion of the TARP project, the Calumet Rivers' potential is even greater. The Environmental Groups argue that IEPA's Aquatic Life Use A proposal is not speculative, costly, or technically infeasible. *Id*.

North Branch below Goose Island. The Environmental Groups state that the North Branch below Goose Island is connected to the North Branch above Goose Island and that stream segment has a relatively high QHEI. PC 1283 at 22. The Environmental Groups opine that the potential habitat would be improved by "better connecting" the Upper North Branch with the CAWS. *Id*. The Environmental Groups state that there are projects proposed to make that connection. *Id*. The Environmental Groups opine that additional habitat improvements are likely to develop as recreational uses increase and could include a direct open connection to Lake Michigan. *Id*.

The South Branch. The Environmental Groups note that the South Branch of the Chicago River is also part of the connected system formed by the North Branch and the Chicago River. PC 1283 at 23. The Environmental Groups note that habitat improvement projects have been proposed, and the LimnoTech Study report indicated that habitat in the South Branch could be improved substantially. *Id*., citing PC 284. If the improvements take place, habitat will dramatically increase and provide optimal conditions for waters designated as Aquatic Life Use A. PC 1283 at 24.

The Environmental Groups note that IEPA hesitated to agree with the District and the Environmental Groups' proposed use designation because of the discharge from Midwest Generation's Fisk station. PC 1293 at 20-21. However, the Environmental Groups note that Midwest Generation stated that it will close Fisk in 2012, and the closure of this plant removes any reason to designate the South Branch with the Aquatic Life Use B designation. *Id*. at 21.

Brandon Pool. The Environmental Groups note that the QHEI score of Brandon Pool near the confluence of the Des Plaines River and the CSSC is well into the good range although the habitat is poor above the dam. PC 1283 at 24. The Environmental Groups opine that independent biological data demonstrates that Brandon Pool is capable of providing habitat for juvenile fish and should be protected with an Aquatic Life Use A designations. *Id*. The Environmental Groups note that much of the information on aquatic life comes from electro-fishing which is less effective for identifying small fish and cannot be used for larval fish. *Id*., citing 11/10/09Tr. at 15-16. However, with the discovery of Asian carp DNA in the CAWS, IDNR performed collections that found a greater variety of fish in CAWS, largely free of DELTs. PC 1283 at 25, citing PC 505. The Environmental Groups maintain that based on the IDNR data, not available to IEPA when IEPA proposed this rule, it is clear that Brandon Pool must be protected for fish reproduction as an existing use.

Asian Carp

The Environmental Groups acknowledge that some interesting information about Asian carp and the progress of Asian carp up the Mississippi River was presented in this rulemaking. PC 1283 at 26. However, the Environmental Groups maintain that the only relevant information about Asian carp "consisted of unsupportable conclusions and speculation." *Id*. The Environmental Groups opine that the presence of aquatic invasive species in a system is no reason to adopt use designations that allow weaker water quality. PC 1283 at 27.

In response to final comments from Midwest Generation, the Environmental Groups reiterate that the presence or absence of invasive species is not a reason to lower aquatic life use designations. PC 1293 at 14-15. The Environmental Groups disagree that the segments of the UDIP will be "regularly poisoned" and instead offer that the piscicide protocol outlines a plan for such actions only upstream of the Lockport Lock. *Id*. at 15.

DISCUSSION

The Board will begin its discussion with the CWA and IEPA's proposed aquatic life uses. The Board will also summarize alternative proposal for aquatic life uses suggested by participants. The first issue the Board will address is the aquatic life use and what the Board will propose as definitions for aquatic life use. The Board then provides a general discussion of the areas of concerns the Board encountered in determining the appropriate aquatic life use for each segment of both CAWS and LDPR. The Board will describe each segment, from north to south, and explain the Board finding on the appropriate aquatic life use designation that is proposed for each segment.

The Board will then discuss its proposed language in Sections 303.204 and 303.220 (35 Ill. Adm. Code 303.204 and 303.220) to apply the General Use fecal coliform water quality standard to Primary Contact Recreation waters in CAWS and LDPR. The Board was unable to make that change in its final opinion and order in Subdocket B as those sections were not proposed for first notice under the Illinois Administrative Procedure Act (*see* 5 ILCS 100/5-40 (2010)). *See* Water Quality Standards And Effluent Limitations For The Chicago Area Waterway System And Lower Des Plaines River: Proposed Amendments To 35 Ill. Adm. Code 301, 302, 303, and 304, R08-9B (Feb. 2, 2012).

Clean Water Act Goals

As described in more detail earlier in this opinion (*see infra* 11), the goal of the CWA is to attain "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water. . .." 33 U.S.C. § 1251(a)(2). This is commonly known as the "fishable and swimmable" goal. *See infra* 11. USEPA has outlined procedures for designating uses and conducting use attainability analyses, permitting states to adopt sub-categories of a use with appropriate criteria as well as seasonal uses. To establish a use other than the CWA aquatic life goals, Illinois must consider the six UAA factors to adopt such a use. 40 C.F.R. § 131.10(g). Illinois is prohibited from removing or downgrading uses that are existing uses (as of November 28, 1975) currently being attained or that could be attained by implementing the CWA effluent limits. 40 C.F.R. § 131.10.

The Board is highly cognizant of the CWA goals for aquatic life as well as the requirement to protect existing uses, including existing water quality. As the Board makes its decisions on the aquatic life use for each of the segments, the guiding principles will be the CWA goals and the protection of existing uses.

Both CAWS and LDPR have shown improvement since these waters were last classified. However, certain segments that are classified as General Use have been unable to attain the

water quality standards of General Use or to meet the CWA goals of "protection and propagation of fish, shellfish and wildlife". Other segments have shown improvement in fish diversity and water quality but still cannot yet meet the CWA goal. Furthermore, Illinois' current designation of General Use addresses aquatic life together with recreational use without providing for the possibility that a segment may attain one but not the other.

For those waters currently classified as General Use that cannot meet the CWA aquatic life goal as well as those waters classified as Indigenous Aquatic Life Use that still cannot meet the CWA aquatic life goal, the Board has found that three of the five UAA factors contribute to the waters inability to achieve the CWA goal. The three UAA factors are:

3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or

4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses. 40 C.F.R § 131.10(g)(3), (4), and (5).

The Board relies on these UAA factors in determining that the CWA aquatic life goal cannot be met in all segments of CAWS and LDPR and will address these factors below as they apply to each segment of CAWS and LDPR.

IEPA Proposed Aquatic Life Use

A more complete discussion of IEPA's proposal is found earlier in the opinion. *See infra* 40. As a reminder, the Board notes that IEPA proposed three aquatic life uses, those uses are:

1) UDIP,
2) CAWS ALU A Waters; and,
3) CAWS and Brandon Pool ALU B Waters.

ALU A waters, as proposed by IEPA, "are capable of maintaining aquatic-life populations predominated by individuals of tolerant and intermediately tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational controls necessary to maintain navigational use, flood control, and drainage functions of the waterway system." Specifically, IEPA proposed the following waters as ALU A waters:

1) North Shore Channel,

2) North Branch of Chicago River from its confluence with North Shore Channel to the south end of North Avenue Turning Basin,
3) Calumet River from Torrence Avenue Bridge to its confluence with both Little Calumet River and Grand Calumet River,
4) Lake Calumet,
5) Grand Calumet River,
6) Little Calumet River from its confluence with both Calumet River and Grand Calumet River to its confluence with Cal-Sag Channel, and
7) Cal-Sag Channel. SR at 51.

According to IEPA, ALU B waters "are capable of maintaining aquatic-life populations predominated by individuals of tolerant types that are adaptive to the unique physical conditions, flow patterns, and operational controls designed to maintain navigational use, flood control, and drainage functions in deep-draft, steep-walled shipping channels." IEPA proposed that the following waters should by ALU B waters:

1) North Branch Chicago River from the south end of the North Avenue Turning Basin to its confluence with Chicago River,
2) Chicago River,
3) South Branch Chicago River,
4) South Fork of South Branch Chicago River,
5) CSSC,
6) Brandon Pool-Des Plaines River from its confluence with CSSC to Brandon Road Lock and Dam,
7) Calumet River from Lake Michigan to the Torrence Avenue Bridge and
8) Lake Calumet Connecting Channel. SR at 50.

For UDIP, IEPA proposed the following:

> Lower Des Plaines River from the Brandon Road Lock and Dam to the Interstate 55 Bridge is designated for the Upper Dresden Island Pool Aquatic Life Use. These waters are capable of maintaining aquatic-life populations consisting of individuals of tolerant, intermediately tolerant, and intolerant types that are adaptive to the unique flow conditions necessary to maintain navigational use and upstream flood control functions of the waterway system. SR at 47, PC 1275.

Alternative Proposals for Aquatic Life Use Designations by Participants

The Board received alternative proposals from several participants on the aquatic life use designations. These included changes to IEPA's proposed aquatic life use designation for the various segments of the CAWS and LDPR, and the modification of IEPA's proposed definitions of the aquatic life uses. The District and the Environmental Groups proposed, as part of their agreement, that the entire CAWS with the exception of the CSSC be designated as CAWS ALU A. They proposed that CSSC be designated as CAWS and Brandon Pool ALU B. Citgo and Corn Products propose a separate designation, CAWS Aquatic Life Use C, for the lower CSSC. Regarding LDPR, the Environmental Groups recommended that Brandon Pool be designated as

CAWS ALU A. Also, Midwest Generation proposed changes to modify IEPA's definition of UDIP ALU. Midwest Generation's proposal was supported by Stepan. Midwest Generation proposes the following revised definition for UDIP waters:

> 302.237 Upper Dresden Island Pool Aquatic Life Use Waters
>
> Lower Des Plaines River from the Brandon Road Lock and Dam to the Interstate 55 Bridge is designated for the Upper Dresden Island Pool Aquatic Life Use. These effluent-dominated, urban-impacted waters are capable of maintaining warm water aquatic-life populations consisting primarily of lentic species of tolerant and intermediately tolerant types that are adaptive to the impounded, channelized and artificially-controlled flow and widespread siltation conditions created by the operation of the locks and dams that are necessary to maintain the existing navigational use and upstream flood control functions of the waterway system. These waters must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D.

Concerns in Determining the Appropriate Aquatic Life Uses

The Board appreciates the extensive work IEPA, public participants, and regulated community put forth in this rulemaking and recognizes the extensive volume of the record. In reviewing the record, the Board encountered several areas of concern in determining the definitions of aquatic life uses and designating segments incorporated by the definitions. The Board invites comment on these concerns. First, IEPA did not fully explain how its proposed definitions were crafted or why they differed from those recommended in the CAWS and LDPR UAAs. Neither the testimony at hearing nor subsequent filings shed light on the biologic intent of the definitions. Accordingly, the Board examined IEPA's proposed language together with the UAA recommendations, testimony and comments to define aquatic life use designations to reflect the biologic intent.

Second, the Board found it difficult to reconcile IEPA's proposed definitions for ALU A, ALU B, and UDIP with the corresponding water quality standards. While Subdocket C addresses only aquatic life use designations, the Board also reviewed IEPA's proposed water quality standards for each aquatic life use designation in an effort to understand the relationships between the three designations as envisioned by IEPA. Even under this scrutiny, these relationships were not clear to the Board.

A third concern pertains to the terms "tolerant, intermediately tolerant, and intolerant" used in IEPA's proposed ALU A and ALU B definitions. The Board shares Stepan's concerns regarding the use of undefined terms such as tolerant, intermediately tolerant, and intolerant species in the aquatic life use definitions. PC 1291 at 19. The record lacks a clear definition of these terms to understand what species might exist or be lacking in a stream segment in order to determine which aquatic life use designation should be applied. There is also no discussion of how the classifications relate to native species or how a fish is defined as "tolerant, intermediately tolerant, and intolerant". In addition, a species may be tolerant of certain parameters and not others. For example, one fish species might be tolerant of low DO levels but

intolerant of higher temperatures. It is not clear from the record whether this species would be classified as tolerant or intolerant, or even intermediately tolerant, and how this classification would aid in determining an appropriate aquatic life use designation.

The fourth concern the Board has is that the UAAs and public comments and testimonies do not seem to have a consistent correlation between water quality and aquatic habitat when using those two factors to determine the appropriate aquatic life use. For example, IEPA relied on the lack of aquatic habitat to argue that the Chicago River should be designated ALU B, while placing less emphasis on water quality. In contrast, for the Upper North Shore Channel, IEPA relied on the lower water quality in terms of DO, while placing less emphasis on the higher quality habitat, and proposed downgrading from General Use to an ALU A designation.

A fifth concern was the record's focus on the stream segments as opposed to the CAWS and LDPR system as a whole. The data presented in the record emphasize stream segments, but do not appear to address the larger aquatic systems and the connectivity inherent to these systems. The Board invites comment on these concerns and further data where available.

Board's Proposed Aquatic Life Use Definitions

After considering the extensive record and recognizing the Board's concerns discussed above, the Board proposes two aquatic life use designations for CAWS and LDPR: ALU A and ALU B. The Board revises both definitions proposed by IEPA to include concepts in IEPA's proposed definitions as well as those recommended in the CAWS and LDPR UAAs, and those suggested by public participants. Specific fish species are included in the definitions in an effort to illustrate the concept of tolerance that is inherent to each definition and to illuminate the biologic conditions of the stream segment. The Board developed the list of fish species using several sources in the record. For the CAWS segments, the Board relied upon the LimnoTech Study (PC 284), IDNR's comment (PC 505) and the CAWS UAA (Attach. B). For the LPPR segments the Board relied upon the EA Engineering's 2004 LDPR Fisheries Investigation (Attach. MM) and the LDPR UAA (Attach. A). The Board uses the term "maintaining" to suggest the aquatic system would have the characteristics needed to meet the needs of aquatic organisms at all life stages. The Board seeks direction from participants on the inclusion of specific fish species in the aquatic life use definitions; should the Board maintain the list of species, eliminate the list of species, or add to the list of species?

The Board declines to include an ALU C designation or a separate UDIP designation. For ALU C, participants had asked that the CSSC or portions of it be designated as ALU C that would be a lesser quality use than IEPA's proposed ALU A and B. The Board is unconvinced that such a designation is warranted and finds the Board's proposed ALU B designation is supported for the CSSC. For the UDIP, as will be discussed more below, the Board finds that based on the record, there appears to be little difference between the UDIP designation as defined by IEPA and General Use waters. Accordingly, the Board proposes designating UDIP as General Use rather than defining a unique aquatic life use.

The Board proposes the following definitions for aquatic life use designations for CAWS and LDPR.

Section 303.230 CAWS Aquatic Life Use A Waters

These waters are not presently capable of maintaining a balanced, integrated, adaptive community of warm-water fish and macroinvertebrates due to the unique physical conditions, flow patterns, and operational controls necessary to maintain navigational use, flood control, and drainage functions of the waterway system. These waters are capable of supporting communities of native fish that are tolerant and moderately tolerant and may include but are not limited to sport fish species such as channel catfish, largemouth bass, bluegill, northern pike, and black crappie, and non-game fish species such as the tadpole madtom, and spotfin shiner, and orangespotted sunfish.

Section 303.235 CAWS and Brandon Pool Aquatic Life Use B Waters

These waters are not presently capable of maintaining a balanced, integrated, adaptive community of warm-water fish and macroinvertebrate community due to irreversible modifications that result in limited physical habitat and stream hydrology. Such physical modifications are of long duration and may include artificially constructed channels consisting of vertical sheet-pile, concrete and rip-rap walls designed to support commercial navigation and the conveyance of stormwater and wastewater. These waters are capable of supporting primarily tolerant fish species, which may include but are not limited to central mudminnow, golden shiner, bluntnose minnow, yellow bullhead and green sunfish.

Board's Proposed Aquatic Life Use Designations

In considering the ability of each stream segment to meet the CWA aquatic life use goal, the Board analyzed three conditions or qualities for each segment of CAWS and LDPR, where no one set of conditions takes precedence over others. These three conditions are water quality, habitat, and biological conditions, including primarily fisheries and macroinvertebrates. Although sediment quality was also discussed in this rulemaking, the Board finds that sediment data found in the record is inconclusive as to its impact on aquatic life use designations and finds water quality, habitat, and biological conditions are better supported measures of aquatic life conditions. In examining the availability of suitable habitat, it is important to note Dr. Thomas' observation that "fish do not need a continuous stretch of good habitat to support life functions". Exh. 227 at 2. Rather as urged by the Environmental Groups the Board should "consider the total system and how that complete system could function with improvements". PC 1283 at 6.

The Board now turns its attention to the assessment of each CAWS and LDPR segment and sets forth its findings on the aquatic life use designations proposed for first notice. The segments will be discussed in order of their geographic location from north to south.

North Shore Channel

The North Shore Channel (NSC) is the northernmost segment of CAWS, and it extends 7.7 miles from Lake Michigan (Wilmette Pumping Station) to its confluence with the North Branch of the Chicago River. PC 284 HER at 4. This man-made channel consists of earthen side slopes with an average width of 90 feet and depth ranging from 5 to 10 feet. Presently, the NSC is divided into two segments with different aquatic life use designations. The Upper NSC, which extends from Lake Michigan to the North Side WRP, is designated as General Use. The Lower NSC, which extends from the North Side WRP to North Branch of the Chicago River, is designated Indigenous Aquatic Life Use. The Board will discuss the proposed aquatic life use designation for each of the NSC segments separately in the following sections.

Upper North Shore Channel

As noted above, the Upper NSC extends from Wilmette Pumping Station at Lake Michigan to the District's North Side WRP. This segment was revised from the Secondary Contact and Indigenous Aquatic life use to General Use in Amendments to Water Quality and Effluent Standards Applicable to the Chicago River System and Calumet River System, R87-27 (May 19, 1988). The General Use designation indicates that the CWA aquatic life goal of "fishable" is being met for the propagation of fish and shellfish. IEPA proposes to revise the aquatic life use designation for the Upper NSC from the current General Use to CAWS ALU A based on UAA Factors 3, 4, and 5. The District and Environmental Groups agree that ALU A is the appropriate aquatic life use designation for Upper NSC. In the following discussion, the Board will examine the biologic, habitat, and water quality information in the record to determine the appropriate aquatic life use designation for the Upper NSC.

Biologic conditions. The CAWS UAA reported 22 species of fish were observed in the Upper NSC at Sheridan Road. Attach. B at 4-36. The dominant game fish species included largemouth bass, and bluegill, and dominant non-game fish included gizzard shad, and common carp, with less tolerant species such as rock bass, northern pike, and black crappie also being observed, albeit in low numbers. The average IBI score over the ten-year period at Sheridan Road ranged from 20 to 38[12] indicating fair to poor water quality. *Id.* The IBI for the Upper NSC tended to be higher than the Lower NSC. More recent data in the LimnoTech Study indicate the presence of 17 fish species in the Upper NSC. PC 284 HER, App. A at 6. The frequently observed species included gizzard shad, common carp, and largemouth bass. These species were classified in the LimnoTech Study as either tolerant or moderately tolerant species. PC 284 HER, App. A, Attach. B The Board notes that LimnoTech's tolerance classification does not address any specific stressors to which the fish may be tolerant or intolerant. The LimnoTech study did not determine IBI scores of the CAWS segments.

The CAWS UAA also included macroinvertebrate sampling data collected by the District and IEPA in 2001. The District's macroinvertebrate data collected in the Upper NSC using Hester-Dendy (HD) samplers showed taxa richness of 10 at Central Street, and two at Oakton

[12] The IBI scores represent the water quality conditions as follows: 50-60 – Exceptional; 40-49 Good; 30-39 Fair; 20-29 Poor; and 12-20 Very Poor. Attach. B at 4-17.

Street with corresponding MBI[13] of 8.6 and 10, respectively. IEPA's HD sampler data showed taxa richness of six at Oakton Street with a corresponding MBI of 6.3. The CAWS UAA noted that the most dominant organism was Oligochaeta (sediment dweller) and the next dominant macroinvertebrate group was the dipterens (flies). The UAA noted Oligochaeta and dipterens are indicative of degraded water quality. Similar results are reported in the LimnoTech Study, which includes macroinvertebrate sampling data collected in 2001 and 2008 for the Upper NSC. PC 284 HER at 53. The LimnoTech Study notes that the macroinvertebrate community in CAWS, including the Upper NSC is dominated by dipterens and oligochaetes. Additionally, the study included taxa richness for pollution-sensitive organisms Ephemeroptera (Mayflies), Tricoptera (caddisflies), and Plecoptera (stoneflies) (EPT). PC 284 HER, App. B, Tech. Memo (1-4-2010) at 1. In Upper NSC, EPT richness[14] was 2 indicating poor water quality. *Id.* at 10.

Habitat Quality. The water quality impairments for the Upper NSC identified in the UAA include physical habitat limitations and flow alterations. The potential causes of impairments include hydro-modification, channelization, habitat modification, bank or shoreline modification, and flow regulations. Both, the CAWS UAA and the LimnoTech Study evaluated the habitat conditions in the NSC. The QHEI[15] scores in the Upper NSC ranged from 47.5 to 54, indicative of fair conditions. Attach. B at 4-43. The UAA noted that while the QHEI scores indicate improving habitat conditions in the Upper NSC, the segment is still affected by a lack of flow or current, instream habitat, and poor substrate. Other than CSOs and stormwater runoff, the Upper NSC experiences little or no flow over long periods due to reduced discretionary diversion from Lake Michigan. The UAA stated that the NSC could potentially support an assemblage of tolerant aquatic species, and those species reflective of high quality substrates and structure would be absent or present in limited numbers. *Id.* at 4-39 citing Attach. R. Further, the CAWS UAA stated that the Upper NSC would need significant improvements like meanders and shallow shorelines to improve the fish and macroinvertebrate communities.

The LimnoTech Study includes a comprehensive assessment of the physical habitat conditions in CAWS. The study addressed substrate type and quality, instream and overhanging cover, channel morphology, hydrology, bank, and riparian conditions. The LimnoTech Study indicates that the deep and shallow substrates in the Upper NSC were dominated by inorganic silts, except for the northern part of the segment near Central Street where sand was the dominant shallow substrate. PC 284 HER at 62-63. The study observes that fine sediments are prone to resuspension and redistribution due to discharges of surface runoff, and suspended sediments adversely affect fish diversity and abundance. Sediment deposition also affects fish diversity by favoring species adapted to fine sediments. *Id.* at 65.

The LimnoTech Study assesses the presence of in-stream and overhanging cover for Upper NSC. Over hanging cover features such as riparian vegetation and woody debris provide

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[13] The MBI scores range from 0 to 11, with lower scores indicating higher quality of water: MBI < 6.0 is Good; 6.1 t0 7.5 is Fair; 7.6-8.9 is Poor; and >9.0 is Very Poor. Attach B at 4.19.

[14] EPT richness indicates the number of EPT taxa (mayflies, stoneflies and caddisflies) in a sample. EPT richness closer to zero indicates poor aquatic conditions.

[15] QHEI is a measure of habitat quality in a stream segment. A QHEI: >/= 75 Excellent; 60-74 Good; 46-59 Fair; 30-45 Poor; <30 Very Poor. Prop. Attach. R.

shallow water protection from predators and shading. In-stream cover in the form of course substrates, emergent and submergent vegetation provides hiding cover, food, and reproductive features. *Id.* at 65-66. The LimnoTech Study notes that although in-stream and overhanging cover is generally limited in CAWS, the two sampling stations in the Upper NSC had significantly higher percentage of both types of cover indicating better habitat conditions than the other segments of the CAWS. *Id.* at 67.

Regarding channel morphology, the LimnoTech Study observes that the channels in CAWS were intentionally constructed to be straight to allow for navigation and conveyance of stormwater runoff and treatment plant flows. Additionally, the study notes that the depth and cross-sectional area of the Upper NSC are relatively uniform along its entire reach. The straight, uniform channels reduce the variability of sediment erosion and deposition patterns. Also, the study states that the lack of sinuosity favors transient and open water species. PC 284 HER at 74. Further, the constructed channels unlike natural streams provide little or no refuge, developed littoral zones, or shallow bank areas to support various life stages of fish. *Id.*

Next, the LimnoTech Study notes that the average flow and velocity predicted by modeling indicate that other than Bubbly Creek, the Upper NSC has the lowest flow rate and velocity in the CAWS. PC 284 HER at 79. The flow conditions in the Upper NSC are typically stagnant except during wet weather events.

Lastly, the LimnoTech Study indicates that more than 80% of the Upper NSC has riparian vegetation. The study observes that the NSC has more riparian vegetation and natural looking banks than most of the other CAWS segments. PC 284 HER at 82. However, the study found that the Upper NSC has a very small number of bank pocket areas and off-channel bays, which serve as fish refuge.

The LimnoTech Study developed a CAWS specific Habitat Index for each segment of the CAWS based on habitat variables that were most statistically important to fish in the CAWS. PC 284 HER at 127. The index was normalized to a scale of zero to 100. The CAWS Habitat Index score for the Upper NSC was 75.2, which was the highest score in CAWS. The CAWS Habitat Index Score for other segments ranged from 33 to 60. While the Board is not ruling on the merits of the CAWS Habitat Index in this rulemaking, the Board notes that the CAWS Habitat Index for the Upper NSC is consistent with the higher QHEI scores for the segment.

Regarding improvement of habitat quality, the LimnoTech Study states that the only habitat attributes with a potential for improvement are provisions for off-channel refuge and bank pocket areas, and removal of riprap banks. PC 284 HIR at 48. The LimnoTech Study notes that the improvement of habitat attributes in the Upper NSC could increase the Habitat Index score by 7%, which is within the range of scores for individual stations in the Upper NSC, suggesting that the changes would not likely have a significant impact on fisheries quality. *Id.* Further, the LimnoTech Study estimates the cost of implementing the habitat improvements across the NSC as a whole to be $29.9 million without accounting for costs associated with land acquisition, demolition, removal, relocation of existing structures, and utilities, and any potential environmental cleanup. The portion of the amount attributable to the Upper NSC was not available. *Id.* at 61.

Water Quality. The CAWS UAA evaluated water quality conditions in the Upper NSC by using the use attainment screening approach with the General Use standards as a benchmark for achieving the CWA goals. The study found low DO levels most of the time in the Upper NSC. Attach. B at 4-25. The UAA attributed low DO levels to "frequent low flow conditions coupled with periodic surges of CSO and stormwater discharges". *Id*. at 4-25. In addition, the study notes that reduced discretionary diversion at the Wilmette Pumping Station impacts DO levels in the Upper NSC. Based on monitoring data, the UAA concluded that water temperature is not a significant concern in the Upper NSC. Attach. B at 4-26. Regarding other monitored parameters, the CAWS UAA established a list of constituents of concern for the Upper NSC based on maximum percent exceedance of screening criteria at sampling locations. *Id.* at 4-34. These constituents of concern for the Upper NSC include total silver, dissolved copper (chronic), dissolved nickel (chronic), dissolved zinc (chronic), ammonia (chronic), and pH. *Id.* at 4-35. 2004 Illinois 305(b)[16] Report lists zinc, nickel, total nitrogen, DO, fecal coliforms, total phosphorus and PCBs as impairments in the Upper NSC. The Board notes that fecal coliform is not an issue here since it is not typically associated with impacts to aquatic life.

Board's Proposed Aquatic Life Use Designation for Upper NSC. Based on the evaluation of biologic, habitat, and water quality conditions, the Board finds that the Upper NSC is not attaining its current designation of General Use for the protection of aquatic life and will not in the foreseeable future. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the General Use designation in the Upper NSC. The biologic data presented by IEPA and the District indicates that the Upper NSC is currently not attaining the CWA goals. While the evidence in the record indicates that the Upper NSC has better biologic and habitat conditions than other segments of the CAWS, both IBI and MBI scores for the Upper NSC are indicative of fair to poor quality. Further, the fish sampling data show that fish assemblages present in the Upper NSC are predominantly tolerant and moderately tolerant types such as gizzard shad, common carp, emerald shiner, and largemouth bass.

The habitat data indicate that Upper NSC has the highest habitat quality for fish in the CAWS. However, the Board agrees with IEPA, the District and the Environmental Groups that this segment is limited by certain habitat conditions from attaining full biological potential to meet the CWA goals. This segment suffers from significant low flow conditions as result of flow regulation from Lake Michigan. Other than CSOs and stormwater runoff, the Upper NSC experiences little or no flow over long periods due to reduced discretionary diversion from Lake Michigan. The record shows that the stagnant flow conditions are not going to change in the foreseeable future. Further, the habitat improvements identified in the UAA and LimnoTech Study are not expected to make a significant impact on achieving General Use.

The water quality data indicate that the primary parameter of concern in the Upper NSC is the DO level. The DO levels frequently failed to meet the General Use standard. As noted above, low DO levels are attributed to frequent low flow conditions coupled with periodic surges

[16] The Board notes that the Illinois 305(b) report is a document prepared by IEPA every two years reporting on the conditions of the waters of the State. The 2004 report is available at http://www.epa.state.il.us/water/water-quality/305b/305b-2004.pdf

of CSO and stormwater discharges. The Board expects that the completion of TARP[17] will mitigate the impact of CSOs and stormwater runoff on Upper NSC. However, the completion of the reservoirs may take another 15 years. Further, there is nothing in the record to indicate that the low flow conditions in the Upper NSC are going to change in the foreseeable future. Therefore, the Board finds that the water quality conditions are not conducive to the Upper NSC attaining General Use.

In light of the above, the Board finds that the biologic, habitat, and water quality conditions in the Upper NSC limit the attainment of the General Use designation for protection of aquatic life. As noted by IEPA, UAA Factors 3, 4 and 5 are all present in the Upper NSC preventing this segment from achieving full biological potential to meet CWA goals. Although completion of TARP would reduce the impacts of human caused conditions and sources of pollution (UAA Factor 3), the impact of such reductions on the Upper NSC can be assessed only after the completion of TARP. Further, there are no plans to address the existing flow conditions due to the effects of dams, diversions, or hydrologic modifications on Upper NSC (UAA Factor 4). Finally, Upper NSC is affected by the physical conditions related natural features of the water way (UAA Factor 5) such as low flow, lack off channel bays and bank pocket areas.

Therefore, the Board proposes to redesignate Upper North Shore Channel as CAWS ALU A. The Board finds that the CAWS ALU A designation supports communities of native fish that are tolerant and moderately tolerant while recognizing the unique physical conditions, flow patterns, and functions of the waterway. Thus, the Board proposes designating the Upper North Shore Channel as CAWS ALU A which is consistent with IEPA's proposal as well as the agreement between the Environmental Groups and the District. 1/27/12 Statement Attach. A; PC 1366 at 1; PC 1275 at 21-22.

Lower North Shore Channel

The Lower NSC is part of the NSC that extends from the District's North Side WRP to its confluence with the North Branch of the Chicago River. The physical habitat conditions (*e.g.* width, depth, side slopes, cover, etc.) of the Lower NSC are very similar to the Upper NSC, except for flow conditions and DO levels. Unlike the stagnant conditions in the Upper NSC, the Lower NSC receives effluent flow from the North Side WRP, which has an average design flow of 333 million gallons per day (mgd). Attach. B at 3-8. Also, the Lower NSC benefits from the higher DO levels in the District's effluent that averages at 7.25 mg/L. The Lower NSC is currently designated as Indigenous Aquatic Life Use. IEPA proposes to designate the Lower NSC as CAWS ALU A based on UAA Factors 3, 4 and 5. The District and Environmental Groups agree that CAWS ALU A is the appropriate aquatic life use designation for the Lower

[17] The District has undertaken the TARP to "alleviate the polluting effects of CSOs and to provide relief from local flooding by providing holding capacity for 18 billion gallons of combined sewage in its tunnels and reservoirs until it can be pumped to the WRP for full treatment." Attach. B at 3-14. TARP is being implemented in two phases. TARP Phase I, which consists of the construction of 109.4 miles of deep tunnel with a storage capacity of 2.3 billion gallons was completed in 2006. PC 565, Item 11 at 1. TARP Phase II, which includes the NSC drainage area, is expected to be completed in 2028. *Id.* at 3.

NSC. The Board will review the biologic, habitat, and water quality information to determine the appropriate ALU designation for the Lower NSC.

Biologic Conditions. The CAWS UAA noted that 10 species of fish (excluding hybrids) were observed in the Lower NSC. Attach. B at 4-36. While the dominant game fish species included largemouth bass and bluegill, the dominant non-game fish included gizzard shad and common carp. The LimnoTech Study classifies these species as either tolerant or moderately tolerant species. PC 284 HER, App. A, Attach. B The average IBI score over the ten-year period at the three sampling stations in the Lower NSC ranged from 21 to 25. *Id.* at 38. The IBI scores for the Lower NSC were indicative of poor quality. *Id.* at 35. Recent fish sampling data in the LimnoTech Study indicate the presence of 19 non-hybrid species in the Lower NSC. PC 284 HER, App. A at 6. The most frequently observed species across all monitoring stations in CAWS, including the Lower NSC were gizzard shad, common carp, and largemouth bass The LimnoTech Study classifies these species as either tolerant or moderately tolerant species. PC 284 HER, App. A, Attach. B.

Regarding macroinvertebrates, the District's HD sampling data for the Lower NSC had a taxa richness of 11 at Touhy Avenue, and 9 at Foster Avenue with corresponding MBI scores of 7.5 and 8.6, respectively. Attach. B at 4-42. IEPA's HD data at Petersen Avenue had a taxa richness of 19 with a corresponding MBI of 8.6. The MBI scores in the Lower NSC are reflective of fair to poor water quality. The dominant sediment dwelling organism in the NSC was Oligochaeta that was followed by the macroinvertebrate group dipterans (flies). As noted above, both oligochaeta and dipterens are indicative of degraded water quality. Similar results are reported in the LimnoTech Study, which included macroinvertebrate sampling data collected in 2001 and 2008 for the Lower NSC. PC 284 HER at 53. The LimnoTech Study notes that the macroinvertebrate community in the Lower NSC was dominated by oligochaetes (85.5%) and dipterans (7.7%). In addition, the LimnoTech Study notes that the Lower NSC had very small number of pollution-sensitive organisms as indicated by EPT richness of 4. PC 284 HER, App. B, Tech. Memo (1-4-2010) at 10.

Habitat Quality. As noted above, the habitat conditions in the Lower NSC are similar to the Upper NSC except for flow conditions. The CAWS UAA noted that the QHEI scores at three sampling locations in the Lower NSC ranged from 40 to 49.5, which indicate poor to fair habitat conditions. The LimnoTech Study includes an evaluation of habitat condition in CAWS, including substrates type and quality, instream and overhanging cover, channel morphology, hydrology, bank, and riparian conditions.

The LimnoTech Study indicates that the Lower NSC had sand as the dominant deep and shallow substrate. PC 284 HER at 62-63. Like the Upper NSC, the two sampling stations in the Lower NSC had a significantly higher percentage of instream and overhanging cover compared to other segments of CAWS. The channel morphology is similar to the Upper NSC in that the lower segment also is characterized by the straight, uniform channels that reduce the variability of sediment erosion and deposition patterns, and the Lower NSC provide little or no refuge, developed littoral zones, or shallow bank areas to support various life stages of fish. PC 284 HER at 74.

Next, the LimnoTech Study states that the average flow in the Lower NSC is significantly higher than the Upper NSC because of the effluent flow from the North Side WRP. Lastly, the Lower NSC has more riparian vegetation and natural looking banks than most of the other segments. However, the Lower NSC has a very small number of bank pocket areas and off-channel bays, which serve as fish refuge. PC 284 HER at 85.

The Lower NSC had a CAWS Habitat Index score of 60.4 on a scale of 0 to 100, approximately 15 points less than the Upper NSC, but at least 10 points more than other segments in the CAWS. The LimnoTech Study Habitat Index score like QHEI indicates that the Lower NSC has better habitat quality than other segments of the CAWS.

Regarding improvement of habitat quality, LimnoTech Study states that the only habitat attributes with a potential for improvement in the Lower NSC are provision of off-channel refuge and bank pocket areas, and removal of riprap banks. PC 284 HIR at 48. However, the LimnoTech Study observes that the changes would not likely have a significant impact on fisheries quality. *Id.*

Water Quality. As noted above, the CAWS UAA evaluated water quality conditions in the Lower NSC by using the General Use standards as a benchmark. The CAWS UAA identified that DO, total silver, dissolved nickel (chronic), dissolved zinc (chronic), ammonia, TDS, and pH as constituents of concern in the Lower NSC. Attach. B at 4-35. The DO levels in Lower NSC at Devon Avenue stayed above the 5 mg/L screening criterion over a 5-year period and dropped below 6 mg/L more than 8 hours per day 13% of the time. *Id.* at 4-26. While the DO conditions in the Lower NSC benefitted from the North Side WRP's effluent with an average DO level of 7.25 mg/L, the DO levels in the Lower NSC were impacted by large rain events during summer months due to CSOs and stormwater runoff. *Id.* Among other constituents of concern, only zinc exceeded the General Use screening level more than 10% of the time.

Board's Proposed Aquatic Life Use Designation for Lower NSC. The Board finds that the biologic, habitat, and water quality conditions indicate that the Lower NSC is not capable of attaining the CWA goals for aquatic life in the foreseeable future. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the CWA goals in the Lower NSC.

The biologic data presented by IEPA and the District indicate that the Lower NSC is currently not attaining the CWA goals. Both, the IBI and MBI scores for the Lower NSC are indicative of fair to poor quality. Further, the fish assemblage present in the Lower NSC is predominantly tolerant or moderately tolerant types such as gizzard shad, common carp, emerald shiner, and largemouth bass. Additionally, the EPT richness suggests that pollution-sensitive macroinvertebrates are present in very small numbers.

Like the Upper NSC, the habitat conditions in the Lower NSC are better than other segments of the CAWS. However, the Board agrees with IEPA and the District that this segment is still limited by channel morphology and flow conditions from attaining full biological potential to meet the CWA goals. Although the CAWS UAA and the District's LimnoTech

Study identified habitat attributes that could potentially be improved in the Lower NSC, such improvements are not expected to have a significant impact on the fisheries.

The water quality data indicate that primary constituents of concern in the Lower NSC were DO and zinc. Although DO levels in the Lower NSC failed to meet the General Use standard less frequently than Upper NSC, the Board notes that the DO levels in this segment are impacted by CSOs. While the completion of TARP would benefit the DO conditions in the Lower NSC, the development of the TARP reservoirs may take another 15 years.

Therefore, the Board finds that the biologic, habitat, and water quality conditions in the Lower NSC limit the attainment of the general Use designation for protection of aquatic life. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 are all present in the Lower NSC preventing this segment from achieving full potential to meet CWA aquatic life goals. The Lower NSC is impacted by UAA Factor 3, human caused conditions and sources of pollution. The man-made straight, steep-sloped channels, CSOs, and stormwater runoff continue to impact the Lower NSC. Although completion of TARP would reduce the impact of CSOs, the impact of such reductions on the Lower NSC can be assessed only after the completion of TARP. Regarding UAA Factor 4, the effects of dams, diversions, or hydrologic modifications, there are no plans to address the existing flow regime in the Lower NSC that is affected by the flow regulation in the CAWS to maintain navigation, flood control and drainage functions of the system. Finally, with respect to UAA Factor 5, the physical conditions related to natural features of the water way, the Board notes the lack off-channel bays and bank pocket areas in the Lower NSC impact aquatic life protection. While the potential exists for some improvement in habitat attributes, the record indicates that such improvements will not make a significant difference in terms of attaining the CWA goals CWA goals in the foreseeable future.

North Branch Chicago River

The North Branch of the Chicago River (North Branch) segment is 7.7 miles long, extending from its confluence with the North Shore Channel to its confluence with the Chicago River and the South Branch of the Chicago River. Attach. B at 3-6. The North Branch is divided into two sections: the upper North Branch extending 2.6 miles from the North Shore Channel to the south end of the North Avenue Turning Basin; and the lower North Branch extending 5.1 miles from the south end of the North Avenue Turning Basin to its confluence with the Chicago River and the South Branch of the Chicago River. *Id.*

In the upper North Branch, the channel has been either straightened or relocated into straight segments with steep earthen side slopes. The width is generally 90 feet with a depth in the center of the channel of approximately 10 feet. *Id.* Land use along the upper North Branch consists of a mix of commercial, industrial, residential and park land/open space.

Although the lower North Branch follows its original course, the channel has been deepened and widened in this area. The width of this reach varies from 15 to 300 feet with a depth between 10 to 15 feet. In several reaches, the banks consist of vertical dock walls in various states of disrepair. In addition to upper and lower North Branch segments, the North Branch of the Chicago River includes the North Branch Canal, which is a one mile long alternate route that splits from the upper North Branch around Goose Island and connects to the North

Avenue Turning Basin. Attach. B at 3-7. The canal's width ranges from 80 to 120 feet with a depth of four to eight feet.

Both the upper and lower segments of the North Branch of the Chicago River are currently designated as Indigenous Aquatic Life Use. IEPA has proposed CAWS ALU A for the upper North Branch, and CAWS and Brandon Pool ALU B for the lower North Branch. The District and Environmental Groups recommend that the entire North Branch be designated as CAWS ALU A. PC 1366 at 1. IEPA states that it does not object to lower North Branch being designated as CAWS ALU A. PC 1275 at 22. The Board will examine the biologic, habitat and water quality information to determine the appropriate aquatic life use designation for the North Branch of Chicago River.

Biologic conditions

The CAWS UAA assessed the biologic conditions in the North Branch using the District's fish and macroinvertebrates sampling data collected from 1993 through 2002. The UAA reported 25 species of fish (excluding hybrids) in the North Branch. The greatest species diversity (19 species) was observed at Wilson Avenue in the upper North Branch in 1994. The data showed a decline in species diversity from 1993 to 2002. Attach. B at 4-54. The dominant game fish species included largemouth bass, green sunfish, and bluegill, and the dominant non-game fish included gizzard shad, common carp, and gold fish. The IBI scores over the ten-year period at the two sampling stations in the North Branch ranged from 16 to 32 indicating fair to very poor quality. Attach. B at 4-54. Based on the District's fish sampling data from 2001 to 2007, LimnoTech Study identifies 17 non-hybrid species at the three sampling locations the North Branch. PC 284 HER, App. A at 6. The most frequently observed species in the North Branch at Grand Avenue includes gizzard shad, common carp, golden shiner, and pumpkin seed. *Id.* at 14.

Regarding macroinvertebrates, the District's HD sampling data collected at five sampling stations in the North Branch had a taxa richness ranging from 23 at Lawrence Avenue in the upper North Branch to 5 at Grand Avenue in the lower North Branch with corresponding MBI of 5.1 and 9.8, respectively. Attach. B at 4-63 – 4-64. The dominant species in the North Branch included Oligochaeta, the isopod *Caecidotea* and chironomids. The dominant dipeteran (flies) was *Dicrotendipes simponi.* In the upper North Branch, the CAWS UAA noted that the MBI scores reflect good water quality at Lawrence Avenue and Argyle Street, and poor water quality at Wilson Avenue and Diversey Parkway. The MBI score at Grand Avenue in the lower North Branch was indicative of poor water quality conditions. *Id.* at 4-62. Similar results are reported in the LimnoTech Study, which included macroinvertebrate sampling data collected in 2001 and 2008 for the North Branch. PC 284 HER at 53. In addition, the LimnoTech Study notes that the North Branch had very small number of pollution-sensitive organisms and an EPT richness in the range of 0 to 2. PC 284 HER, App. B, Tech. Memo (1-4-2010) at 4, 10.

Habitat Quality

The water quality impairments listed in the 2004 Illinois 305(b) Report for North Branch include physical habitat alterations and flow alterations as causes. Further, the Illinois 305(b)

report lists hydro-modification, channelization, habitat modification, bank or shoreline modification, and flow regulations as potential causes for impairment. Attach. B at 3-7. Both, the CAWS UAA and the LimnoTech Study addressed the habitat conditions in the North Branch. The CAWS UAA states that a habitat survey done by Rankin in 2004 indicated poor aquatic life potential at Wilson Avenue (upper North Branch) and very poor potential at Grand Avenue (lower North Branch). Attach. B at 4-65, citing Rankin (2004). The limiting factors for the North Branch included channelization, low gradient, and lack of riffles. *Id.* The CAWS UAA noted that the QHEI score was 42 at Wilson Avenue and 26 at Grand Avenue. The higher QHEI at Wilson Avenue indicate more improved habitat conditions in upper North Branch than the lower North Branch. The CAWS UAA observed that upper North Branch could support a more permanent assemblage of fish tolerant to water pollution, while the lower section would support fish species that are accustomed to an open water environment. *Id.*

The LimnoTech Study evaluated habitat conditions in the North Branch, including substrates type and quality, instream and overhanging cover, channel morphology, hydrology, bank, and riparian conditions. The LimnoTech Study indicates that while the substrates in the upper North Branch were dominated by sand and cobble, the lower North branch had inorganic silt as the dominant deep and shallow substrate. PC 284 HER at 62-63. The sampling stations in the North Branch had no instream cover, but overhanging cover was present in the upper North Branch. *Id.* at 67. Regarding channel morphology, the North Branch is channelized with a cross-sectional area of 1000 ft^2 in the upper North Branch and 2000 ft^2 in the lower segment. The North Branch is affected by some of the same factors as the NSC such as reduced variability of sediment erosion and deposition patterns, lack of developed littoral zones, or shallow bank areas to support various life stages of fish. PC 284 HER at 74. Also, the lack of sinuosity favors transient and open water species. *Id.*

Next, the average flow and velocity predicted by modeling indicates that the hydrologic conditions in the North Branch are similar to the Lower NSC. Regarding bank conditions, the LimnoTech Study notes that the North Branch has riparian vegetation in the upper sections, but no vegetation in the lower North Branch. PC 284 HER at 84. Also, the study found that the North Branch has more bank pocket areas and off-channel bays, which serve as fish refuge, compared to the NSC. *Id.* at 85.

Regarding improvement of habitat quality, the LimnoTech Study states that the habitat conditions in the North Branch with a potential for improvement include provision for off-channel refuge and bank pocket areas, removal of vertical dock walls in certain sections, reduction of riprap banks, and improvement of macrophyte/overhanging cover. PC 284 HIR at 48-49. The LimnoTech Study estimates a cost of $98 million for the habitat improvements in the North Branch. *Id.* at 61.

Water Quality

The CAWS UAA relied on water quality data from 1998 to 2002, and the General Use standards as screening levels to evaluate water quality conditions in the North Branch. The CAWS UAA identified that DO, total silver, dissolved nickel (chronic), dissolved zinc (chronic), ammonia, TDS, cyanide and pH as constituents of concern. Attach. B at 4-53. Among these

constituents, only DO failed to meet the water quality screening criterion more than 10%. Silver, nickel, ammonia, and TDS exceeded the screening levels more than 5%.

Based on data from five continuous DO monitoring stations in the North Branch, the UAA noted that while DO levels in the North Branch stayed above the 4 mg/L screening criterion most of the time, the DO levels dropped below 5 mg/L screening level frequently in the lower sections of North Branch. Further, the DO levels frequently dropped below the screening level 6 mg/L more than 8 hours per day at all monitoring stations. *Id.* at 4-49. The CAWS UAA stated that the failure to meet the DO screening criteria was significantly greater during CSO impacted period. *Id.*

The water quality impairments listed in the 2004 Illinois 305(b) Report for North Branch include silver, total nitrogen, DO, TDS, chlorides, TSS, aldrin, iron, oil and grease, PCBs and hexachlorobenzene. Attach. B at 3-7.

Board's Proposed Aquatic Life Use Designation for North Branch Chicago River.

The Board finds that the biologic, habitat, and water quality conditions indicate that North Branch of the Chicago River is not capable of attaining the CWA goals for aquatic life in the foreseeable future. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the CWA goals in the North Branch

The biologic data in the record indicate that the North Branch is currently not attaining the CWA goals. Both, the IBI and MBI scores for the North Branch are indicative of fair to very poor quality. Further, the fish sampling data show that the fish assemblage present in the North Branch is predominantly tolerant or moderately tolerant types such as gizzard shad, common carp, emerald shiner, and largemouth bass. Additionally, the EPT richness suggests that pollution-sensitive macroinvertebrates are present in very small numbers.

While the upper North Branch has some positive habitat attributes like overhanging cover and off-channel refuge, the overall habitat conditions in the North Branch are not favorable for supporting a balanced and diverse assemblage of aquatic life. The Board agrees with IEPA and the District that this segment is limited by channel morphology, bank conditions, and flow regulation from attaining full biological potential. Although the CAWS UAA and the District's LimnoTech Study identified habitat attributes that could potentially be improved in the North Branch, such improvements may cost tens of millions of dollars. Also, there are no plans to implement large-scale habitat improvements in the North Branch in the near future.

The water quality data indicate that the primary constituent of concern in the North Branch was DO, and to a lesser extent silver, nickel, zinc, and ammonia. Since the DO levels in this segment are impacted by the CSOs, the Board expects that the completion of TARP would benefit the DO conditions in the North Branch. However, the completion of the reservoirs may take another 15 years.

In light of the above, the Board finds that the biologic, habitat, and water quality conditions in the North Branch limit the attainment of the CWA goals for protection of aquatic

life. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 are all present in the North Branch preventing this segment from achieving full biological potential to meet CWA goals. The North Branch is impacted by UAA Factor 3, human caused conditions and sources of pollution. The straightened, steep-sloped channels, CSOs, and stormwater runoff continue to impact North Branch. Although CSOs will be addressed by TARP, the completion of TARP reservoirs is at least 15 years away. The impact of the elimination of CSOs on the North Branch can be assessed only after the completion of TARP reservoirs. Regarding UAA Factor 4, the effects of dams, diversions, or hydrologic modifications, there are no plans to change the existing flow regime in the North Branch that is affected by the flow regulation in the CAWS to maintain navigation, flood control and drainage functions of the system. Finally, with respect to UAA Factor 5, the physical conditions related to natural features of the water way, the Board notes the presence of vertical dock walls, and lack of in-stream cover, and sinuosity in the Lower North Branch impact aquatic life protection. While the potential exists for some improvement in habitat attributes, the record did not address the potential for improvements to make a significant difference in terms of attaining the CWA goal.

Therefore, the Board finds that the record supports the designation of the entire North Branch as CAWS ALU A. The Board notes that IEPA proposed designating the upper North Branch as CAWS ALU A and the lower North Branch as CAWS ALU B but does not object to the lower North Branch being designated as CAWS ALU A. The CAWS ALU A waters are capable of supporting communities of native fish that are tolerant and moderately tolerant while recognizing the unique physical conditions, flow patterns, and functions of the waterway. This designation reflects the biologic, habitat and water quality conditions expected in the North Branch for the foreseeable future. Designating the North Branch as CAWS ALU A is consistent with the agreement between the Environmental Groups and the District. 1/27/12 Statement Attach. A; PC 1366.

Chicago River

The Chicago River is 1.5 miles in length, beginning at the junction of the North and South Branch, ending at the Chicago River Lock and Controlling Works. The Chicago River ranges in width from 200 feet to 250 feet, with the banks consisting primarily of vertical walls except at Wolf Point, at the confluence of the three branches of the river, where there is a sloped earthen bank. Attach. B at 3-5. The river is 20 feet deep at the west end and 26 feet deep at the east end. The banks are developed with high rise buildings, plazas, and cafes. *Id.* The Chicago River receives fresh water from Lake Michigan diversions. *Id* at 4-48.

The Chicago River is currently designated General Use, however, IEPA proposed redesignating this segment to the CAWS ALU B designation. SR at 47. The Environmental Groups and the District have agreed to support a CAWS ALU A designation for the Chicago River. PC 1366 at 1. The IEPA relies on UAA Factors 3, 4 and 5, as support for redesignating the Chicago River to a CAWS ALU B water. In the following discussion, the Board will examine the biologic, habitat, and water quality information in the record, as that information relates to the UAA Factors, to determine whether to revise the aquatic life use of the Chicago River.

Biologic Conditions

Twenty-seven species of fish, excluding hybrids, were collected at four locations on the Chicago River from 1993 and 2002. Attach. B at 4-54. Native species collected include, black buffalo, bluegill, bluntnose minnow, emerald shiner, freshwater drum, gizzard shad, golden shiner, green sunfish, largemouth bass, pumpkinseed, rock bass, smallmouth bass, spottail shiner, and orangespotted sunfish. *Id.* at 4-55. Of these, rock bass, largemouth bass, and bluegill are game species found to be abundant. IBI values in the Loop area ranged from 12 to 24, indicating habitat quality ranging from very poor to poor, and 14 to 36 in the Inner Harbor area, indicating water quality is very poor to good. *Id.* at 4-57. Twenty-two species of macroinvertebrates were collected in the Chicago River, with species richness being highest at the Lake Shore Drive station with 18 species, and lowest at Wells Street, with 12 species found. Existing MBI scores are indicative of good water quality at the Lake Shore Drive site to very poor at the Wells Street sampling location. *Id.* at 4-62.

Habitat Quality

While water quality and fish diversity is good, the habitat survey indicated the Chicago River had very poor aquatic life potential due to channelization, lack of meanders, and no instream cover or riffles. One positive attribute of the Chicago River is that the water depths are greater than 15 inches. Attach. B at 4-68. QHEI scores for the sampling sites in the Chicago River included 28 at the Inner Harbor and Chicago River junction with the NBCR and SBCR, and 22.5 in the Loop area, both an indication of very poor biological potential. *Id.* The Environmental Groups agree that the Chicago River does not generally have good habitat, but notes that water quality is generally very high, which is the basis for its General Use designation. PC 1283 at 15-16.

Water Quality

The CAWS UAA identified one water quality impairment for the Chicago River. This is bacteria resulting from flows from the NBCR. Attach. B at 3-21. DO levels in the Chicago River fell below the 6 mg/L standard approximately five percent of the time during the reporting period. *Id.* at 1-8. DO levels historically had been low in CAWS; however, SEPA and Instream Aeration System Stations (IASS) were installed to enhance the water quality of various segments of CAWS. There are, for example, two IASS along the Chicago River System. *Id* at 3-15.

Water temperature exceeded screening criteria less than one percent of the time at the Clark Street sampling station on the Chicago River and never exceeded criteria at the remaining sampling points over a five year period. *Id* at 4-50.

Board's General Use Designation for the Chicago River

The Board finds the record does not support redesignating the Chicago River from General Use. The Board is unconvinced that UAA Factors 3, 4 and 5 justify the redesignation of the Chicago River. The Board finds that human caused conditions or sources of pollution do not prevent attainment of the CWA goals in the Chicago River. Specifically, the existing water

quality is generally meeting the General Use water quality standards, including DO and temperature. The fish assemblage is also good, including the presence of less tolerant species such as the black crappie, northern pike, rock bass, smallmouth bass, and spottail shiner.

The existing water quality and fish assemblage, have been impacted by hydrologic modifications, but not to such an extent that the CWA goals cannot be achieved in the foreseeable future. The Board believes this is especially true given the redesignation of recreational use in the Chicago River to primary contact with corresponding water quality standards, which should improve overall water quality in the Chicago River.

Although physical conditions, such as a lack of adequate habitat to sustain populations, may impact the fish assemblage, the Board finds that the impact is not so great as to prevent attainment of the CWA goals in the foreseeable future. The Board also finds no reason to support jeopardizing a decline in water quality based on one attribute of the Chicago River.

As discussed earlier, in determining the appropriate aquatic life use designation, the Board based its decision on an examination of water quality, biological conditions, and habitat, with no one of these factors being more important than the others. The Board notes that Mr. Seegert explained that fish need riffle habitat to spawn, but as long as they have access to the necessary spawning habitat at the appropriate times, they can live in other segments of lakes and rivers. PC 1293. Based on the record, the Board finds that the UAA Factors 3, 4 and 5 do not support a use less than the CWA goals, therefore, the Board proposes to maintain the General Use designation for the Chicago River.

South Branch of the Chicago River

The South Branch of the Chicago River is 4.5 miles in length and extends from the confluence with the Chicago River to the confluence with the CSSC at the Damen Avenue Bridge. This segment mostly follows its original course and consists of vertical dock walls throughout much of its length. Attach. B at 3-4. The width of the South Branch varies from 200 to 250 feet and is 15 to 20 feet deep. This CAWS segment runs through Chicago neighborhoods of Chinatown, Bridgeport, the Lower West Side, and the Loop and is primarily commercial and industrial, although there are abandoned areas that have grown up with pioneer vegetation. *Id.*

The South Branch of the Chicago River is currently designated Secondary Contact and Indigenous Aquatic Life Use, and IEPA proposed an ALU B designation. SR at 47. The Environmental Groups and the District have agreed to support an ALU A designation for the South Branch of the Chicago River. PC 1366 at 1. In the following discussion, the Board will examine the biologic, habitat, and water quality information in the record to determine the appropriate aquatic life use designation for the South Branch of the Chicago River.

Biologic Conditions

Twenty species of fish, excluding hybrids, were collected at one location on the South Branch as it flows out of Chicago. Attach. B at 4-57. Native species documented in this segment include, black buffalo, bluegill, bluntnose minnow, emerald shiner, freshwater drum,

gizzard shad, golden shiner, green sunfish, largemouth bass, pumpkinseed, rock bass, smallmouth bass, spottail shiner, and orangespotted sunfish. Dominant non-game, non-native species included goldfish and common carp. *Id.* at 4-60. IBI values have increased over the last ten years in the South Branch, to 18-26, which is similar to the North Branch at 14-32. The South Branch has similar characteristics as the North Branch and Loop area of the Chicago River with sheet-pile and concrete-lined sides and little instream habitat. Limited habitat occurs near the confluence with Bubbly Creek. *Id.* at 57.

Twenty-three species of macroinvertebrates were collected at two locations on the South Branch in 2002. MBI scores were set at 7.3 at Madison Avenue and 6.9 at Loomis Avenue, indicating fair water quality. *Id.* at 4-65. Habitat conditions were not analyzed for the South Branch; however, the South Branch is known to be similar to the lower reaches of the North Branch. *Id.* at 4-69.

Habitat Quality

According to the CAWS UAA, the South Branch was not analyzed for habitat conditions; however, it is similar to reaches of the North Branch and therefore would have the same aquatic life potential. Attach. B at 4-69. The LimnoTech Study evaluated habitat conditions in the North Branch, including substrates type and quality, instream and overhanging cover, channel morphology, hydrology, bank, and riparian conditions. The LimnoTech Study indicates South branch had inorganic silt as the dominant deep substrate, and shallow substrate included bedrock or hardpan. PC 284 HER at 62-63. The sampling stations in the South Branch had no instream or overhanging cover. *Id.* at 67. Regarding channel morphology, the South Branch is channelized with a cross-sectional area ranging from approximately 1000 ft^2 at Madison Street to 3,500 ft^2 at Loomis Street. *Id.* at 72.

Next, the hydrologic conditions predicted by modeling indicates that the flow rate is higher in the South Branch than North branch, but the flow velocity is about the same. PC 284 HER at 79. Regarding bank conditions, the LimnoTech Study notes that the South Branch has no riparian vegetation. *Id.* at 84. Also, the study found that the South Branch has several bank pocket areas and off-channel bays, which serve as fish refuge, compared to the NSC. *Id.* at 85.

Regarding improvement of habitat quality, the LimnoTech Study states that the habitat conditions in the South Branch with a potential for improvement include provision for off-channel refuge and bank pocket areas, removal of vertical dock walls in certain sections, reduction of riprap banks, and improvement of macrophyte/overhanging cover. PC 284 HIR at 50-51. The LimnoTech Study estimates a cost of $78 million for the habitat improvements in the South Branch. *Id.* at 61.

Water Quality

The only water quality impairment is from PCBs, which is documented in the 2004 Illinois 305(b) Report. The source of these PCBs was unknown at the time of the report. Attach. B at 3-4. Downstream of the Midwest Generation Fisk power generating facility at Loomis Street, temperature screening criteria were exceeded an average of 2.2% of the time in the five years prior to the CAWS UAA being released. *Id.* at 50. The Environmental Groups

note that Midwest Generation announced the closure of the Fisk power generation facility to occur in 2012. As a result, they contend there "is every reason to believe the aquatic life potential of this CAWS segment will be significantly enhanced by habitat improvements and better water quality (including more natural temperatures)". PC 1293 at 21. The other constituents exceeding the screening levels included DO and silver. Attach. B at 4-53.

Board's Proposed Aquatic Life Use Designation for the South Branch of the Chicago River

The Board finds that the biologic, habitat, and water quality conditions indicate that the South Branch of the Chicago River is not capable of attaining the CWA goals for aquatic life in the foreseeable future. The Board agrees with IEPA, the Environmental Groups, and the District that UAA Factors 3, 4, and 5 prevent the South Branch of the Chicago River from attaining the CWA goals. Although IEPA proposes an ALU B designation, the Board finds that the record supports a designation of CAWS ALU A waters. This finding is consistent with the agreement between the Environmental Groups and the District, and IEPA does not oppose an ALU A designation for the South Branch of the Chicago River. 1/27/12 Statement Attach. A; PC 1366 at 1; PC 1275 at 21-22.

South Fork of South Branch Chicago River (Bubbly Creek)

Bubbly Creek is 1.3 miles long and flows into the South Branch. The channel varies from 100 to 200 feet wide and 3 to 13 feet deep. Attach. B at 3-4. The majority of the bank consists of steeply sloped earth or rock materials, and there are several sections with vertical dock walls. *Id*. Bubbly Creek has been mostly filled in and is primarily a stagnant side-channel to the South Branch of the Chicago River. Attach. B at 3-5. Currently, there is virtually no natural flow into the system; the flow mainly consists of discharge from CSOs and discharge from the District's Racine Avenue Pumping Station. *Id*. The flow coming from this pumping station is high in oxygen demanding compounds as well as floatable materials.

Bubbly Creek is currently designated as Indigenous Aquatic Life Use. IEPA proposed to revise this designation to ALU B; however, the District and the Environmental Groups ask that a new Subdocket be created to address Bubbly Creek. 1/27/12 Statement Attach A; PC 1366 at 2. The District and the Environmental Groups ask that the Board delay any action on Bubbly Creek until the USACE issues its report on Bubbly Creek. IEPA notes that even though designation of Bubbly Creek was adequately addressed in IEPA's proposal, IEPA supports the District and the Environmental Groups request for deferring decision on this segment while the USACE completes an ecosystem restoration study. PC 1275 at 23.

The Union Stock Yards were located in the headwaters of Bubbly Creek from the late 1800s until its closing in 1971. Attach. B at 3-5. Bubbly Creek was the recipient of large amounts of slaughterhouse and rendering waste. *Id*. As a result, the significantly contaminated sediments in the Bubbly Creek are the residual of historic discharges from the stockyards and other industries, plus organic matter originating from the Racine Avenue Pumping Station. *Id*.

Bubbly Creek is impaired by high pH, total phosphorus, and low DO and. Attach. B at 3-5. The primary cause of impairments is from CSOs along Bubbly Creek, with the majority of the

flow coming from the Racine Avenue Pumping Station. *Id*. As a result of the stagnant conditions, combined with sediments and CSO pollutant loads exerting a high oxygen demand, the oxygen in Bubbly Creek can be depleted for days. Exh. 204 at 6, 2/17/09Tr. at 51.

Four species of fish were collected in Bubbly Creek in 2002, and they include: common carp , gizzard shad, emerald shiner, and largemouth bass. Attach. B at 4-57. The physical alterations to the channel and drainage area have eliminated most of the natural aquatic and riparian habitats. Exh. 192 at 2. The transition from stagnant conditions to wet weather flow velocities in excess of five feet per second can damage aquatic habitat and resuspend sediments. Exh. 192 at 3-4.

Even within CAWS, Bubbly Creek presents unique issues that need to be addressed. The effects of contaminated sediments on aquatic life, lack of habitat, and low flow point to a need for further examination of Bubbly Creek before an aquatic life use is designated. The USACE is developing a report on Bubbly Creek that may shed some light on these issues. Therefore, the Board agrees to the request by the Environmental Groups and the District to open another Subdocket to address Bubbly Creek. The Board will await submission of the USACE report and any comments on that report into the record before proceeding in the new Subdocket.

Chicago Sanitary and Ship Canal

The Chicago Sanitary and Ship Canal (CSSC) is 31.1 miles long, beginning at the confluence with the Des Plaines River and ending at the Damen Avenue Bridge. The CSSC consists of vertical concrete walls and steep rockfill embankments. The depth ranges from 200 to 300 feet deep, and is 27 to 50 feet wide. Attach. B at 4-69. The CSSC was created in 1900 to transport human waste and industrial pollutants away from Lake Michigan by reversing the flow of the Chicago River. In addition, the CSSC was constructed to provide a commercial navigation conduit between the Great Lakes and the Mississippi River. Attach. B at 3-2. Land use adjacent to the CSSC is dominated by industrial and commercial uses. *Id* at 3.3.

The CSSC is currently designated Secondary Contact and Indigenous Aquatic Life Use; and, IEPA proposed an ALU B designation. SR at 47. The Environmental Groups and the District have agreed to support an ALU B designation for the CSSC, but industries such as Citgo and Corn Products have proposed a new ALU C designation. PC 1366 at 1. IEPA stated that CAWS and Brandon Pool ALU B waters are artificially constructed or channelized, straight, deep-draft, steep-walled shipping channels with little or no fixed aquatic or overhanging riparian vegetation or other refugia for aquatic life from shipping traffic and predation. SR at 49. These waters are subject to recurring, moderate to severe anthropogenic impacts from navigation and flood control functions. In addition, the aquatic invasive species barrier installed in the CSSC in 2002 prevents both native and invasive species from passage between Lake Michigan and the Illinois River. *Id.* 49 and 50. Due to these factors, IEPA concludes that the CSSC cannot meet CWA goals.

In the following discussion, the Board will examine the biologic, habitat, and water quality information in the record to determine the appropriate aquatic life use designation for the CSSC.

Biologic Conditions

Twenty-seven species of fish, excluding hybrids, were captured in the CSSC from 1993 to 2002. Attach. B at 4-77. Dominant species included common carp, gizzard shad, goldfish, and bluntnose minnow, and dominant games species were largemouth bass, pumpkinseed, and bluegill. Attach at 4-77. IBI scores ranged from 12 to 24, which is indicative of poor to very poor water quality conditions. Thirty-one species of macroinvertebrates were collected in the CSCC. *Id.* MBI scores ranged from 6.4 to 10.0, indicating poor to very poor water quality conditions. *Id.* at 4-80.

IDNR conducted fish sampling that included the use of Rotenone on the CSSC in 2009 that resulted in more detailed observations of resident fish assemblages than those reported through the use of conventional electro-fishing and netting collection gear. PC 505 at 1. The latter can be effective in sampling native fish species; however, this gear has limitations for sampling in large, deep draft channels, particularly those with steep, artificial banks. *Id.* IDNR reported 39 species from their sampling efforts, with 12 native species not having been reported in the CAWS UAA. Of particular note is the presence of sport fish, including smallmouth bass, which is considered to be intolerant. *Id.* Other sport fish reported by IDNR include bluegill, largemouth bass, northern pike, and walleye. *Id.* at 3. IDNR noted that while tolerant species may comprise the most biomass observed in their sampling, only one-third of the species collected were considered to be tolerant. *Id.*

Habitat Quality

According to the CAWS UAA, Rankin's habitat evaluation showed that the CSSC instream habitat ranged from poor to very poor. Attach. B at 4-83. QHEI scores of 27 at Romeoville to 40.5 at Willow Springs Road and 16th Street-LP&L were reported. *Id.* at 4-83. The habitat in portions of the CSSC was canal-like with steep sides and little cover for fish. Limiting factors for the CSSC include silty substrates, little instream cover, channelization, and no sinuosity. *Id.* at 4-80.

Water Quality

The District's largest wastewater treatment plant, the Stickney WRP, discharges into the CSSC in Cicero, and the Lemont WRP discharges into the CSSC near Lemont, located in the lower reaches. The effluent of neither WRP is disinfected at this time. Attach. B at 3-3. There are three coal-fired power plants, two upstream of the Stickney WRP, the Fisk and Crawford generating stations, and the Will County generating station downstream of the Stickney WRP near Romeoville. According to the CAWS UAA, these three coal-fired power plants withdraw and discharge water from the CSSC for non-contact cooling purposes. *Id.* The Aquatic Nuisance Species Barrier Project is also located on the CSSC, near Romeoville. This barrier consists of an electric field barrier to prevent the upstream migration of aquatic nuisance species, particularly Asian carp, from entering Lake Michigan. *Id.* This electrical barrier was designed and constructed by the USACE and has appeared to be successful in preventing nuisance species

from entering the CSSC. This barrier also prevents the movement of fish species from moving into and out of CAWS. *Id.* at 3-4.

Flow in the CSSC is comprised primarily by upstream flow from the Chicago River System and WRP effluent from the Stickney plant. The Crawford generating stations utilize the majority of the CSSC flow for cooling purposes that results in a significant thermal input to the CSSC. Attach. B at 4-70. According to the 2004 Illinois 305(b) Report, the CSSC is potentially impaired by PCBs in fish tissue, ammonia (unionized), low DO, total nitrogen, oil and grease, total phosphorus and iron. Potential sources of these impairments include flow regulation/ modification, municipal point sources, CSO, urban runoff during storm events, channelization and hydro-modification. *Id.* at 3-2.

The District operates seven DO monitoring stations along the CSCC. DO levels were documented at less than 6 mg/l more than eight hours per day 40-71% of the time across the seven stations. DO levels were less than 4 mg/l a range of 4-19% of time. Attach. B at 4-72. Temperatures over a five-year period prior to the CAWS UAA, exceeded water quality criteria less than one percent of the time from the B&O Central Railroad to Romeoville Road, but 15% of the time at the Cicero Avenue station, which is one mile downstream of the Crawford power generation facility. *Id.* During the winter, temperatures exceeded 60°F more than 25% of the time, whereas General Use water quality standards allow for a 10% exceedance. *Id.* at 4-73. While thermal inputs decrease the availability of oxygen downstream of the two power plants, the CAWS UAA reported that wet weather impacts due to discharges from the Racine Avenue Pumping Station and many upstream CSOs are the primary factors contributing to lower DO levels. *Id*. at 4-71.

Board's Proposed Aquatic Life Use Designation for the CSSC

The Board finds that the biologic, habitat, and water quality conditions indicate that the CSSC is not capable of attaining the CWA goals for aquatic life. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the CWA goals in the CSSC. The biologic data presented by IEPA and IDNR indicate that the CSSC is currently not attaining the CWA goals. Both the IBI and MBI scores for the CSSC are indicative of poor to very poor quality. The Board finds that while water quality has improved in the CSSC and as a result, a greater number of fish species have been documented as occurring, problems persist with DO and temperature.

Therefore, the Board finds that the biologic and water quality conditions in the CSSC limit the attainment of the General Use designation for protection of aquatic life. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 are all present in the CSSC preventing this segment from achieving full potential to meet CWA aquatic life goals. While the potential exists for some improvement, the record indicates that such improvements will not make a significant difference in terms of attaining the CWA goals in the foreseeable future.

Thus, the Board proposes to redesignate the CSSC as CAWS ALU B. The Board finds that the new aquatic life use designation reflects the biologic and water quality conditions in the CSSC. Designating the CSSC as CAWS ALU B is consistent with IEPA's proposal as well as

the agreement between the Environmental Groups and the District. 1/27/12 Statement Attach. A; PC 1366 at 1; PC 1275 at 21-22.

Cal-Sag Channel

The Calumet system is 23 miles in length, and includes the Cal-Sag Channel, the Little Calumet River, the Grand Calumet River, the Calumet River, and Lake Calumet. Attach. B at 3-2. The Cal-Sag Channel begins at its confluence with the Little Calumet River, flows west-northwest, and ends at its confluence with the CSSC. SR at 29-30. The Cal-Sag Channel is approximately 16.2 miles long. Attach. B at 4-83. The Cal-Sag Channel was excavated as a completely man-made channel during 1911- 1922, and was widened in the 1960s. PC 284 HER at 4. The Cal-Sag Channel was constructed to reverse the flow of the Calumet River away from Lake Michigan into the Des Plaines River. PC 284 HER at 12. The Cal-Sag Channel has a trapezoidal shape, extending 225 feet wide and approximately 10 feet deep, with vertical walls in some sections. The channel is generally straight, with three bends. Attach. B at 3-9.

The Cal-Sag Channel is currently designated as Secondary Contact and Indigenous Aquatic Life. IEPA proposed to revise the aquatic life use designation to CAWS ALU A based on UAA Factors 3, 4, and 5. SR at 51, Exh. 29. The District and Environmental Groups agree that ALU A is the appropriate aquatic life use designation for the Cal-Sag Channel. PC 1366. In the following discussion, the Board will examine the biologic, habitat, and water quality information in the record to determine the appropriate aquatic life use designation for the Upper NSC.

Biologic Conditions

The District sampled the fish community in the Cal-Sag Channel between 1993 and 2002. Attach. B at 4-92. Twenty-six fish species were collected during this time frame. Dominant species were gizzard shad, common carp, emerald shiner, and bluntnose minnow. Common game fish found included green sunfish, bluegill, pumpkin seed, and largemouth bass. Attach. B at 4-92. In October 2009, Asian carp eDNA was detected in the Cal-Sag Channel upstream of the barrier zone. Exh 425 at 12. The species richness for the Cal-Sag Channel ranged from 9 to 18 over the 10-year timeframe from 1993 to 2002, and taxa richness ranged from 7 to 17 during 2001 to 2007. Attach. B at 4-92, PC 284 HER App. A at 7. IBI scores ranged from 12 to 24, increasing over time at the Cicero Avenue location and decreasing at Route 83. Based on the IBI, water quality in the Cal-Sag Channel would be rated as poor to very poor. Attach. B at 4-92, 5-9, Attach. U at 3.

Macroinvertebrate data collected by IEPA in 2001 and the District in 2002 in the Cal-Sag Channel at Cicero Avenue documented a taxa richness of 16 in the IEPA sampling and a species richness of 15 in the District sampling, respectively. Oligochaetes and dipterans were the dominant macroinvertebrates in the IEPA data set. In the data collected by the District, Oligochaetes, *Dicrotendipes,* and zebra mussels dominated at the Cal-Sag Channel sampling location. Attach. B at 4-100 to 4-103. The MBI ranged from 5.5 to 5.7 in the IEPA data to 6.9 in the District data, based on Hester Dendy sampling. Taxa richness ranged from 12 to 13 in the IEPA data, and species richness rated 15 in the District data. The CAWS UAA noted that the

Cal-Sag Channel had the best diversity of macroinvertebrates in the CAWS. From the perspective of macroinvertebrate data, the CAWS UAA indicated that water quality in the Cal-Sag Channel would be considered good to fair based on the Hester Dendy MBI scores. Attach. B at 4-19, 4-100 to 4-103. However, the ponar sampling resulted in lower species richness dominated by pollution tolerant individuals, such as the Oligocheates, and an MBI of 9.5, indicative of very poor water quality. Attach. B at 4-19, 4-103, PC 284 HER at 101.

Habitat Quality

Habitat data collected from late March through early April 2004 yielded QHEI scores of 42.0 and 54.0 at Route 83 and 37.5 and 47.5 at Cicero Avenue, classifying these sites in the poor to fair range, based on a general ability of the habitat to support aquatic life. The fair habitat can be attributed to limestone rubble and coarse materials along much of the shoreline left behind from the construction of the channel. Attach. R at 2, 4, 5, 10. Along the riparian area are dense trees. Habitat for aquatic life also can be found in some places where the rock walls have crumbled. Attach. B at 4-83. Offshore, the habitat was found to be limited due to the 10-foot deep center region and lack of flow in the Cal-Sag Channel. Attach. R at 2, 5, 10, Attach. B at 3-9. Other limiting factors included silty-muck and sand substrate, channelization, no sinuosity, and little instream cover. Attach. B at 4-100. Additionally, the regulated flow from the O'Brien Lock and Dam and the Lockport Lock was found to produce high flows in the Cal-Sag Channel capable of sweeping habitat and aquatic organisms downstream. Exh. 191 at 3-5, 12/3/08Tr at 95.

The LimnoTech Study examined two sites along the Cal-Sag Channel to develop conceptual designs for habitat improvement: Route 83 and Cicero Avenue. Habitat impairments identified along the Cal-Sag Channel at Route 83 and Cicero Avenue included limited bank pocket areas, limited natural banks, presence of riprap banks, lack of in-channel structure, limited overhanging vegetation, and lack of off-channel refuge. To provide habitat improvement, the conceptual design for Cal-Sag Channel at Route 83 addressed the limited bank pocket areas, riprap banks, lack of in-channel structure, and lack of off-channel refuge. At Cicero Avenue, the conceptual design addressed the lack of submerged structure and lack of off-channel refuge. PC 284 HIR at 40.

The LimnoTech Study estimates costs for potential habitat improvements in the Cal-Sag Channel on the order of $41 million for construction of off-channel bays, $101 million for removal of vertical wall banks, $53 million for riprap replacement, $2 million for construction of bank pocket areas. Costs did not include land acquisition, demolition of existing structures, removal or relocation of utilities and infrastructure, or environmental cleanup costs. PC 284 HIR at 61.

Environmental Groups presented a list of habitat improvement projects that both the District and the Environmental Groups agreed would be feasible and beneficial in the CAWS. PC 1283 at 9. The highest priority project was identified as the "Cal[umet]-Sag Channel Millennium Reserve Project" to introduce artificial seaweed, linear shallows, and sunken structure. The project was outlined with a budget of $350,000 to $500,000 and timeframe of 2 1/2 to 3 years from design to completion. PC 1283 Exh. 1 at 1. Another project was identified

as the "Cal[umet]-Sag Channel near CSSC confluence" to introduce artificial seaweed, linear shallows, and chamber revetments. Costs were estimated at $250,000 to $325,000 with a timeframe from design to completion of 2 years. PC 1283 Exh. 1 at 9. These projects would be ten to twenty years from the completion of the UAA. PC 1283 at 9-10.

With respect to DO, based on data from continuous DO monitoring from 1998 to 2002, DO levels in the Cal-Sag Channel near Route 83 dropped below 6 mg/L for more than 8 hours/day as often as 45% of the time, and below the 5 mg/L screening criteria 23% of the time. For the most part, DO levels in the Cal-Sag Channel were above 4 mg/L. Attach. B at 1-9, 4-87. The District operates three SEPA stations along the Cal-Sag Channel. Attach. B at 3-9 to 3-10.

Water Quality

With respect to DO levels, based on data from continuous DO monitoring from 1998 to 2002, DO levels in the Cal-Sag Channel near Route 83 dropped below 6 mg/L for more than 8 hours/day as often as 45% of the time, and below the 5 mg/L screening criteria 23% of the time. For the most part, DO levels in the Cal-Sag Channel were above 4 mg/L. Attach. B at 1-9, 4-87. The District operates three SEPA stations along the Cal-Sag Channel. Attach. B at 3-9 to 3-10.

Even with the SEPA stations, the slow travel times in the CAWS were found to make it difficult to effectively disperse the DO generated by the stations. Exh. 169 at 5. Additionally, since waters of the CAWS are deeper than natural streams, DO levels suffer from lack of natural reaeration from the atmosphere. 11/17/08Tr. at 35-37.

Regarding other monitored parameters in the CAWS UAA, for metal constituents, total silver and nickel in the Cal-Sag Channel exceeded water quality screening criteria 14.5% of the time. Levels in the Cal-Sag Channel also exceeded the chronic ammonia and fluoride screening criteria 6.6 and 7.3% of the time, respectively. Attach. B at 4-89, 4-91. As for temperature, no levels above screening criteria were recorded from the twelve continuous temperature monitoring stations in the Calumet System during the years 2002 to 2007. Attach. B at 4-88.

Board's Proposed Aquatic Life Use Designation for Cal-Sag Channel

Based on the evaluation of biologic, habitat, and water quality conditions, the Board finds that the Cal-Sag Channel is not capable of attaining the CWA goals for the protection of aquatic life now or in the foreseeable future. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the CWA goals in the Cal-Sag Channel. The Board finds that the CAWS ALU A designation supports communities of native fish that are tolerant and moderately tolerant while recognizing the unique physical conditions, flow patterns, and functions of the waterway. While the potential exists for some improvement in habitat attributes, the record establishes that such improvements will not make a significant difference in terms of attaining the CWA goals in the foreseeable future. .

Thus, the Board proposes to redesignate the Cal-Sag as CAWS ALU A. The Board finds that the new aquatic life use designation reflects the biologic and water quality conditions in the Cal-Sag Channel. Designating the Cal-Sag Channel as CAWS ALU A is consistent with IEPA's

proposal as well as the agreement between the Environmental Groups and the District. 1/27/12 Statement Attach. A; PC 1366 at 1; PC 1275 at 21-22.

Calumet River

The Calumet River has been divided into two sections by IEPA's proposal. The first section is from Lake Michigan to Torrence Avenue and the second section is from Torrence Avenue to the Calumet River's confluence with the Grand Calumet River and the Little Calumet River. Below, the Board will briefly describe the Calumet River and then more specifically address the two sections of the Calumet River.

General Information on the Calumet River

The Calumet River extends upstream of the Grand Calumet River, through the O'Brien Lock and Dam and ends at the Calumet Harbor in Lake Michigan. Attach b. at 3-11. The river is approximately 8 miles in length, with an average width of 450 feet. The river flow was severed by the O'Brien Lock and Controlling Works in the mid-20th century to prevent pollution from entering Lake Michigan. *Id*. The Calumet River has been heavily dredged to support barge operations and the industries that are found along the banks. *Id*. Numerous slips and turning basins are present to accommodate the commercial barge traffic. The average depth in the channel is 27 feet, but the actual navigation depths may vary due to the fluctuations in the level of Lake Michigan. Numerous domestic and hazardous waste landfills surround the Calumet River. *Id*. The channel banks consist of sheet-pile, concrete walls and rip-rap. Very little riparian vegetation exists along the Calumet River, except in the vicinity of the landfills. *Id*.

Calumet River From Lake Michigan to Torrence Avenue

The stretch of the Calumet River from the O'Brien Lock and Dam to Lake Michigan was revised from Secondary Contact and Indigenous Aquatic Life Use to General Use in Amendments to Water Quality and Effluent Standards Applicable to the Chicago River System and Calumet River System, R87-27 (May 19, 1988). SR. at 11. IEPA proposed CAWS ALU B, and the Environmental Groups and the District have agreed to support an ALU A designation for the entire Calumet River. PC 1366 at 1

Calumet River From Torrence Avenue to Confluence with Grand Calumet River and Little Calumet River

The south reach of the Calumet River begins at Torrence Avenue and ends at its confluence with both Little Calumet River and Grand Calumet River. The south reach of the Calumet River includes the O'Brien Lock and Controlling Works. The reach of the Calumet River extending from the Lake Calumet Connecting Channel to its confluence with the Little and Grand Calumet rivers is man-made. SR at 29-30.

The south reach, except the segment extending from the O'Brien Lock and Dam to Torrence Avenue, was designated Secondary Contact and Indigenous Aquatic Life waters. IEPA proposed to revise the aquatic life use designation to CAWS ALU A based on UAA Factors 3, 4,

and 5. SR at 51, Exh. 29. The District and Environmental Groups agree that ALU A is the appropriate aquatic life use designation for this reach of the Calumet River. PC 1366.

Biologic Condition

The District collected fish from the Calumet River at two primary locations, 130th Street and the O'Brien Lock and Dam. Fish were also sampled upstream and downstream of SEPA Station 1. Attach. B at 4-95. Between 1993 and 2002, 32 species of fish were collected. *Id*. Dominant species found in the sampling were gizzard shad, common carp, emerald shiner, and bluntnose minnow. Common game fish included green sunfish, pumpkinseed, bluegill, smallmouth bass, and largemouth bass. *Id*. Similar to the Cal-Sag Channel, more emerald shiners were captured in the Calumet River than in the other Chicago waterways. Also, more smallmouth bass were captured in the Calumet River than in any other parts of CAWS. *Id*.

According to the CAWS UAA, species richness decreased from 21 to 12 from 1993 to 2002 and IBI Scores increased from 22 to 32 at the l30th Street sampling location over three years (1993 to 1996) and ranged from 24 to 28 over two years (1994 to 1996) at the O'Brien Lock and Dam. Attach. B at 4-95. The IBI Scores are indicative of fair to poor water quality. *Id*. Macroinvertebrates were also sampled at the 130th Street location in 2002, revealing a species richness of 5 with an MBI of 8.0 based on Hester Dendy sampling and an MBI of 9.7 based on ponar sampling. The dominant species found were Oligochaetes, *Dicrotendipes*, and zebra mussels. Attach. B at 4-100 to 4-103. From the perspective of macroinvertebrate data, water quality in the south reach of the Calumet River would be considered poor to very poor based on the MBI scores. Attach. B at 4-19, 4-100 to 4-103.

Habitat Quality

Habitat in the Calumet River is limited by silty substrates, little instream cover, no sinuosity, overall embeddedness, and no fast current. Attach. B at 4-95. Positive habitat attributes of the Calumet River include riffle development, moderate cover, depth, and boulder and cobble substrates. *Id*. Mixed silt-sand surrounding coarser substrates near the O'Brien Lock and Dam limit the habitat functionality. *Id*. The CAWS UAA noted that the parts of the Calumet River, north and east of SEPA station 1 resembles the Chicago River; it is a deep draft shipping channel with no riparian vegetation, and vertical or near vertical sheet pile, concrete and rock walls. Attach. B at 4-104. Although the CAWS UAA reported that very little riparian vegetation exists along the Calumet River, south of 130th Street to the O'Brien Lock and Dam, the Calumet River was found to have a shallow 3-foot deep side channel with relatively abundant fixed aquatic vegetation and a gradually sloping bank with emergent vegetation. Attach. B at 3-11, Exh. 461 at 6, PC 1283 at 17. The QHEI score was 47 at 130th Street and was 43 at O'Brien Lock and Dam, classifying these sites in the lower range of fair to poor, respectively, based on a general ability of the habitat to support aquatic life. Attach. R at 2, 5. 12.

Water Quality

Water quality impairments as identified in the 2004 Illinois 305(b) Report indicate that the Calumet River is impaired by PCBs, silver, pH, total phosphorus, and fecal coliform bacteria.

Attach. B at 3-11. Potential sources of impairment include industrial point sources, CSOs, and urban runoff during storm events. *Id.*

In terms of DO, based on data from continuous DO monitoring from 1998 to 2002, DO levels in the Calumet River near 130th Street only dropped below 6 mg/L for more than 8 hours/day two percent of the time. In the Calumet System, the CAWS UAA noted that the Calumet River and Lake Calumet exhibited the least percent of time where DO levels fell below water quality screening criteria of 5 or 6 mg/L. Attach. B at 1-9. 4-87. While DO levels have varied in each reach of the Calumet System, the lowest percentage of time that DO levels dropped below screening level criteria was in Lake Calumet and the Calumet River. Attach. B at 1-9. Except for a short segment of the Calumet River downstream of the O'Brien Lock and Dam, both of these water bodies are lakeward of the lock and dam, and the Calumet River is directly connected to Lake Michigan. *Id*. The District has installed SEPA stations in the Calumet River System, including one in the Calumet River. Attach. B at 3-15.

Board's Proposed Aquatic Life Use Designation for Calumet River From Lake Michigan to Torrence Avenue

According to IEPA testimony, their proposal to redesignate this segment of the Calumet River will result in grouping the segment according to the characteristics it shares with the other reaches of CAWS. Exh. 1 at 15. IEPA justifies this revision by explaining that the General Use designation was based on water quality conditions that existed at the time without consideration of habitat and aquatic life potential. IEPA believes that the CAWS UAA demonstrated through habitat and other aquatic life data that the Calumet River possesses conditions described in UAA factors 3, 4 and 5. These conditions, which are not reversible in the foreseeable future, in combination with other factors, prevent the General Use segments from maintaining a biological condition that meets the Clean Waters Act's aquatic life goal. Exh. 1 at 15.

Based on an evaluation of biologic, habitat, and water quality conditions, the Board finds that the Calumet River from Lake Michigan to Torrence Avenue is not attaining its current designation of General Use for the protection of aquatic life. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the General Use designation.

The biologic and water quality data as reflected in the IBI and MBI scores indicate that the Calumet River is currently not attaining the CWA goals.

In terms of habitat, the part of the Calumet River, north and east of SEPA station 1, was found to resemble the Chicago River, with its deep draft shipping channel, no riparian vegetation, and vertical or near vertical sheet pile, concrete and rock walls. Attach. B at 4-104.

In light of the above, the Board finds that the biologic, habitat, and water quality conditions in the Calumet River from Lake Michigan to Torrence Avenue limit the attainment of the General Use designation for protection of aquatic life. As noted by IEPA, UAA Factors 3, 4, and 5 prevent this segment from achieving the CWA goals for the propagation of fish and shell fish and is not capable of meeting those goals in the foreseeable future.

The Board notes that while the physical attributes of part of the Calumet River from Lake Michigan to Torrence Avenue are similar to the Chicago River, the lower water quality as reflected in the IBI and MBI scores in the Calumet River in connection with those physical attributes supports an ALU A designation rather than General Use. The designation of Calumet River from Lake Michigan to Torrence Avenue is more similar to the proposed designation of the Upper NSC, where the combination of biologic, habitat, and water quality conditions dictate an ALU A designation. The Board finds that the CAWS ALU A designation supports communities of native fish in the Calumet River that are tolerant and moderately tolerant while recognizing the unique physical conditions, flow patterns, and functions of the waterway. Designating this segment as ALU A is consistent with the agreement between the Environmental Groups and the District and IEPA does not object to this designation. 1/27/12 Statement Attach. A; PC 1366 at 1; PC 1275 at 21-22.

Board's Proposed Aquatic Life Use Designation for Calumet River From Torrence Avenue to Confluence with Grand Calumet River and Little Calumet River

Based on the evaluation of biologic, habitat, and water quality conditions, the Board finds that the south reach of the Calumet River is not capable of attaining the CWA goals for the protection of aquatic life now or in the foreseeable future. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the CWA goals in the south reach of the Calumet River. The Board expects that the completion of TARP would mitigate the impact of CSOs and stormwater runoff on the south reach of the Calumet River. However, the completion of the reservoirs may take another 15 years. Therefore, the Board also agrees with IEPA, the District, and Environmental Groups to redesignate the south reach of the Calumet River as CAWS ALU A. The Board finds that the CAWS ALU A designation supports communities of native fish in the south reach of the Calumet River that are tolerant and moderately tolerant while recognizing the unique physical conditions, flow patterns, and functions of the waterway. Further, the Board proposes designating the Little Calumet River as CAWS ALU A which is consistent with IEPA's proposal as well as the agreement between the Environmental Groups and the District. 1/27/12 Statement Attach. A; PC 1366 at 1; PC 1275 at 21-22.

Little Calumet River

The Little Calumet River begins at its confluence with both the Calumet River and Grand Calumet River at the border of Burnham and Chicago, flows west, and ends at its confluence with the Cal-Sag Channel. SR at 29-30. The Little Calumet River is approximately 6.9 miles long. Attach. B at 4-83.

The CAWS UAA described the Little Calumet River as having been altered from its natural condition by deepening, widening, changing alignment, and reversing the flow. SR at 29-30. Attach. B at 3-10. The width varies from 250 to 350 feet, and the depth is approximately 12 feet in the center of the channel. The shoreline includes mostly earthen side slopes with a few reaches of vertical dock walls, and vegetation along the shoreline provides habitat in some places. SR at 29-30, Attach. B at 3-10, 4-83. Flow just downstream of its confluence with the

Grand Calumet River has a 7Q10[18] of 20 cfs, while further downstream on the Little Calumet River, the District's Calumet WRP discharges with an average design flow of 354 mgd. The District also operates a SEPA station on the Little Calumet River. Attach. B at 3-10.

The Little Calumet River was designated as Secondary Contact and Indigenous Aquatic Life waters. IEPA proposed to revise the aquatic life use designation to CAWS ALU A based on UAA Factors 3, 4, and 5. SR at 51, Exh. 29. The District and Environmental Groups agree that ALU A is the appropriate aquatic life use designation for the Little Calumet River. PC 1366.

Biologic Conditions

The District sampled the fish community in the Little Calumet River between 1993 and 2002. Twenty-nine fish species were collected during this time frame. Dominant species were gizzard shad, common carp, emerald shiner, and bluntnose minnow. Common game fish found included bluegill, pumpkin seed, and largemouth bass. Attach. B at 4-92. The species richness for the Little Calumet River ranged from 14 to 24 over the 10-year timeframe from 1993 to 2002, and taxa richness ranged from 13 to 22 during 2001 to 2007. Attach. B at 4-97 to 4-98, PC 284 HER App. A at 7. The LimnoTech Study notes that the value of 22 observed in 2006 was the greatest number of species collected in a single event in CAWS during the sampling timeframe. PC 284 HER App. A at 7. IBI scores ranged from 12 to 28, with a median IBI score of 21 at Halsted Street. Based on the IBI, water quality in the Little Calumet River would be rated as poor to very poor. Attach. B at 4-92, 5-9, Attach. U at 3.

IDNR's electrofishing and Rotenone sampling in the Little Calumet River during May 2010 found a total of 38 fish species, 10 of which were not recorded in the UAA, and 13 of which were gamefish. PC 505 at 2-3. Among the species found only during the Rotenone sampling were flathead catfish, smallmouth buffalo, ghost shiners, and black buffalo. PC 505 at 2. The two most abundant species of gamefish observed by IDNR were channel catfish and rock bass, but smallmouth bass was also found. PC 505 at 3-4. IDNR indicated that during the Asian carp monitoring program, large numbers of young-of-the year were found, including largemouth bass, bluegill, gizzard shad, carp, minnow, quillback, minnow, and sunfish. *Id*. at 4.

Macroinvertebrate data collected by IEPA in 2001 and the District in 2002 in the Little Calumet River documented a taxa richness of 6 to 19 in the IEPA sampling and a species richness of 12 in the District sampling. Oligochaetes and dipterans were the dominant macroinvertebrates in the IEPA data set. In the data collected by the District, Oligochaeta, *Dicrotendipes, Gammarus*, and zebra mussels were dominant. The MBI ranged from 5.2 to 6.3 in the IEPA data to 5.8 in the District data based on Hester Dendy sampling, and 9.4 in the District data based on ponar sampling. From the perspective of macroinvertebrate data, the CAWS UAA indicated that water quality in the Little Calumet River would be considered good to fair based on the Hester Dendy MBI scores. Attach. B at 4-100 to 4-103. However, the ponar sampling resulted in lower species richness dominated by pollution tolerant individuals, such as the Oligocheates, and an MBI indicative of very poor water quality. Attach. B at 4-19, 4-103, PC 284 HER at 101.

[18] 7Q10 is the seven day low flow in a ten year period.

Habitat Quality

Habitat data collected from late March through early April 2004 yielded QHEI scores of 48.5 near both Halstead Street and the I-94 Bridge, classifying these sites in the lower range of fair, based on a general ability of the habitat to support aquatic life. Both sites had moderate cover along the shorelines, although most were considered fairly low quality. Substrates were coarse along the shoreline but became mixed with silt, muck and sand farther from shore. Attach. R at 2, 5. 12. The LimnoTech Study notes that the Little Calumet River had the highest measured values of large substrate (gravel, cobble, and boulders) in CAWS, which was characterized as a habitat attribute positively associated with fish. PC 284 HIR at 21. Other positive habitat attributes included riffle development, moderate cover, and maximum depth, while limiting habitat factors included little sinuosity and no fast current. Attach. B at 4-105.

The LimnoTech Study estimated costs for potential habitat improvements in the Little Calumet River. Costs were on the order of $5 million for construction of off-channel bays, $10 million for removal of vertical wall banks, and $7 million for riprap replacement[19]. PC 284 HIR at 51. Even if the potential habitat improvements were implemented, the LimnoTech Study found that measuring significant improvements in fisheries would be difficult. PC 284 HIR at 53.

Water Quality

According to the 2006 Illinois Integrated Water Quality Report and Section 303(d) list of impaired waters and the 2004 Illinois 305(b) Report, the Little Calumet River is not supporting aquatic life, fish consumption, and primary contact. The list indicated the causes of impairment as mercury, PCBs, Aldrin, iron, non-native fish, shellfish or zooplankton, other flow regime alterations, DO, silver, phosphorus (total), aquatic algae, alteration in stream-side or littoral vegetative covers, sedimentation/siltation, TDS, TSS, nitrogen (total), fecal coliform, fluoride, hexachlorobenzene, and oil and grease. Sources of impairment were identified as unknown, contaminated sediments, CSOs, municipal point source discharges, urban runoff/storm sewers, impacts from hydrostructure flow regulation/modification, channelization, upstream impoundments (*e.g.* Pl-566 NRCS Structures), contaminated sediments. The Board expects that the completion of TARP would mitigate the impact of CSOs and stormwater runoff on the Little Calumet River. However, the completion of the reservoirs may take another 15 years.

Looking at DO data from continuous monitoring for the years 1998 to 2002, DO levels in the Little Calumet River dropped below 6 mg/L for more than 8 hours/day 13% of the time in the east reach upstream of the Calumet WRP and 27% of the time downstream in the west reach. DO levels fell below the 5 mg/L screening criteria 5% of the time in the east reach of the Little Calumet River and 7% in the west reach. Attach. B at 4-87.

[19] Costs did not include land acquisition, demolition of existing structures, removal or relocation of utilities and infrastructure, or environmental cleanup costs. PC284 HIR at 51.

Regarding other constituents of concern identified in the CAWS UAA, for metal constituents, total silver in the Little Calumet River exceeded water quality screening criteria upstream and downstream of the Calumet WRP 3.6 and 8.5% of the time, respectively. Dissolved nickel and zinc exceeded water quality screening criteria downstream of the Calumet WRP 4.5 and 9.1% of the time, respectively. Attach. B at 4-89, 4-91. As for temperature, no levels above screening criteria were recorded from the twelve continuous temperature monitoring stations in the Calumet System during the years 2002 to 2007. Attach. B at 4-88.

Board's Proposed Aquatic Life Use Designation for Little Calumet River

Based on the evaluation of biologic, habitat, and water quality conditions, the Board finds that the Little Calumet River is not capable of attaining the CWA goals for the protection of aquatic life now or in the foreseeable future. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the CWA goals in the Little Calumet River. While the potential exists for some improvement in habitat attributes, the record establishes that such improvements will not make a significant difference in terms of attaining the CWA goals in the foreseeable future. Additionally, implementation of habitat improvements must preserve navigation, require significant time to complete, and may cost millions of dollars. Therefore, the Board agrees with IEPA, the District, and Environmental Groups to redesignate the Little Calumet River as CAWS ALU A. The Board finds that the CAWS ALU A designation supports communities of native fish in the Little Calumet River that are tolerant and moderately tolerant while recognizing the unique physical conditions, flow patterns, and functions of the waterway. Further, the Board proposes designating the Little Calumet River as CAWS ALU A, which is consistent with IEPA's proposal as well as the agreement between the Environmental Groups and the District. 1/27/12 Statement Attach. A; PC 1366 at 1; PC 1275 at 21-22.

Grand Calumet River

The Grand Calumet River begins at the Illinois-Indiana state line in Burnham, flows west for about 3 miles, and then ends at its confluence with both the Calumet River and the Little Calumet River just south of the O'Brien Lock and Dam. The Grand Calumet River originates in Indiana and is very shallow at around 2 feet deep. In order to flow west, the historic direction of flow in the Grand Calumet River was reversed. SR at 29-30, Attach. B at 3-10.

The Grand Calumet River was designated as Secondary Contact and Indigenous Aquatic Life waters. IEPA proposed to revise the aquatic life use designation to CAWS ALU A based on UAA Factors 3, 4, and 5. SR at 51, Exh. 29. The District and Environmental Groups agree that ALU A is the appropriate aquatic life use designation for the Grand Calumet River. PC 1366.

Biologic Conditions

The biologic conditions of fish or macroinvertebrate species in the Grand Calumet River were not specifically identified in the CAWS UAA. However, Ms. Wasik testified that between 2001 and 2008, only 3 fish species were collected as part of the District's ambient water quality monitoring program. Exh. 461 at 9, Exh. 28 at 7.

Habitat Quality

The CAWS UAA described the Grand Calumet River as very shallow, averaging around 2 feet deep. Attach. B at 3-11. During dry weather, the Grand Calumet River exhibits stagnant conditions. Exh. 461 at 9. The CAWS UAA noted that the riparian vegetation along the Grand Calumet River provides excellent habitat for birds and mammals, and that the black-crowned night heron is common in this area. Attach. B at 3-11.

The Grand Calumet River was not evaluated during the physical habitat assessment by LimnoTech or Rankin. Exh. 461 at 9, Attach. R. The District referred to beneficial use impairments on the Grand Calumet River that included loss of habitat and degradation of aquatic life, which were documented by USEPA[20] as a basis for implementing a Remedial Action Plan to address such use impairments. Exh. 461 at 9.

Water Quality

According to the 2006 Illinois Integrated Water Quality Report and Section 303(d) list of impaired waters, the Grand Calumet River is impaired. The list indicated the causes of impairment as ammonia (un-ionized), arsenic, barium, cadmium, chromium (total), copper, DDT, iron, lead, nickel, DO, PCBs, sedimentation/siltation, silver, zinc, nitrogen (total), phosphorus (total), aquatic algae. Sources of impairment were identified as municipal point source discharges, contaminated sediments, CSOs, urban runoff/storm sewers, channelization. Exh. 34, 3/11/08 Tr. at 127, 133.

In terms of DO in the Calumet system, the CAWS UAA characterized the Grand Calumet River as having the most significant challenges. Attach. B at 1-9. Based on data from continuous DO monitoring from 1998 to 2002, DO levels in the Grand Calumet River dropped below 6 mg/L for more than 8 hours/day as often as 47% of the time, and below the 5 mg/L and 4 mg/L screening criteria 27% and 19% of the time, respectively. Attach. B at 1-9, 4-87. The Board expects that the completion of TARP would mitigate the impact of CSOs and stormwater runoff on the Little Calumet River. However, the completion of the reservoirs may take another 15 years.

For metal constituents, total silver and nickel in the Grand Calumet River exceeded water quality screening criteria 17% and 4.5% of the time, respectively. Levels of total dissolved solids in the Grand Calumet River also exceeded screening criteria 30.5% of the time, and pH showed an exceedance 31% of the time. Attach. B at 4-89, 4-91. As for temperature, no levels above screening criteria were recorded from the twelve continuous temperature monitoring stations in the Calumet System during the years 2002 to 2007. Attach. B at 4-88.

Board's Proposed Aquatic Life Use Designation for Grand Calumet River

Based on the evaluation of biologic, habitat, and water quality conditions, the Board finds that the Grand Calumet River is not capable of attaining the CWA goals for the protection of

[20] Ms. Wasik's testimony referred to http://www.epa.gov/glnpo/aoc/grandcal.html#Beneficial. Exh. 461 at 9.

aquatic life now or in the foreseeable future. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the CWA goals CWA goals in the Grand Calumet River. While the potential exists for some improvement in habitat attributes, the record does not establish if such improvements will make a significant difference in terms of attaining the CWA goals in the foreseeable future. Therefore, the Board also agrees with IEPA, the District, and Environmental Groups to redesignate the Grand Calumet River as CAWS ALU A. The Board finds that the CAWS ALU A designation supports communities of native fish in the Grand Calumet River that are tolerant and moderately tolerant while recognizing the unique physical conditions, flow patterns, and functions of the waterway. Further, the Board proposes designating the Grand Calumet River as CAWS ALU A, which is consistent with IEPA's proposal as well as the agreement between the Environmental Groups and the District. 1/27/12 Statement Attach. A; PC 1366 at 1; PC 1275 at 21-22.

Lake Calumet

IEPA defines Lake Calumet as including the contiguous waters west of the Calumet River and north of an imaginary extension of 126th Street that crosses the lake. Lake Calumet receives flow from storm ditches, storm sewers, and some surrounding remnant wetlands, but is otherwise stagnant. During fluctuations in Lake Michigan water levels caused by wind, Lake Calumet acts with the Calumet River as a surge basin for Lake Michigan. SR at 29-30.

Lake Calumet was designated as Secondary Contact and Indigenous Aquatic Life Use. IEPA proposed to revise the aquatic life use designation to CAWS ALU A based on UAA Factors 4 and 5. SR at 51, Exh. 29. The District and Environmental Groups agree that ALU A is the appropriate aquatic life use designation for the Cal-Sag Channel. PC 1366.

Biologic Conditions

The District sampled the fish community in Lake Calumet between 1990 and 1996. Fourteen fish species were collected during this time frame. Dominant species were gizzard shad and carp. Common game fish found included bluegill, pumpkin seed, and largemouth bass. Attach. B at 4-99. A bighead carp was also collected in Lake Calumet by a commercial fisherman at the request of IDNR in June of 2010. Exh. 428 at 8, Exh. 431 at 8. The total number of species for Lake Calumet ranged from 8 to 12 over the 6-year timeframe. The CAWS UAA did not report an IBI score or macroinvertebrate data for Lake Calumet. Attach. B at 4-99.
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Habitat Quality

The Lake Calumet area was historically surrounded by marshes, but underwent industrial development beginning in the mid-1800s. Many contaminated sites subject to various federal, state, and local cleanup efforts over the past 30 years have been found in and around the historic footprint of Lake Calumet. According to the CAWS UAA, legacy landfills still threaten the lake through contamination in the sediments and filling in of the lake. Attach. B at 3-11 to 3-12.

The CAWS UAA pointed out that Lake Calumet is the only inland lake in Illinois that is hydrologically connected to Lake Michigan. Lake Calumet provides habitat for migratory birds as well as fish for feeding and spawning. Parts of the shoreline have limited wetland systems. While the northern part of the lake is shallow at 2 to 6 feet deep, the southern part is made up of deep-draft channels. On the east side of the lake, rip-rap and debris material are found along the banks of the slip channels. During visits by IEPA, little instream structure and few emergent aquatic plants were observed for fish habitat and foraging. Attach. B at 4-105. However, in testimony, some areas of Lake Calumet were described as having instream cover with overhanging vegetation and woody debris near the shoreline. Exh. 461 at 6.

The CAWS UAA indicated that while Lake Calumet has limited fish habitat, it has potential to provide diverse aquatic habitat for fish and wildlife through restoration efforts. Attach. B at 4-105. Environmental Groups suggested that Lake Calumet has the potential to provide off-channel habitat with shallows for the Calumet River. According to Environmental Groups, Lake Calumet is proposed to be transferred to a natural resource management agency, such as Cook County Forest Preserve or the IDNR as part of an effort to restore headwater wetlands. PC 1283 at 17-18.

Lake Calumet was also not included in the Rankin habitat reports or LimnoTech Study.

Water Quality

According to the 2006 Illinois Integrated Water Quality Report and Section 303(d) list of impaired waters, Lake Calumet is not supporting fish consumption. The list indicated the cause of impairment as PCBs. The source of impairment was listed as unknown. Exh. 34, 3/11/08Tr. at 127, 133.

In terms of DO, IEPA surveys in 1999, 2000, and 2004 showed levels in Lake Calumet dropped below 5 mg/L two percent of the time. Attach. B at 4-87. In the Calumet System, the CAWS UAA noted that Lake Calumet and the Calumet River exhibited the least percent of time where DO levels fell below water quality screening criteria of 5 or 6 mg/L. Attach. B at 1-9.

Board's Proposed Aquatic Life Use Designation for Lake Calumet

Based on the evaluation of biologic and habitat, conditions, the Board finds that Lake Calumet is not capable of attaining the CWA goals for the protection of aquatic life now or in the foreseeable future. The Board agrees with IEPA that the UAA Factors 4 and 5 prevent the attainment of the CWA goals in Lake Calumet. The Board finds that the CAWS ALU A designation supports communities of native fish in Lake Calumet that are tolerant and moderately tolerant while recognizing the unique physical conditions, flow patterns, and functions of the waterway. Therefore, the Board proposes Lake Calumet as a CAWS ALU A water. Designating Lake Calumet as CAWS ALU A is consistent with IEPA's proposal as well as the agreement between the Environmental Groups and the District. 1/27/12 Statement Attach. A; PC 1366 at 1; PC 1275 at 21-22.

Lake Calumet Connecting Channel

IEPA states that the term "Lake Calumet Connecting Channel" is being used in the CAWS UAA to describe the waters beginning at the southern end of Lake Calumet and ending at the confluence with the Calumet River. SR at 30.

The Lake Calumet Connecting Channel is part of the Calumet System, however, it was not specifically designated Secondary Contact and Indigenous Aquatic Life. SR at 18. IEPA proposed to revise the aquatic life use designation for the Lake Calumet Connecting Channel to CAWS ALU B based on UAA Factors 3, 4, and 5. SR at 46-47, Exh. 29. However, the District and Environmental Groups agreed that ALU A is the appropriate aquatic life use designation for the Lake Calumet Connecting Channel. PC 1366. IEPA stated that it has no objections to the Board designating the Lake Calumet Connecting Channel as ALU A in accordance with the agreement reached by the Environmental Groups and the District. PC 1275 at 48.

Biologic Conditions

The biologic conditions of fish or macroinvertebrate species in the Lake Calumet Connecting Channel were not specifically identified in the CAWS UAA or studies done by the District in the record for this rulemaking. In proposing an ALU B designation for the Lake Calumet Connecting Channel, IEPA reasoned that other such waters typically had IBI scores below 22, indicating poor to very poor water quality. SR at 50, Attach. U at 3.

Habitat Quality

IEPA identified little about the habitat features of the Lake Calumet Connecting Channel, but did indicate it generally lacks flow. SR at 30. In proposing an ALU B designation for the Lake Calumet Connecting Channel, IEPA reasoned that other such waters typically had QHEI scores below 40, corresponding to poor to very poor, based on a general ability of the habitat to support aquatic life. SR at 50, Attach. R.

The Lake Calumet Connecting Channel was not specifically identified in habitat studies done by Rankin or LimnoTech, and the CAWS UAA did not include sediment quality information for this waterway. Attach. B at 4-91. However, in testimony, the Lake Calumet Connecting Channel was described as being a very deep, non-natural waterway with vertical sheet piling and rip rap along the shoreline and no instream cover or overhanging vegetation. Exh. 304 at 2-3, Exh. 461 at 8. The Board notes that the record did not address the potential for habitat improvement in the Lake Calumet Connecting Channel or indicate if such improvements would make a significant difference in terms of attaining the General Use in the foreseeable future.

Water Quality

Water quality information for the Lake Calumet Connecting Channel was not specifically identified in the CAWS UAA, 2004 Illinois 305(b) Report, or the 2006 Illinois Integrated Water Quality Report and Section 303(d) list of impaired waters. Attach. B at 3-19 to 3-12, Exh. 34.

Board's Proposed Aquatic Life Use Designation for Lake Calumet Connecting Channel

Based on the evaluation of primarily habitat information, the Board finds that the Lake Calumet Connecting Channel is not capable of attaining the CWA goals for the protection of aquatic life now or in the foreseeable future. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 prevent the attainment of the CWA goals in the Lake Calumet Connecting Channel. The Board finds that the CAWS ALU A designation supports communities of native fish in the Lake Calumet Connecting Channel that are tolerant and moderately tolerant while recognizing the unique physical conditions, flow patterns, and functions of the waterway. Therefore, the Board proposes that the lake Calumet Connecting Channel be designated as a CAWS ALU A water. Designating the Lake Calumet Connecting Channel as CAWS ALU A is consistent with the agreement between the Environmental Groups, the District, and IEPA does not oppose and ALU A designation for the channel. 1/27/12 Statement Attach. A; PC 1366 at 1; PC1275 at 21-22.

Lower Des Plaines River

The Lower Des Plaines River (LDPR) evaluated in the LDPR UAA extends from the confluence of the river with the CSSC at the E.J. & E Railroad Bridge downstream to the Interstate 55 Bridge. Attach. A at 1-7. Almost the entire LDPR reach is impounded. There are two morphologically different segments, the Brandon Road Pool, which is above the Brandon Road Lock and Dam at River Mile 286, and the portion of the Dresden Pool above the Interstate 55 Bridge. *Id.*

The LDPR is a part of the Upper Illinois Waterway, which is one of the busiest inland commercial navigation systems in the nation. This waterway is used for commercial transport of bulk commodities such as grain, coal, petroleum products, and chemical and raw materials. *Id.* Historically, the LDPR has received flows from the CSSC, which receives effluents from several District WRPs and CSOs, although the TARP project has significantly reduced the frequency of CSOs. *Id*. at 1-8.

The LDPR is effluent dominated under low and medium flow conditions and is on the Illinois Section 303(d) list of impaired waters. *Id.* at 1-7. IEPA has identified the following parameters of concern for the LDPR: nutrients, metals, habitat alterations, low DO, ammonia, siltation, and flow alteration. *Id*. at 1-8. The LDPR UAA concluded that habitat throughout the LDPR is degraded due to channelization and impoundment of the river. *Id.* at 4-33.

Brandon Pool

The Brandon Road Pool (Brandon Pool) extends four miles from Des Plaines River's confluence with CSSC to Brandon Road Lock and Dam. Attach. A at 1-7. It is essentially a man-made channel with concrete or sheet pile embankments, approximately 300 feet wide, and 12 to 15 feet deep. The average flow velocity in this pool is 0.23 m/s. The CSSC contributes 80% of flow to the LDPR downstream from the confluence with the Des Plaines River. *Id.*

Barge traffic consumes a large portion of the river channel. The Brandon Pool is currently designated as Indigenous Aquatic Life Use.

IEPA proposes to designate Brandon Pool as CAWS and Brandon Pool ALU B (ALU B) based on UAA Factors 3, 4 and 5. The Environmental Groups assert that the Brandon Pool must be protected for aquatic life use with the CAWS ALU A designation. PC 1283 at 3. Midwest Generation contends that the Environmental Groups have failed to justify their proposal that the Brandon Road Pool should be CAWS ALU B. PC 1286 at 6. The Board will review the biologic, habitat and water quality information to determine the appropriate ALU designation for the Brandon Pool.

Biologic Conditions. LDPR UAA evaluated the biologic conditions in the Brandon pool using fish and macroinvertebrate data. The LDPR UAA relied on three years (1999-2001) of fish sampling data collected by EA Engineering, Science and Technology at seven sampling stations in the Brandon Pool. Attach. A at 6-5. The fish assemblage in LDPR, including Brandon Pool was evaluated by calculating the Ohio Boatable IBI, which is used for large rivers like LDPR. *Id.* at 6-3. The IBI values for Brandon Pool ranged from 12 to 26 with a mean of 17.4. The LDPR UAA notes that the individual metrics contributing to IBI scores indicate that intolerant species are rarely present in Brandon Pool. *Id.* at 6-13 and 6-14. The IBI values in Brandon Pool are indicative of waters with poor to very poor quality.

Greg Seegert who testified on behalf of Midwest Generation presented fish data collected by EA Engineering from 1993 to 2006 in the Upper Illinois Waterway, which includes LDPR. Exh. 366, Attach. 1. The fish surveys from 1993 to 1995 included Brandon Pool, the later years focused on UDIP. *Id.* at 9. The detailed fish sampling results for Brandon Pool were included in a Commonwealth Edison report entitled "Final Report: Aquatic ecological Study of Upper Illinois Waterway" that was published in March 1996. Exh. 370 CD1. While 31 species of fish were found in Brandon Pool, the segment was dominated by highly tolerant taxa. These included gizzard shad (13%), common carp (15%), and bluntnose minnow (44%). Exh. 370, CD1 at 9.3-18 – 9.3-19. Less dominant species included emerald shiner, white sucker, and green sunfish.

The ComEd report also addressed fish spawning in the Brandon Pool by documenting the occurrence and relative abundance of the young-of-the-year (YOY) fish along with the spawning condition through external examination where possible. *Id.* at 9.5-1. The fish spawning data shows that gizzard shad and bluntnose minnow dominated YOY production in the Brandon Pool. *Id.* at 35. The report concludes that reproductive success in Brandon Pool is confined primarily to gizzard shad and highly tolerant species such as bluntnose minnow, fathead minnow, and white sucker. *Id.* The report also addressed the incidence of DELT (deformities, erosion, lesions, and tumors) anomalies in fish by gross external examination in the field or laboratory. *Id.* at 9.9-1. The overall incidence of DELT anomalies for all fish combined in Brandon was 14.6% with incidence being higher in spring. *Id.* at 9.9-8. Further, greater than 76% of the DELT anomalies concerned fin erosion.

IDNR presented fish data collected during IDNR's Asian carp monitoring and control operations, which included application of fish toxicant, Rotenone. PC 505. IDNR notes that

Rotenone sampling was performed on a 5.5-mile segment starting upstream of Aquatic Nuisance Species Electric Barrier (River Mile 296.8) in Romeoville and ending at Ruby Street in Joliet (RM 288.8). IDNR found 39 fish species, including sport fish like smallmouth bass, channel catfish and sauger. *Id.* at 2. The number of species found was significantly higher than the sample totals obtained by conventional methods reported in the UAA. IDNR states that area of CSSC and LDPR below Lockport Lock may be an important wintering area for sauger. Further, IDNR observes that a third of the total species found are considered tolerant and the remaining species, other than small mouth bass, are generally classified as moderately tolerant. *Id.* Smallmouth bass is classified as an intolerant species. Also, most of the fish observed during Rotenone operations had very good to excellent body conditions with very few external anomalies, *i.e.* DELTS. IDNR notes that it is common to see high percentage of DELTS in areas of poor water or sediment quality. *Id.* at 3. Finally, IDNR states that a significant observation of the Rotenone operation was the "very high abundance of young-of-the-year channel catfish." *Id.* This observation, IDNR asserts, indicates that existing water quality and habitat is sufficient to support larval stages of the channel catfish and that spawning is commonly occurring.

The LDPR UAA also addressed the macroinvertebrate community in the Brandon Pool. Macroinvertebrate data collected by the District and IEPA in 2000 were used to assess the water quality conditions. The data were collected using Hester-Dendy (HD) samplers for artificial substrates and Ponar Grab (PG) for natural substrate (consolidated soft substrate). Attach. A at 5-4. The taxa richness in the Brandon Pool was 21 (HD) and 5 (PG). Attach. A, App. E. The MBI scores for Brandon Pool were 6.5 (HD) and 10 (PG). The MBI scores are indicative of fair to poor water quality. In addition, the Brandon Pool had very small number of pollution-sensitive organisms as indicated by EPT richness of two (HD) and zero (PG). *Id.* Based on the sampling results, the UAA states that the macroinvertebrate community in the Brandon Pool does not support a General Use Classification. Attach. A at 5-17.

Habitat Conditions. As noted above, the Brandon Pool is a man-made section of the river channel that has been deepened and widened to accommodate barge traffic. Attach. A 4-9. The channel is lined with vertical concrete walls with no spawning substrates other than cracks and expansion joints in the concrete. *Id.* at 4-11. The LDPR UAA notes that spawning substrates for benthic macroinvertebrates is also limited to soft fine-grained organic sediments. *Id.* at 4-11. Further, organic detritus and woody debris is limited throughout the pool and there is no instream or overhanging cover in the pool. The QHEI score in the Main Channel[21] at two locations approximately around the midway point in Brandon Pool ranged from 27 to 37. The QHEI scores at seven stations along the Main Channel Border[22] ranged from 35.5 to 55.5. The LDPR UAA states that QHEI scores indicate stream modifications that are generally severe and widespread, and conditions that do not provide habitat to support full warm water use. *Id.* at 4-27.

[21] Main Channel refers to the portion of the river through which large commercial crafts can operate. Exh. 370, Attach 1.

[22] Main Channel Border refers to the zone between the nine foot navigation channel and the main river banks. Exh. 370, Attach 1.

Additionally, the LDPR UAA notes that some of the habitat attributes associated with the Brandon Pool are irreversible without major physical alteration to stream channel and removal of lock and dam system that forms the Brandon Pool impoundment. *Id.* 4-30. Specifically, the LDPR UAA observes that the navigation channel maintenance, which involves the operation of lock and dam and periodic dredging, affects QHEI metrics like substrate, channel morphology, riffle quality, pool quality and stream gradient. *Id.* 4-32. These metrics cannot be improved without major modifications. Further, even with habitat metrics with potential for improvement like instream cover and riparian vegetation, the LDPR UAA notes that opportunities for such improvements are limited in Brandon Pool because of concrete/sheet pile retaining walls and downtown Joliet development. *Id.* at 33.

Water Quality Conditions. The water quality conditions in the Brandon Pool were evaluated by using sampling data collected by the District and IEPA at two monitoring stations between 1995 and 2000. Attach. A at 2-24 – 2-26. A total of 25 chemical constituents were evaluated to determine if they were meeting the General Use standards by performing the 99.8 probability test for non-exceedance. *Id.* at 2-31. Of the 25 chemical constituents, 20 met the General Use standards[23]. *Id.* The constituents not meeting the standards in the Brandon Pool included copper, mercury, fecal coliform, DO, and zinc. *Id.* at 2-34.

The LDPR UAA notes that copper and mercury were marginally non-compliant. The level of compliance for copper was 99.2%, and mercury was 98%. Further, the LDPR UAA notes that DO levels in the Brandon Pool frequently dropped below the General Use standard of 5 mg/L. The level of non-compliance for DO in Brandon Pool ranged from 20-25%. *Id.* at 35. The LDPR UAA observes that the low DO levels in Brandon Pool are due to the low reaeration capacity of the impounded waterway. The LDPR UAA concludes that the General Use standard is not attainable in the Brandon Pool without significant aeration at the Lockport Dam. Finally, the LDPR UAA notes that zinc exceeded the General Use chronic standard in the Brandon Pool. The level of non-compliance was more than 50%. *Id.* at 2-36. However, the LDPR UAA notes that the zinc levels were compliant with the federal chronic criteria. As noted above, the Board's General Use standards, including zinc have been updated to reflect the recent federal guidance.

Additionally, the LDPR UAA evaluated temperature in the LDPR, including Brandon Pool. Based on probability distribution plots of the grab temperature data, the LDPR UAA states that the General Use temperature limit of 32^0 C would be met with a compliance level of greater than 99%. *Id.* at 2-33.

Board's Proposed Aquatic Life Use Designation for Brandon Pool. The Board finds that the biologic, habitat, and water quality conditions indicate that Brandon Pool is not capable of attaining the CWA goals for aquatic life in the foreseeable future. The Board agrees with IEPA that the UAA Factors 3, 4, and 5 are all present in the Brandon Pool preventing the attainment of the General Use designation.

[23] The Board's General Use water quality standards, including those for copper, mercury, zinc and DO have been updated since the publication of the UAA.

The Board agrees with IEPA that the biologic data in the record indicates that the Brandon Pool is currently not attaining the CWA goals. Both the IBI and MBI scores for the Lower NSC are indicative of fair to poor quality. Further, the fish assemblage in the Brandon Pool is predominantly tolerant types such as gizzard shad, common carp, and bluntnose minnow. Additionally, the EPT richness suggests that pollution-sensitive macroinvertebrates are present in very small numbers.

The Board agrees with IEPA and Midwest generation that this segment is limited by channel morphology, substrate, cover, and flow conditions from attaining full biological potential. Moreover, some of the habitat attributes associated with the Brandon Pool are irreversible without major physical alteration to stream channel and removal of lock and dam system that forms the Brandon Pool impoundment.

The water quality data indicates that DO is the primary constituent of concern in the Brandon Pool. The Board notes the DO levels are due to the low reaeration capacity of the impounded waterway. The Board agrees with the LDPR UAA finding that the General Use standard is not attainable in the Brandon Pool without significant aeration at the Lockport Dam.

Thus, the Board proposes to redesignate Brandon Pool as CAWS and Brandon Pool ALU B. As explained earlier, ALU B waters are capable of supporting primarily tolerant fish species while recognizing the limited physical habitat and stream hydrology resulting from irreversible modifications of the waterway to maintain the navigational use, flood control, and drainage functions of the waterway. The Board is not convinced that the fish data from IDNR's Rotonone operations supports the designation of Brandon Pool as ALU A, as suggested by the Environmental groups. When fish data is viewed in conjunction with habitat and water quality conditions, the Board believes that ALU B is the appropriate designation for the Brandon Pool. The Board finds that the ALU B designation reflects the biologic, habitat and water quality conditions expected in the Brandon Pool for a foreseeable future.

Upper Dresden Island Pool

The Upper Dresden Island Pool (UDIP) is a part of the Dresden Island Pool (DIP), which extends from the Brandon Road Lock and Dam to the Dresden Island Lock and Dam. This impounded reach is 14.5 miles long, 500 feet wide, with depths of 2 to 17 feet. Attach A at 4-12. The UDIP comprises an 8.1 mile long stretch of the DIP extending from the Brandon Road Lock and Dam to the Interstate 55 Bridge and is the reach of the DIP included in this rulemaking. *Id.* at 1-7.

The UDIP is currently designated an Indigenous Aquatic Life Use. IEPA proposed a special aquatic life use designation for the UDIP, and the Environmental Groups and the District agree with this designation, while several industries, including Midwest Generation, ExxonMobil, and Stepan, oppose this designation. To reiterate, IEPA's definition of UDIP Aquatic Life Use Waters is:

> Lower Des Plaines River from the Brandon Road Lock and Dam to the Interstate 55 bridge shall be designated for the Upper Dresden Island Pool Aquatic Life

> Use. These waters are capable of maintaining aquatic-life populations consisting of individuals of tolerant, intermediately tolerant and intolerant types that are adaptive to the unique flow conditions necessary to maintain navigational use and upstream flood control functions of the waterway system. These waters must meet the water quality standards of 35 Ill. Adm. Code 302, Subpart D. SR at 47, PC 1275 at 10.

Midwest Generation also proposes language for the UDIP Aquatic Life Use Waters to more accurately reflect the conditions of the UDIP. PC 1277 at 101. Midwest Generation asks that the Board adopt its proposed UDIP ALU. *Id.* at 5. ExxonMobil also opposes IEPA's UDIP aquatic life use definition. IEPA's inclusion of intolerant species in its definition is based on assumptions made in the UAA for the LDPR, and ExxonMobil contends this use is not achievable. PC 1282 at 1. According to ExxonMobil, the UDIP cannot achieve CWA aquatic life use goals because of irreversible existing conditions, including the physical modifications to CAWS and LDPR that have permanently altered their hydrology, hydraulics, and aquatic habitat. PC 1282 at 6. ExxonMobil recommended that the Board revise IEPA's UDIP aquatic life use definition to delete references to intolerant species as a criterion. PC 1282 at 10. Stepan urges the Board to not make any changes to existing designation of UDIP, or alternatively, adopt the definition proposed by Midwest Generation. PC 1291 at 22.

The Environmental Groups disagree with both Midwest Generation and ExxonMobil. The Environmental Groups point out that Midwest Generation's own experts provided evidence that over a 12-year period "intermediately intolerant", "moderately intolerant", and "intolerant" fish were collected in the UDIP. PC 1293 at 4, citing Exh. 366 at Exh. 2, pg. 18. Based on these collections, the Environmental Groups argue that this is an "existing use" that must be protected under the CWA. *Id*. The Environmental Groups also take issue with how Midwest Generation has framed their discussion of the UDIP. PC 1293 at 9. Their fragmenting the UDIP into its component parts to determine the appropriate aquatic life use designation "ignores a fundamental principle of ecology that a river system must be considered in its entirety, together with its tributaries." *Id.* The Environmental Groups elaborate by stating that habitat of the UDIP "must be considered together with the habitat to which it is connected in assessing what habitat is available to aquatic life" in the UDIP. *Id.*

The Board examined IEPA's UDIP designation in the context of IEPA's proposed water quality standards to understand how IEPA's proposed UDIP ALU compares to General Use and CAWS ALU A. As proposed by IEPA, most water quality standards for the UDIP waters are identical to those for General Use, including DO. The two exceptions are mercury and temperature. IEPA proposes a more stringent mercury standard for UDIP than General Use. IEPA's proposed temperature standard for UDIP is more stringent than General Use for the months of April through November (88.7°F for UDIP; 90°F for General Use). For the months of December through March, the temperature standard would be less stringent for the UDIP ALU than General Use standards (88.7°F for UDIP; 60°F for General Use).

IEPA's proposed CAWS ALU A is also virtually identical to IEPA's proposed UDIP ALU except for mercury and DO. IEPA's proposed mercury standard for UDIP is more stringent than the mercury standard for General Use. IEPA's proposed DO standards for CAWS

ALU A have the same standard for UDIP of 5.5 mg/L any time during March through July and 3.5 mg/L any time for August through February. The difference is the DO standard for the daily mean averaged over both seven and 30 days for the period of March through July. IEPA proposed no standard for ALU A but for UDIP IEPA proposed a standard of 6.0 mg/L and 5.5 mg/L, respectively. Thus, the primary difference proposed by IEPA between UDIP and General Use is a slightly less stringent temperature standard for four months of the year, and between UDIP and ALU A, the daily mean average DO levels over 7 and 30 days.

Biologic Conditions. The LDPR UAA relied on fish sampling done by EA Engineering Science and Technology[24] for the LDPR UAA. Attach. A at 6-3. For this assessment, the LDPR was divided into four segments, the UDIP being one. Fish data were collected at 20 locations in the LDPR from 1999 through 2001, although no species lists were provided in the LDPR UAA. *Id.* at 6-5. Four of the 20 sampling stations were located in the UDIP. The analyses conducted demonstrated that IBI scores increasing from upstream to downstream, with Brandon Road Pool having significantly lower IBI scores than the UDIP. However, the UDIP had significantly lower IBI scores than did the Lower DIP. *Id.* at 6-7. The IBI scores in the UDIP ranged from 12 to 32 with a mean of 20.5, *Id.* at 6-8 to 6-12.

Comparisons were made in the LDPR UAA between the LDPR and reference sites such as the Fox River. Attach. A at 6-17. Free-flowing segments of the Fix River had median IBI scores of 32, whereas the impounded segments had a mean of 21. The LDPR UAA concluded that the significant difference between the impounded and free-flowing segments on the Fox River demonstrate that habitat modifications resulting from dams result in major declines in biotic integrity. However, the LDPR UAA also concluded that the IBI scores for the UDIP and Lower DIP stations were comparable to those for the impounded segments of the Fox River, which is designated a General Use water. *Id.* This is consistent with Dr. Thomas' testimony regarding UDIP where he stated that many of our large rivers are now impounded, but they can still support diverse fish communities. PC 1293 at 4, citing 8/14/09ATr. at 78-79..

While the LDPR UAA did not include a discussion on fish species composition and abundance in UDIP, IEPA and Midwest generation submitted such information collected by EA Engineering. Prop. Attach MM, Exhs. 366 and 370. EA Engineering's 2004 LDPR Fisheries Investigation Report summarizes the fish composition and abundance in UDIP from 1994 to 2004 with the exception of 1996. The total number of species showed an increasing trend from 36 species in 1994 to 50 in 2004. Attach. MM 3-17 – 3-18. The dominant non-hybrid species included gizzard shad, bluntnose minnow, green sunfish, bluegill, and largemouth bass. These species accounted for approximately 70% of the fish collected in UDIP during the 2004 sampling event. The less dominant species included emerald shiner, spotfin shiner, and channel catfish. *Id.*

[24] The Board notes that EA Engineering has been conducting fish surveys in the Upper Illinois Waterway (UIW) on behalf of Midwest Generation and its predecessor Commonwealth Edison since 1980. Exh. 366 at 17.

The EA Engineering report also addressed the incidence of DELT (deformities, erosion, lesions, and tumors) anomalies in fish. *Id.* at 3-51. The overall incidence of DELT anomalies for all fish combined in UDIP ranged from 23% in 1994 to 15% in 2004. *Id.* at 3-54. Between 1998 and 2003, DELT anomalies ranged from 7.3 to 6.2% with incidence being higher in spring. *Id.* at 9.9-8. Further, greater than 76% of the DELT anomalies concerned fin erosion. While DELT afflictions have been generally low, the EA report notes that the incidence of higher rate in 2004 is unclear. *Id.* at 3-59.

Dr. Thomas noted that all of the species listed under IEPA's Representative Aquatic Species Modified Use have been found in the Lower DIP, and 40 of these species were collected in the UDIP in 2004. Exh. 474 at 4. He noted that the white sucker, a temperature-sensitive species was collected in the UDIP every year since 1994, and logperch, also a temperature-sensitive species was collected here regularly. *Id.* at 5. The Environmental Groups noted that "new species were collected from the Dresden Reach in 2007 and 2008, including silver redhorse and logperch from the mouth of the DuPage and tadpole madtom and blackside darter from Treat's Island." PC 1293 at 11. The EA Engineering's fish surveys indicate that white suckers accounted for 0.9 to 0.03% of the fish collected during annual sampling from 1994 to 2004. Attach. MM at 3-17. Further, the data indicates that silver redhorse, log perch and tadpole madtom have been collected sporadically in UDIP.

In the LDPR UAA, macroinvertebrate data were converted to MBI scores and compared to aquatic life support assessment criteria. The results indicate that about half of the UDIP stations were fully meeting the General Use classification. Several locations were partially supporting and no locations were considered non-supporting. Attach. A at 5-16. Based on artificial substrates and use of MBI, the Upper Dresden Pool appears to provide water quality sufficient to support a General Use Classification. *Id.* at 5-17.

The LDPR UAA also found that taxa richness in sediment samples from the UDIP was higher than the Lower DIP, which suggests that the UDIP can meet similar taxa richness values found in the Lower DIP, which is designated a General Use water. *Id.* at 5-7. The LDPR UAA examined the percent composition of individuals in the insect orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) as compared to other invertebrates present in the sample. *Id.* at 5-8. Percent abundance on HD samplers was quite low in the Brandon Road Pool, but these indicator organisms increased going downstream. The Lower and Upper DIP had similar abundance distributions. *Id.*

Habitat Quality. The UDIP is more natural than the Brandon Road Pool. It meanders and has a fair amount of natural shoreline and side channels. Attach. A at 4-7. The banks are not armored with concrete walls. The main channel edge is shallow and creates a littoral zone along the banks. *Id.* at 4-12-13. Riparian vegetation along the banks includes secondary growth floodplain community composed of cottonwoods, green ash, and elm trees. *Id*. at 4-12. There are several backwater areas and tributary mouths for the UDIP that do not exist for the Brandon Road Pool. *Id.* In both the Brandon Road Pool and the UDIP, the water is impounded, reducing stream velocity and creating deep water habitat that is not optimum for a diverse benthic macroinvertebrate community. *Id.* at 5-14.

QHEI scores in the UDIP range from 35.5 to 68, which suggests that portions of the UDIP do not attain the CWA aquatic life goals, although other portions do. *Id.* at 4-23-4-27. The better habitat quality exist mostly in the tailwater areas below the dam and at tributary mouths. *Id.* at 4-28. The main channel and main channel border provide marginal habitat with QHEI scores typically less than 50. The UDIP scores higher than the Brandon Road Pool primarily due to the presence of tailwater and tributary mouth habitats. *Id.* at 4-30. While the UDIP has higher QHEI scores than does Brandon Road Pool, the LDPR UAA concluded that the UDIP is believed to be a system that does not meet the optimum for warm water use. *Id.* at 4-33. However, the UAA noted that improvements in in-stream cover and riparian buffers could potentially improve QHEI scores to above the recommended Ohio value of 60. *Id.* at 4-34. In this regard, Dr. Thomas testified that in the UDIP, QHEI scores establish a potential to meet the CWA aquatic life use goal with a number of scores above 60. Exh. 227 at 3. Dr. Thomas opined that "fish do not need a continuous stretch of good habitat to support life functions. Exh. 474 at 2.

Mr. Seegert provided testimony on behalf of Midwest Generation where he disagreed with the proposed ALU designation for the UDIP. Exh. 366 at 1. Mr. Seegert testified that QHEI data collected in 2003 and 2008 confirmed that the "average score in the UDP is generally between 45 to 50, which is at the lower end of the range of habitat that may have the potential to support CWA aquatic life goals". Exh. 366 at 8. The only portion of the UDIP that has been documented as having suitable habitat is the "Brandon tailwater area, which accounts for only a small fraction (around 7%) of the entire Dresden Pool", although this area "is isolated and surrounded by predominantly poor to fair habitat in the Dresden Pool". Exh. 366 at 11. Mr. Seegert asserted that "much of the data relied upon by IEPA to establish uses in the LDPR are significantly flawed", including inaccurately calculating IBI and QHEI scores. Exh. 366 at 13.

Midwest Generation also concluded that fish species that require riffle habitat, hard substrate, and fast water are negatively affected by the effects of impoundment and that reductions in diversity of fish community are greatest when spacing between the dams are the least. PC 1275 at 34 and 35. IEPA disagrees with both assertions, stating "some low-gradient rivers can naturally have little riffle habitat, have small amounts of cobble/boulder substrate, and lack fast water much of the time and yet support a fish community that is consistent with the Clean Water Act aquatic life." PC 1275 at 34-35.

IEPA argues that even though riffles, fast water, and coarse substrates are sparse for large and flat rivers like LDPR, other localized habitat conditions are important for fish. PC 1289 at 6-7. IEPA contends that in large rivers, the relative ecological importance of a particular habitat type can be much greater than the relative amount of habitat type. *Id.* at 7 citing Stalkner *et al*. (1989). IEPA maintains that in a large river a relatively small, localized amount of critical habitat can provide a large influence in sustaining overall fish community. Further IEPA asserts that biological (Ohio EPA fish index of biological integrity) and habitat (Ohio EPA habitat index) indicators relied upon by IEPA support the proposed aquatic life use designation for UDIP. *Id.* at 8.

Water Quality. The General Use Standard for DO, 5 mg/L, is met 99.8% of the time in the UDIP, although a few excursions have been reported at the I-55 Bridge. Attach. A at 2-35.

According to the LDPR UAA, meeting the 6 mg/L General Use standard in the UDIP for the minimum 16 hours is difficult during the summer when the water temperature of the pool is high. *Id.* at 2-80. The LDPR UAA relied on sampling data collected by the District and IEPA between 1995 and 2000 to evaluate the water quality conditions in the UDIP. Attach. A at 2-24 – 2-26. A total of 25 chemical constituents were evaluated to determine if they were meeting the General Use standards by performing the 99.8 probability test for non-exceedance. *Id.* at 2-31. Of the 25 constituents, 20 met the General Use screening criteria[25]. *Id.* The constituents not meeting the standards in the UDIP included copper, mercury, fecal coliform, DO, and zinc. *Id.* at 2-34.

The UAA notes that the level of compliance for copper was 95% for acute standard, and 85% for chronic standard at the monitoring location near Empress casino. Further, mercury was only marginally non-compliant in the UDIP. *Id.* at 2-33 – 2-34. The anytime General Use Standard for DO, 5 mg/L, was met 99.8% of the time in the UDIP. The LDPR UAA noted that even a few excursions above the standard may not be acceptable at the Interstate 55 Bridge, since 5 mg/L is the "absolute" minimum standard. Attach. A at 2-35. According to the LDPR UAA, meeting the 6 mg/L DO General Use standard in the UDIP for the minimum 16 hours is difficult during the summer when the water temperature of the pool is high. *Id.* at 2-80.

Additionally, the UAA evaluated temperature in the UDIP. Based on probability distribution plots of the grab temperature data, the UAA states that the General Use temperature limit of 32^0 C would be met with a compliance level of greater than 99%. *Id.* at 2-33. However, the UAA notes that the continuous temperature monitoring data from 1999 and 2000 show exceedance of the General Use standard at the I-55 Bridge. *Id.* at 2-100

Board's Proposed Aquatic Life Use Designation for UDIP. The Board begins this discussion by examining statements made by IEPA and industry regarding the aquatic life use designation proposed by IEPA for the UDIP. IEPA's Mr. Sulski maintained that based on the available data, including data in the LDPR UAA and the weight of evidence, the UDIP could meet the CWA goals for aquatic life use. 1/28/08Tr. at 77. He noted that the QHEI scores for the UDIP range from 45 to 80, which according to the report prepared by the CABB, correspond to fair to excellent ability of habitat to support aquatic life. Attach. R at 2. Thus, Mr. Sulski argues that the UDIP is capable of maintaining a biological condition that minimally meets the CWA's aquatic life goal. He also notes, however, that the Ohio Boatable Index and IEPA Fish IBI scores for the UDIP are approximately 20, suggesting that the existing aquatic life is not achieving its expected biological potential. Exh. 1 at 14-15.

For CAWS[26] and LDPR segments IEPA proposed to designate as ALU A or ALU B, IEPA relied on UAA Factors 3, 4 and 5 to demonstrate that the segments could not attain CWA aquatic life goals. For UDIP, IEPA invoked none of the UAA factors. 1/28/08Tr. at 29, Exh. 29. Mr. Sulski explained that IEPA did not deem sources of pollution to be irreversible stressors, nor habitat modifications severe enough to invoke UAA Factor 3. Further, he stated that even though barge traffic is present in the navigation channel, sufficient habitat exists to meet the

[25] The Board's General Use water quality standards, including those for copper, mercury, zinc and DO have been updated since the publication of the UAA.
[26] IEPA cited only UAA factors 4 and 5 for Lake Calumet. Exh. 29.

proposed aquatic life designation for UDIP. 3/10/08Tr.1 at 97-99. To justify designating the UDIP as a special aquatic life use, IEPA must demonstrate that at least one of the UAA factors is present to make the CWA aquatic life goal unattainable for the UDIP. IEPA has made no such demonstration for the UDIP and rather has defended the position that no UAA factors apply to the UDIP (as discussed below).

This position was refuted by Mr. Seegert, testifying on behalf of Midwest Generation. Mr. Seegert testified that comparing UDIP conditions to General Use waters is misleading because General Use waters "do not have the combination of channelization, impoundment, commercial navigation, irregular flows, and significant inputs from urban storm water and wastewater discharges that characterize the UDIP". Exh. 366 at 14. IEPA contends that Midwest Generation failed to provide sufficient evidence to conclude that UAA Factors 2, 3, 4, and 5 prevents the attainability of the proposed designation for UDIP. PC 1275 at 25-27 citing Exh. 366. The Board is also unconvinced by Midwest Generation's arguments.

The Board has examined the record and agrees with IEPA that no UAA factors apply to the UDIP. Because the UAA factors do not justify an aquatic life use less than the CWA goal, the Board finds that identifying UDIP as General Use is appropriate.

Furthermore, IEPA has not adequately explained its justification for a UDIP ALU in light of its conclusion that none of the UAA factors apply. As explained above, the Board attempted to discern IEPA's intent by reviewing IEPA's proposed water quality standards for UDIP. However, this analysis supported the Board's determination that the UDIP should be designated as General Use because the proposed standards were nearly identical except for more stringent standards for April to November temperatures and mercury and a less stringent temperature standard for December to March. The Board will examine water quality standards for UDIP in Subdocket D to ensure that the UDIP can meet the water quality standards applicable under the General Use standard. The Board is mindful that, particularly in the area of temperature, water quality standards may need to be adapted for the UDIP.

Fecal Coliform Water Quality Standards

During the Board's consideration of the first notice in Subdocket B, IEPA provided the Board with language amending Sections 303.204 and 303.220 (35 Ill. Adm. Code 303.204 and 303.220) to apply the General Use fecal coliform water quality standard to Primary Contact Recreation waters in the CAWS and LDPR. However, the Board did not propose changes to Sections 303.204 or 303.220 (water quality standards) at first notice in Subdocket B. *See* 5 ILCS 100/5-40 (2010). Thus, the Board could not make the language changes suggested by IEPA, without reissuing the rules to first notice. Therefore, in adopting Subdocket B, the Board stated it would:

> in Subdocket C, propose language in Sections 303.204 and 303.220 (35 Ill. Adm. Code 303.204 and 303.220) to apply the General Use fecal coliform water quality standard to Primary Contact Recreation waters in the CAWS and LDPR. The Board could not make that change in this Subdocket as those sections were not proposed for first notice under the Illinois Administrative Procedure Act. *See* 5

ILCS 100/5-40 (2010). Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and Lower Des Plaines River: Proposed Amendments To 35 Ill. Adm. Code 301, 302, 303, And 304, R08-9B, Feb. 2, 2012.

The Board will propose for first notice the language included in IEPA's comment in Subdocket B (*see* PC 1152) as amended in its comment in this docket (PC 1275). However, the Board notes that in November 2012, the USEPA adopted new recreational water quality criteria. *See* 77 Fed. Reg. 71191 (Nov. 29, 2012). The Board invites participants to comment on whether USEPA's actions impact the water quality standards for primary contact recreational use or the need for water quality standards for incidental contact recreational use.

The Board will propose for first notice the following language in Section 303.204 (new language is underlined):

> The Chicago Area Waterway System and Lower Des Plaines River Waters are designated to protect for primary contact recreation, incidental contact or non-contact recreational uses (except where designated as non-recreational waters) and commercial activity (including navigation and industrial water supply uses) and the highest quality aquatic life and wildlife that is attainable, limited only by the physical condition of these waters and hydrologic modifications to these waters. These waters are required to meet the secondary contact and indigenous aquatic life standards contained in 35 Ill. Adm. Code 302, Subpart D, but are not required to meet the general use standards or the public and food processing water supply standards of 35 Ill. Adm. Code 302, Subpart B and C, except that the waters designated as Primary Contact Recreation Waters in Section 303 .220 must meet the numeric water quality standard for fecal coliform bacteria applicable to protected waters in 35 Ill. Adm. Code 302.209. Designated recreational uses and aquatic life use for each segment of the Chicago Area Waterway System and Lower Des Plaines River are identified in this Subpart.

The Board will propose for first notice the following language in Section 303.220 (new language is underlined):

> The following waters are designated as Primary Contact Recreation Waters and must be protected for Primary Contact Recreation uses as defined in 35 Ill. Adm. Code 301.323. These waters must meet the numeric water quality standard for fecal coliform bacteria applicable to protected waters in 35 Ill. Adm. Code 302.209:
>
> a) Lower North Shore Channel from North Side Water Reclamation Plant to confluence with North Branch of the Chicago River;
>
> b) North Branch of the Chicago River from its confluence with North Shore Channel to its confluence with South Branch of the Chicago River and Chicago River;

c) Chicago River;

d) South Branch of the Chicago River;

e) Little Calumet River from its confluence with Calumet River and Grand Calumet River to its confluence with Cal-Sag Channel; and

f) Cal-Sag Channel.

CONCLUSION

The Board today proposes designations of aquatic life use for CAWS and LDPR. After reviewing the record and examining the CWA goals of "water quality which provides for the protection and propagation of fish, shellfish, and wildlife . . .." 33 U.S.C. § 1251(a)(2), the Board is proposing two aquatic life use designations and has developed definitions of those aquatic life use designations. The Board proposes a CAWS ALU A and CAWS and Brandon Pool ALU B. Generally, CAWS ALU A waters are capable of supporting communities of native fish that are tolerant and moderately tolerant and may include sport fish species such as channel catfish, largemouth bass, bluegill, northern pike, and black crappie, and non-game fish species such as tadpole madtom, spotfin shiner, and orangespotted sunfish. CAWS and Brandon Pool ALU B waters are capable of supporting primarily tolerant fish species, which may include central mudminnow, golden shiner, bluntnose minnow, yellow bullhead and green sunfish.

The Board proposes as CAWS ALU A waters: Upper North Shore Channel, Lower North Shore Channel, North Branch of the Chicago River, South Branch of the Chicago River, Cal-Sag Channel, Calumet River, Little Calumet River, Grand Calumet River, Lake Calumet, and Lake Calumet Connecting Channel. The Board proposes as ALU B waters the Chicago Sanitary and Ship Canal and Brandon Pool.

The Board does not propose an ALU C designation, or an Upper Dresden Island Pool (UDIP) designation. Instead, the Board proposes that the UDIP be classified as General Use, given the ability to meet the CWA goals. However, the Board will visit the issue of water quality standard for UDIP in Subdocket D.

The Board has determined that maintaining the General Use standard for the Chicago River is appropriate as the Chicago River can meet the CWA goals in the foreseeable future. Therefore no change is proposed for the Chicago River.

The Board also opens a Subdocket E to examine issues surrounding Bubbly Creek as requested by the District and Environmental Groups.

The Board is also proposing language to establish numeric water quality standards for fecal coliform bacteria applicable to Primary Contact Recreation Waters as the Board indicated it would in Subdocket B.

ORDER

The Board directs the Clerk to cause the publication of the following rule in the *Illinois Register* for first notice:

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE C: WATER POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 303
WATER USE DESIGNATIONS AND SITE-SPECIFIC WATER QUALITY STANDARDS

SUBPART A: GENERAL PROVISIONS

Section
303.100 Scope and Applicability
303.101 Multiple Designations
303.102 Rulemaking Required (Repealed)

SUBPART B: NONSPECIFIC WATER USE DESIGNATIONS

Section
303.200 Scope and Applicability
303.201 General Use Waters
303.202 Public and Food Processing Water Supplies
303.203 Underground Waters
303.204 Chicago Area Waterway System and Lower Des Plaines River Outstanding Resource Waters
303.205 List of Outstanding Resource Waters
303.220 Primary Contact Recreation Waters
303.225 Incidental Contact Recreation Waters
303.227 Non-Contact Recreation Waters and Non-Recreational Waters
303.230 Chicago Area Waterway System Aquatic Life Use A Waters
303.235 Chicago Area Waterway System and Brandon Pool Aquatic Life Use B Waters

SUBPART C: SPECIFIC USE DESIGNATIONS AND SITE SPECIFIC WATER QUALITY STANDARDS

Section
303.300 Scope and Applicability
303.301 Organization
303.311 Ohio River Temperature
303.312 Waters Receiving Fluorspar Mine Drainage (Repealed)
303.321 Wabash River Temperature
303.322 Unnamed Tributary of the Vermilion River
303.323 Sugar Creek and Its Unnamed Tributary

SUBPART D: THERMAL DISCHARGES

AUTHORITY: Implementing Section 13 and authorized by Sections 11(b) and 27 of the Environmental Protection Act [415 ILCS 5/13, 11(b) and 27].

SOURCE: Filed with the Secretary of State January 1, 1978; amended at 2 Ill. Reg. 27, p. 221, effective July 5, 1978; amended at 3 Ill. Reg. 20, p. 95, effective May 17, 1979; amended at 5 Ill. Reg. 11592, effective October 19, 1981; codified at 6 Ill. Reg. 7818; amended at 6 Ill. Reg. 11161, effective September 7, 1982; amended at 7 Ill. Reg. 8111, effective June 23, 1983; amended in R87-27 at 12 Ill. Reg. 9917, effective May 27, 1988; amended in R87-2 at 13 Ill. Reg. 15649, effective September 22, 1989; amended in R87-36 at 14 Ill. Reg. 9460, effective May 31, 1990; amended in R86-14 at 14 Ill. Reg. 20724, effective December 18, 1990; amended in R89-14(C) at 16 Ill. Reg. 14684, effective September 10, 1992; amended in R92-17 at 18 Ill. Reg. 2981, effective February 14, 1994; amended in R91-23 at 18 Ill. Reg. 13457, effective August 19, 1994; amended in R93-13 at 19 Ill. Reg. 1310, effective January 30, 1995; amended in R95-14 at 20 Ill. Reg. 3534, effective February 8, 1996; amended in R97-25 at 22 Ill. Reg. 1403, effective December 24, 1997; amended in R01-13 at 26 Ill. Reg. 3517, effective February 22, 2002; amended in R03-11 at 28 Ill. Reg. 3071, effective February 4, 2004; amended in R06-

24 at 31 Ill. Reg. 4440, effective February 27, 2007; amended in R09-8 at 33 Ill. Reg. 7903, effective May 29, 2009; amended in R09-11 at 33 Ill. Reg. 12258, effective August 11, 2009; amended in R08-9(A) at 35 Ill. Reg. 15078, effective August 23, 2011; amended in R11-18 at 36 Ill. Reg. 18898, effective December 12, 2012; amended in R08-9(C) at 37 Ill. Reg. _____, effective_____.

SUBPART B: NONSPECIFIC WATER USE DESIGNATIONS

Section 303.204 Chicago Area Waterway System and Lower Des Plaines River

The Chicago Area Waterway System and Lower Des Plaines River Waters are designated to protect for primary contact recreation, incidental contact or non-contact recreational uses (except where designated as non-recreational waters) and commercial activity (including navigation and industrial water supply uses) and the highest quality aquatic life and wildlife attainable, limited only by the physical condition of these waters and hydrologic modifications to these waters. These waters are required to meet the secondary contact and indigenous aquatic life standards contained in 35 Ill. Adm. Code 302, Subpart D, but are not required to meet the general use standards or the public and food processing water supply standards of 35 Ill. Adm. Code 302, Subpart B and C, except that the waters designated as Primary Contact Recreation Waters in Section 303.220 must meet the numeric water quality standard for fecal coliform bacteria applicable to protected waters in 35 Ill. Adm. Code 302.209. Designated recreational uses an aquatic life use for each segment of the Chicago Area Waterway System and Lower Des Plaines River are identified in this Subpart.

(Source: Amended at _____, effective _____)

Section 303.220 Primary Contact Recreation Waters

The following waters are designated as Primary Contact Recreation Waters and must be protected for Primary Contact Recreation uses as defined in 35 Ill. Adm. Code 301.323. These waters must meet the numeric water quality standard for fecal coliform bacteria applicable to protected waters in 35 Ill. Adm. Code 302.209

a) Lower North Shore Channel from North Side Water Reclamation Plant to confluence with North Branch of the Chicago River;

b) North Branch of the Chicago River from its confluence with North Shore Channel to its confluence with South Branch of the Chicago River and Chicago River;

c) Chicago River;

d) South Branch of the Chicago River;

e) Little Calumet River from its confluence with Calumet River and Grand Calumet River to its confluence with Cal-Sag Channel; and

f) Cal-Sag Channel.

(Source: Amended at 37 Ill. Reg. _____, effective_____.)

Section 303.230 Chicago Area Waterway System Aquatic Life Use A Waters

These waters are not presently capable of maintaining a balanced, integrated, adaptive community of warm-water fish and macroinvertebrates due to the unique physical conditions, flow patterns, and operational controls necessary to maintain navigational use, flood control, and drainage functions of the waterway system. These waters are capable of supporting communities of native fish that are tolerant and moderately tolerant and may include but are not limited to sport fish species such as channel catfish, largemouth bass, bluegill, northern pike, and black crappie, and non-game fish species such as the tadpole madtom, and spotfin shiner, and orangespotted sunfish. The following waters are designated as Chicago Area Waterway System Aquatic Life Use A waters and must meet the water quality standards of 35 Ill. Adm. Code 302**,** Subpart D:

a) Upper North Shore Channel

b) Lower North Shore Channel

c) North Branch of the Chicago River

d) South Branch of the Chicago River

e) Cal-Sag Channel

f) Calumet River

g) Little Calumet River

h) Grand Calumet River

i) Lake Calumet

j) Lake Calumet Connecting Channel

(Source: Added at 37 Ill. Reg. _____, effective_____.)

Section 303.235 Chicago Area Waterway System and Brandon Pool Aquatic Life Use B Waters

These waters are not presently capable of maintaining a balanced, integrated, adaptive community of warm-water fish and macroinvertebrate community due to irreversible modifications that result in limited physical habitat and stream hydrology. Such physical modifications are of long duration and may include artificially constructed channels consisting of

vertical sheet-pile, concrete and rip-rap walls designed to support commercial navigation and the conveyance of stormwater and wastewater. These waters are capable of supporting primarily tolerant fish species, which may include but are not limited to central mudminnow, golden shiner, bluntnose minnow, yellow bullhead and green sunfish. The following waters are designated as Chicago Area Waterway System and Brandon Pool Aquatic Life Use B waters and must meet the water quality standards of 35 Ill. Adm. Code 302. Subpart D:

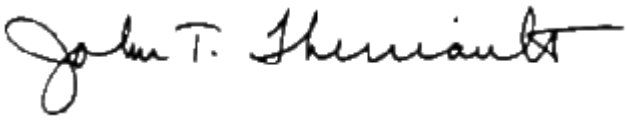
a) Chicago Sanitary and Ship Canal

b) Brandon Pool

(Source: Added at 37 Ill. Reg. _____, effective_____.)

IT IS SO ORDERED.

I, John T. Therriault, Assistant Clerk of the Illinois Pollution Control Board, certify that the Board adopted the above order on February 21, 2013, by a vote of 5-0.



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John T. Therriault, Assistant Clerk
Illinois Pollution Control Board