BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
WATER QUALITY STANDARDS AND	)	
EFFLUENT LIMITATIONS FOR THE	)	
CHICAGO AREA WATERWAY SYSTEM	)	R08-9(D)
AND THE LOWER DES PLAINES RIVER:	)	(Rulemaking-Water)
Adm. Code Parts 301, 302, 303 and 304	)	

NOTICE OF FILING

To: John Therriault, Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 West Randolph St., Suite 11-500
Chicago, IL 60601

Marie Tipsord, Hearing Officer
Illinois Pollution Control Board
James R. Thompson Center
100 W. Randolph St., Suite 11-500
Chicago, IL 60601-3218

Stefanie N. Diers, Assistant Counsel
Illinois Environmental Protection Agency
1021 N. Grand Ave. East
P.O. Box 19276
Springfield, IL 62794

SEE ATTACHED SERVICE LIST

Please take notice that on December 12, 2014, we filed electronically with the Office of the Clerk of the Illinois Pollution Control Board the attached RESPONSIVE COMMENTS OF LEMONT REFINERY ON FIRST NOTICE OPINION AND ORDER, a copy of which is served upon you.

CITGO PETROLEUM CORPORATION and
PDV MIDWEST REFINING, LLC

By: /s/ Jeffrey C. Fort

Jeffrey C. Fort
Irina Dashevsky
Dentons US LLP
233 S. Wacker Drive
Suite 7800
Chicago, IL 60606-6404

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
WATER QUALITY STANDARDS AND	)	
EFFLUENT LIMITATIONS FOR THE	)	
CHICAGO AREA WATERWAY SYSTEM	)	R08-9(D)
AND THE LOWER DES PLAINES RIVER:	)	(Rulemaking-Water)
PROPOSED AMENDMENTS TO 35 Ill.	)	
Adm. Code Parts 301, 302, 303 and 304	)	

RESPONSIVE COMMENTS OF LEMONT REFINERY ON FIRST NOTICE OPINION AND ORDER

CITGO Petroleum Corporation and PDV Midwest, LLC (collectively, the "Lemont Refinery") submits this Response to comments filed by certain other parties in this proceeding with respect to the Board's Proposed Opinion and Order at First Notice, dated September 18, 2014 (hereafter "First Notice"). The Lemont Refinery submits that no substantive information or arguments have been submitted which should cause the Board to make any changes to the seasonal chloride standards for the Chicago Sanitary and Ship Canal. Moreover, the comments of the environmental groups demonstrate that additional clarifying language is needed for the Board proposed BMP language for NPDES permits. To be more precise, we are revising slightly our suggested language.

I. THE BOARD CORRECTLY CHOSE TO CATEGORIZE THE CHICAGO SANITARY AND SHIP CANAL ("CSSC")AS A DISTINCT WATER BODY FOR WHICH SEPARATE WATER QUALITY STANDARDS WERE APPROPRIATE. THE WINTER-TIME CHLORIDE STANDARD FOR THE SHIP CANAL IS APPROPRIATE AND AMPLY SUPPORTED BY THE RECORD. NONE OF THE COMMENTS SUBMITTED ON THE FIRST NOTICE OPINION AND ORDER PRESENT ANY SUBSTANTIVE REASON NOT TO PROCEED WITH THE PROPOSED CHLORIDE STANDARD

USEPA and IEPA have not changed their position from their respective comments at the close of the merit hearings. But they offer nothing new or substantive to show that the calculated

and proposed winter chloride levels are not appropriate or not protective of the aquatic species which are in the CSSC. They have offered no new analysis, and simply rely on the same conclusory assertions which are not accurate in light of the actual sampling of aquatic life in the CSSC.

The Lemont Refinery has done additional aquatic investigations, including for the very species which USEPA and IEPA opine should exist. Those species simply are not present and the agencies have not cited to a single study which supports their conclusions for the lower CSSC. Further information compiled by Huff & Huff in response to those comments is attached as Exhibit B. We urge the Board to read the Huff & Huff document in full. Its findings can be summarized briefly here:

Neither agency has presented any facts to contradict the facts and analyses presented by in this proceeding by the Lemont Refinery and Huff & Huff. Not only has Huff & Huff *conducted* more in-stream biological analyses, all of the data point to the same conclusions. The species used in the re-calculation procedure were appropriate. In particular:

- no *Ceriodaphnia* has been found in the lower CSSC and the larger class of *Cladocera* (water fleas, of which *Ceriodaphnia* is a species) decline as water temperatures cool; none were found after October. Again, no *Ceridaphnia* have been found at all in the CSSC and no water fleas have been found when the water temperature cools below 50°F.[1];

[1] Exhibit B at 1; see tables in Exhibits A and B. Exhibit A to our November 21, 2014 comments in this proceeding are incorporated by reference.

- *Sphaerium* fingernail claims are not a resident species (two reported sitings in 35 years of observation does not constitute a resident species) while other fingernail claims are present and were appropriately included in the re-calculation[2];
- No records exist of native freshwater mussels for the CSSC and the silty bottom substrates, which are repeatedly disturbed by barge traffic, are unsuitable for mussel colonization.[3]

Therefore, these species were not included in the re-calculation. "*Ceropdaphnia, Sphaerium, and Lamplis* were appropriately not included in the recalculation. These species do not serve as surrogates for other species that do occur in the CSSC during winter months and because suitable, related species are available for which there is GMAV and SMAV data are available for these other species."[4]

With respect to other topics, they too are addressed in detail by Exhibit B, and quickly answered. As to the topic of new toxicity data relating to *rotifers,* it appears that including any such data would only increase the potential chloride values.[5] As to "a sound scientific rationale under 40 CFR 131", USEPA points to nothing in the Huff & Huff analysis which is not scientific. The resulting calculation may be different than other water bodies, but the lack of presence of these species in "a man-made industrial canal that lacks habitat during the winter months is not surprising from a biological perspective."[6] As to the request that the hardness of

[2] Exhibit B at 2.
[3] Id.
[4] Id.
[5] Id at 3.
[6] Id.

the CSSC be used and applied to the species included, Huff & Huff did that; it reports that the calculated values actually would increase.[7]

We note than neither agency goes to the effort of performing a recalculation were the particular missing species included. By not following through on their own assertions, both fail to provide the Board with any information useful for the Board to decide what the appropriate water quality standard should be.

As to protecting downstream aquatic life conditions, neither USEPA nor IEPA offer any specific analysis or information. Were this a real issue, we would have expected questions at the hearing or during the briefing period before the First Notice, or even now. Yet even now, there are no analyses or data presented – just a conclusory question.

Moreover, in light of the IEPA's most recent proposal to keep the 1,500 mg/L TDS standard (more on that below), there should be no question at all. The Lemont Refinery has already analyzed TDS levels at the Refinery and at the I-55 Bridge. There is a 23% decline in maximum TDS values between the Lemont Refinery and the I-55 Bridge.[8] A maximum chloride level of 750 mg/L (or half of the TDS standard) appears reasonable to predict.[9] Thus, the proposed winter chloride standard is quite consistent with the IEPA's most recent position that the existing TDS standard of 1,500 mg/L should be retained for awhile.[10]

---

[7] Id at 5-7, and Attachment E, Tables 9 & 10.
[8] Id at 4; Exhibit B, Attachment D.
[9] Id. at 3-4. Of course, if the Agency does pursue further analyses of separate water segments, further data on chlorides might be collected to test this deduction based on the existing information, all of which is already in this record. If that new information suggests a need for further action, then further rulemaking could be undertaken. But at this point, both USEPA and IEPA are speculating.
[10] Of course, it is quite odd that the Agency did not use the 1,686 mg/L TDS standard which USEPA found protective and approved for the Illinois River just above the I-55 Bridge to the Kankakee River confluence, about a year before this rulemaking began. See Exhibit B, Attachment C.

Therefore, the Board's findings with respect to the winter seasonal chloride standard remain valid:

> "The Board finds that Citgo/PDV properly employed USEPA's 2013 recalculation procedures to derive scientifically defensible site-specific acute and chronic water quality criteria for chloride in the CSSC as USEPA stated could be done. PC 1401 Enc. 1 at 1. The Board finds that Citgo/PDV adequately responded to each of IEPA's and USEPA's concerns in the record to provide supplemental evidence and clarification of the site-specific derivation. The Board notes that Citgo/PDV's site-specific criteria derivation also underwent external peer review. 12/17/13 Tr. at 171.
>
> The Board observes that Citgo/PDV's site-specific criteria derivation was specific to the CSSC and the winter months, and did not apply to all waters designated ALU B, in particular Brandon Pool. For all other segments in CAWS and LDPR, the Board notes that no other site-specific criteria were proposed or derived consistent with USEPA's 2013 recalculation procedures."

Board Opinion at 192.

The District apparently agrees that the recalculation procedure can be a useful tool. We understand that the calculation submitted by the District was an illustration and was not intended to disagree with the calculation done by the Lemont Refinery based on data collected immediately upstream and downstream of the Regulated Navigation Area.[11] The District also did not contest the appropriateness of this calculation on the CSSC. Indeed, we understand the District to have offered the calculation in their comments to illustrate that the recalculation procedure might be useful to identify which, if any, of the other CAWS segments would exceed a re-calculated winter chloride level. This is exactly as we suggested in the earlier comments of the Lemont Refinery: the recalculation procedure could be used with respect to other portions of

[11] For example, different portions of the CAWS will have different conditions and aquatic life from the Lower Ship Canal. The recalculation procedure could be used to determine which portions of the CAWS is in need of the so-called variance process which the Agency is considering.

the CAWS and the Lower Des Plaines River and would appear to be a first step in even deciding which water segments deserved first attention.[12]

The Lemont Refinery withdraws most of its water used in the refining process from the CSSC and then discharges treated effluent back into the CSSC. The Lemont Refinery has an extensive data base of elevated TDS (and chloride) levels resulting from snow melt run-off, extending for nearly a decade on its water intake from the CSSC (upstream of its discharge). The CSSC is, without doubt, an "effluent dominated" stream, receiving treated wastewater from at least four MWRDGC treatment plants, as well as stormwater run-off from most of Cook County and parts of DuPage County, before reaching the Lemont Refinery intake.

The water quality standards calculated by Huff & Huff and proposed by the Board to be adopted for the CSSC during winter months are clearly appropriate. The CSSC does not support the same diversity of species as do other bodies of water in Illinois, particularly natural streams. If EPA believes that its recalculation procedure and formula is scientific, upon further reflection we would hope it would accept the proposed values for the CSSC; indeed it appears that the environmentalists accept the recalculation effort for the stream segment studied in the CSSC. The EPA recalculation procedures provided a useful framework for analysis. Applying this same framework to other stream reaches may be appropriate, as the District suggests.

There is no good reason for the Board not to decide a seasonal chloride standard for the CSSC. No other party has submitted any evidence or information with respect the appropriateness of the CSSC chloride standards proposed in the First Notice Opinion and Order. The Lemont Refinery has already sought and been granted variances from the state water quality

[12] We would hope the Agency considers the District's approach as it would likely substantially reduce the number of water segments in the CAWS which would exceed an appropriate winter chloride standard.

standard for TDS for nearly 10 years. Throughout that time, the Lemont Refinery has petitioned the Board and worked with the Agency, including participating in this very rulemaking seeking the promised, though long-delayed, forum for a decision specifically to replace the TDS standard with another more appropriate requirement. It would truly be arbitrary and capricious to wait any longer.

Moreover, the Agency is not even clear what it will do or what it will propose. It has vacillated on what a chloride standard should be, and then it has tried to completely restart this proceeding on the chloride issue. To do so it is looking to the District and some new stakeholder group to make recommendations. It could easily be a very long time before that new proceeding leads to any new winter chloride standard.

Seven years ago IEPA began this proceeding with a promise to work out the chloride issues. It first testified that USEPA would not accept the proposed 500 mg/L standard. As the merit hearings concluded, it said it would propose there be no winter chloride standard.[13] And now it wants to abandon its initial proposal to remove TDS standard entirely and keep the 1,500 mg/L TDSstandard. After years of hearing and testimony from the Agency that it wanted to replace the TDS standard, it now wants the Board to revert to a TDS standard! This position is not supported by a whiff of evidence or technical justification. All that USEPA now says is that a 500 mg/L chloride standard is protective and apparently it will not go back on its prior approval – in the 1970s – of the TDS standard.

The Lemont Refinery has been trying to secure a regulatory standard for its discharge for almost ten years. TEN YEARS. There is no reason to put off adoption of the CSSC seasonal

[13] This was a surprise since IEPA knew that USEPA rejected the TDS variance for the Lemont Refinery which the Board ordered in 2012 precisely because USEPA believed it did not provide a water quality or effluent limitation on TDS.

chloride standard. We recall that the Statement of Reasons for this proceeding, the Agency referred to the Board's First Notice Opinion in R07-09, in which TDS was to be replaced by standards for sulfate and chlorides. The Board stated:

> TDS is the sum of dissolved substances in water and TDS is dominated by the common ions of sulfate, chloride, sodium, calcium, carbonate, and magnesium in various proportions. Reasons at 11. The Agency is proposing the deletion of the general water quality standard for TDS in this rulemaking. Reasons at 10-11. The Agency states that investigations into sulfate toxicity indicate that the existing TDS standard is unnecessary. Reasons at 11. The standard is unnecessary because the toxicity of each constituent in TDS is the significant factor in protecting aquatic life rather than the total. *Id.* The Agency believes that with toxicity based standards adopted for sulfate and chloride, the TDS standard is not needed, as TDS cannot predict the threshold of adverse effects to aquatic life. *Id.* R07-09 Opinion and Order at 4, September 20, 2007.

If IEPA is now going to abandon seven years of hearings and hold off on adopting chloride standards, then it cannot object to the proposed seasonal chloride standard for chlorides, which the Board has now proposed and which the Lemont Refinery has documented and supported with detailed analyses which follow published USEPA policy for doing such calculations. A properly documented chloride standard, which the Board has proposed, provides more protection than relying just on a TDS standard as the Board articulated in 2007 in R07-09.

Even though IEPA may not now be willing to accept the proposed seasonal chloride standard, there is nothing to preclude IEPA from including the CSSC as another water body segment to be considered in the promised rulemaking proceeding. As long as the Board has proceeded to complete this rulemaking and adopt the proposed winter chloride standard, then the Lemont Refinery will not have to continue to seek yet another state variance (or more likely go back and amend the pending variance reconsideration). We expect some substantial amount of time will pass while IEPA and USEPA, and many other parties, grapple with issues that have not been considered in Illinois before: what are the parameters for a water body segment by water

body segment assessment? Perhaps the USEPA *proposed* water quality rule will be a guide. Maybe. The Agency says it is "proposing a chloride variance approach" which "has been developed after numerous conversations with USEPA."[14] A work group, which has not yet been officially formed, would "work on an approvable variance should one be sought." So we don't know what the work group will propose or when, or even if USEPA would support it. Yet that proposal is to feature BMPs, the very remedy which the Lemont Refinery developed and presented in this rulemaking and which the Board has endorsed in its proposed NPDES language!

The Lemont Refinery has been petitioning the Board, and the Agency, since 2005 for relief from the 1,500mg/L TDS standard.[15] The Agency proposal merely continues the status quo, which would waste the time and energy of many in this rulemaking alone. The Agency's compliant that the proposed standard will "only benefit Citgo" is not only wrong, it displays an attitude that no discharger should assert its rights to be heard and to offer alternatives! Others who discharge into the CSSC, and likely much of the Chicago Area Waterways, also have the same problem as the Lemont Refinery – The Agency has simply closed it eyes when writing permits to the TDS 1,500 mg/L water quality violations.

Moreover, the efforts of the Lemont Refinery have the potential for greatly benefiting many others, not the least of which is the environment. The Lemont Refinery has developed the chloride BMP concept and presented it to the Board and the Agency, and has stated its willingness to include in its NPDES permit. The Board, the Environmental Groups, other dischargers like Exxon-Mobil, and even now USEPA and IEPA are supporting the use of BMPs,

---

[14] Agency comment at 9 and footnote 1.

[15] In addition to the variances sought, the Lemont Refinery also asked the Board in the R07-09 proceeding to grant the same relief with respect to TDS. We were told that this proceeding would be the proper forum.

in NPDES permits as well as in stormwater permits. Moreover, as demonstrated by the District, others may be able to use the re-calculation procedure presented by Huff & Huff. We submit that the approach championed by the Lemont Refinery in this proceeding ought to be embraced, not denied.

II. THE BOARD SHOULD CLARIFY ITS PROPOSAL WITH RESPECT TO BMP CONDITIONS FOR CHLORIDES IN NPDES PERMITS.

The Lemont Refinery is committed to use of the BMP approach and believes that it is the critical element for addressing the chloride issues in the CAWS and the LDPR. We have so advised the Agency and submitted a specific proposed plan for review and inclusion in our NPDES permit. As illustrated by the concerns expressed by the environmental groups, having a BMP is not the only relevant condition for an NPDES permit. We would expect the Agency to include appropriate limitations, perhaps in the form of a discharge limit based on historical discharges, and provide relief from whatever water quality standard is adopted, if the discharger committed to a winter BMP plan for chloride run-off. We are NOT proposing that there be no limits in wastewater discharges with respect to TDS and/or chlorides. But given that the Lemont Refinery discharges from an outfall that also receives stormwater flows from off-site sources as well as its own stormwater flows, and has its intake in waters affected by upstream snow melt, the existing regulatory structure needs to be adjusted. The added language we proposed in our initial comments would address this issue.

After reading the comments of others, we would make a modification to our proposed language. The key terms to be included is to address the time period prior to adoption of any chloride TMDL and to make clear that snow-melt run-off conditions are a qualifying event for use of BMPs in NPDES permits, as well as storm water permits. We specifically want to be sure

that point sources are also entitled to use BMPs and do not get caught in not being able to use a mixing zone in an effluent dominated water such as the CSSC. We therefore suggest the following revisions to the Board's proposed language, which differs subtly from what we proposed in our initial comments:

> (i) Best management practices (BMPs) to control or abate the discharge of chloride when:
>
> (1) Authorized under section 402(p) of the CWA for the control of storm water dischargers; or
>
> (2) Numeric effluent limitations are infeasible; or
>
> (3) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA; or
>
> (4) Until adoption of an applicable Total Maximum Daily Load allocation under section 303(d) of the Clean Water Act, during periods of time when applicable water quality standards are exceeded in the receiving stream due to snow melt run-off from upstream point and/or non-point sources.

The record is replete with justifications for use of a BMP mechanism to address elevated chlorides in snow melt run-off and no one has raised any objection to their appropriateness. The above proposed language would allow for imposition of effluent limitations for chlorides (and other pollutants if the Board chooses) for times other than when chloride standards are being exceeded during snow melt run-off. This would address the concern expressed by some that the BMP rule should not allow for a lessening of existing limitations. The Lemont Refinery agrees with that position but strongly believes it should not be penalized due to lack of compliance by upstream point and non-point sources with respect to snow melt conditions and excessive chloride run-off into the CSSC. The stormwater rules and the point source discharge rules

should apply the same BMP requirements for chloride use.[16] The Lemont Refinery is willing to move forward with BMPs for chlorides associated with snow melt conditions.

Conclusion

The Lemont Refinery respectfully requests: the Board adopt the Winter Chloride Criteria for the CSSC, and the mercury HHS as proposed in the First Notice Opinion; and adopt the proposed BMP chloride rule for NPDES dischargers, with the revisions as requested herein.

Dated: December 12, 2014

Respectfully submitted

CITGO PETROLEUM CORPORATION and
PDV MIDWEST REFINING, LLC

By: /s/ Jeffrey C. Fort

Jeffrey C. Fort
Irina Dashevsky
Dentons US LLP
233 S. Wacker Drive
Suite 7800
Chicago, IL 60606-6404

[16] The Environmental Groups were supportive of our position. "We welcome Citgo's suggestion that best management practices be implemented for control of chlorides by all of the entities adding chloride to waters suffering from chloride pollution." PC 1412 at 14. Moreover, we submit Exhibit C, as an anecdote: The photo is of a pair of dress shoes worn from the Ogilvie train station toward Willis Tower on concrete surfaces during a torrential rain in May, 2014. After two blocks in the downpour, look at the amount of salt on the shores from salt still on the pavement! The non-point source contributions of salt into the CSSC is immense, and not something which a discharger in an effluent dominated water like the Ship Canal should be penalized. The issue requires new approaches to reduce the chlorides going into the CSSC.

EXHIBIT B

EXHIBIT B
Responses to U.S. EPA and IEPA Comments on Winter Chloride Recalculation in CSSC

By

James E. Huff, P.E. and Roger Klocek

The Lemont Refinery asked Huff & Huff to prepare technical responses to the U.S. EPA and Illinois EPA comments on November 20, 2014 to the Illinois Pollution Control Board regarding the water quality standards of the Chicago Area Waterways for Docket R08-009 Subdocket D.

Responses to U.S. EPA Comments

Under part V, Section C, the U.S. EPA addressed comments regarding Huff & Huff's recalculation of winter chloride criteria for the Chicago Sanitary & Ship Canal (CSSC) on behalf of Citgo. The specific comments from the U.S. EPA are responded to herein.

1. Comment. With respect to the Huff & Huff April 28, 2014 comments regarding the winter chloride site-specific criteria for the CSSC, U.S. EPA state, "EPA's preliminary review suggests that the deletion of *Ceriodaphnia, Sphaerium*, and *Lampsilis* GMAVs is not appropriate **due to the fact** that these species should be considered to 'occur at the site' as defined in EPA's 2013 revised deletion process guidance **or** because they serve as necessary surrogates for other species that occur at the site" (*emphasis added*).

1a. Response. We disagree and note that U.S. EPA doesn't identify any **"fact"** which is missing and seems undecided if these should be included because these species serve as surrogates or because they are present. No data were offered to show these species were present or that other specific species which are present are not accounted for with the species list developed by Huff & Huff based on actual collections.

Ceriodaphnia was appropriately not included as a resident species during winter months. Plankton data from the Illinois Natural History Survey, INHS (Butler, 2013) are among the few plankton collections aside from Huff & Huff's collections. The INHS collected at one upstream location on the CSSC location at Western Avenue in Chicago. *Ceriodaphnia* were collected by INHS in one month of four during 2010, three months of five in 2011, and one month in six during 2012. All collections yielded small numbers of *Ceriodaphnia* **and no collections were made beyond October, so their study does not address the presence in the winter months.**

Huff & Huff collections (see Attachment A) were made at two sites in July 2013, one site in November 2013 in Lockport on the Lower CSSC. For 2014, the one site, downstream of the Citgo Refinery has been sampled for plankton on six occasions from May 5, 2014 to October 29, 2014. All of the collections in 2013 and 2014 yielded no *Ceriodaphnia* in the Lower CSSC. In November 2014, the Western Avenue site was sampled for plankton, and the collected species are also included in Attachment A. No *Ceriodaphnia* were collected in November at Western Avenue.

A review of the data in Attachment A reveals an interesting trend. Note the Cladocera (water fleas, including *Ceriodaphnia*) peak in the summer and steadily declined as the water temperatures cool. By October 29th, no Cladocera have been collected. There is no supporting data that suggests *Ceriodaphnia* would be or are present in the Lower CSSC in the winter months, while there is supporting data that they are not present in the winter months, and require warmer water temperatures. *Ceriodaphnia* are not resident in the CSSC during any season of the year, and are likely infrequent visitors swept into the CSSC from Lake Michigan.

Once water temperatures decline to approximately 50 degrees F in streams, and the fall season daylight hours shorten, photosynthesis declines dramatically and the plankton food source (single celled algae, phytoplankton) rapidly declines from water bodies. The zooplankton, such as water fleas, that rely on the single-celled algae as food also disappear from these waterways at the same time, which is consistent with collection results.

Cladocerans (water fleas) including *Ceriodaphnia* produce "resting" (diapausing) eggs that are thickly shelled and resistant to complete drying, cold, heat and other extremes of conditions. The resting eggs are microscopic, rest in the sediment, and are often viable for years, (Kaya and Erdogan, 2013). In this protected egg state, water fleas are able to pass the winter and hatch when conditions are more favorable. Elevated chlorides in the CSSC at levels we have historically seen during winter months would likely have no effect on the hatchability of the resting eggs, (Bailey et al., 2004). Eggs will hatch when the waters warm to approximately 55 degree Fahrenheit

1b. Response. *Sphaerium* fingernail clams are not considered to be resident species in the CSSC as described in previous comments provided to the Illinois Pollution Control Board on May 13, 2014. *Sphaerium* have been found twice in the CSSC between 1975 and 2010, one specimen was recovered at Cicero Avenue in July, 2009 (MWRDGC, 2011). Multiple specimens were taken at Lockport, IL during October and November, 1991 (Sparks & Dillon, 1993). Two records of *Sphaerium* in a thirty-five year period do not constitute a resident species in our professional opinion. A different fingernail clam, *Musculium*, is regularly present in the CSSC and was appropriately used for recalculation purposes. Another fingernail clam that is regularly in the CSSC is *Eupera cubensis*. *Eupera* is more tolerant of salinity than *Sphaerium*, (Bass, 2009), and is adequately represented by the *Musculium* as its surrogate species.

1c. Response. *Lampsilis* mussels are not present in the CSSC and are not included in recalculation efforts, as described in previous comments provided to the Illinois Pollution Control Board on May 13, 2014, cited above. Further museum database searches - of museums holding large collections of native freshwater mussels included the Field Museum of Natural History, Museum of Zoology, University of Michigan, Ohio State University Museum Michigan Museum, Illinois State Museum, and the INHS Mollusk Database - were searched (December, 2014). **No historical records of native freshwater mussel are listed for the CSSC;** the CSSC silty bottom substrates, which are constantly disturbed by barge traffic, are considered unsuited for mussel colonization by mussel professionals. The only other non-Sphaeriidae bivalves present in the CSSC are the zebra mussel (*Dreissena polymorpha*) and the Asiatic clam, (*Corbicula fluminea*). Both the zebra mussel and the Asiatic clam are highly tolerant of salinity and do not require a surrogate species of low chloride tolerance to be included in a recalculation.

Summary: *Ceriodaphnia*, *Sphaerium* and *Lampsilis* were appropriately not included in the re-calculation. These species do not properly serve as surrogates for other species that do occur in the CSSC in the winter months, and there are other related species that are better suited to use as surrogates for which there are GMAV and SMAV data available.

2. Comment. EPA questions whether all appropriate new toxicity data have been added to the toxicity database used to derive the criteria.

2. Response. The new toxicity data U.S. EPA apparently are referring to are the data for *Brachionus* rotifers; this species is directly raised again under Comment 8. Please see Response #8 for an explanation as to why *Brachionus* rotifers are not appropriate for the winter chloride recalculation.

3. Comment. EPA questions whether the proposed winter chloride criteria for the CSSC are based upon a sound scientific rationale as required by 40 CFR 131.11 and suggests the deletion procedure does not appear to have been completed in accordance with EPA guidance.

3. Response. EPA does not specifically identify any deviations from its procedures. 40 CFR 131.11 requires that water quality criteria be based on "sound scientific rationale". 40 CFR 131.11(b) (iii) goes further and allows "other scientifically defensible methods". Thus, even if the U.S. EPA believes the analysis did not follow the U.S. EPA guidelines in totality, there is no such requirement under 40 CFR 131.11(b) (iii). The U.S. EPA apparently is referring to the species that were included in the derivation procedure; specifically the species U.S. EPA identified in Comment 1 above. H&H used "sound scientific rationale", that was clearly described and the rationale for each exclusion clearly explained. Furthermore, the analysis conducted by Huff & Huff was peer reviewed, and verifying results through the peer review process is a fundamental component of the scientific method. If the scientific rationale applied was flawed, the peer review method exists to expose these flaws. As the analysis was successfully peer reviewed, the analysis should be considered "scientifically defensible".

The definition of the word rationale is a set of reasons or logical basis for a course of action or particular belief. That U.S. EPA disagrees with the reasons or logical basis for exclusion does not make the criteria derived inconsistent with 40 CFR 131.11. Recall, the analysis conducted by H&H was peer reviewed, and from the comments the Board has received from the MWRDGC and ExxonMobil, there were no issues identified with the scientific rationale utilized.

4. Comment. CITGO derived the proposed winter chloride criteria for the CSSC by deleting the toxicity data for some of the most sensitive surrogate species present in the toxicity database, which raises questions about whether the proposed winter chloride criteria for the CSSC are protective of the species that "occur at the site." U.S. EPA questions the deletion of toxicity data for species in the toxicity database **because information suggests the species occur at the site** or are necessary, consistent with EPA's guidance, **to serve as surrogates for untested species** that **may** occur at the site.

4. Response. Species that are absent in the winter months were appropriately deleted from the recalculation for the **winter chloride criteria**. No information has been provided that these species are present in the winter months on the CSSC, while CITGO continues to collect plankton samples that consistently show the absence of the *Ceriodaphnia*. The lack of presence of these species in a man-made industrial canal that lacks habitat during the winter months is not surprising from a biological perspective.

The U.S. EPA has failed to identify any untested species for which it thinks the deleted species represents appropriate surrogates. Simply stating that there **could be** untested species present, or that the deleted species represents some unidentified surrogate species, is not a "sound scientific rationale". Under 40 CFR 131.11(b) (iii), the burden would seem to be on the U.S. EPA to show why the method used is not "scientifically defensible".

5. Comment. EPA is unaware of information in the record that demonstrates that the criteria will ensure that downstream aquatic life uses in the Lower Des Plaines River will be protected in accordance with 40 CFR 131.10(b).

5. Response. Once outside of the confines of the man-made, habitat-poor channel, downstream of the Brandon Street Lock and Dam, fishery data does show an improvement in the number of species present. There is also additional flow from the merger with the Des Plaines River, as well as other streams such as Deep Run Creek, immediately below the Lockport Lock & Dam.

The harmonic mean flow at the Lemont Refinery in the CSSC is 2,900 cfs. The harmonic mean flow at the I-55 Bridge on the Des Plaines River is 3,675 cfs. So the CSSC contributes on average 79 percent of the flow at the I-55 Bridge. From January 2 through March 26, 2007, the Lemont Refinery measured Total Dissolved Solids at the I-55 Bridge and at the Refinery Intake on the CSSC. The results are presented in Attachment B. The peak TDS values declined from 1,500 to 1,686 mg/L at the Lemont Refinery to 1,300 mg/L at the I-55 Bridge, or by **14** to **23 percent,** so there is clearly dampening of peak chloride values as the water flows downstream. A primary source of the additional flow is from the Des Plaines River, which merges with the CSSC just below the Lockport Lock & Dam. The harmonic mean on the Des Plaines River before this merger is 450 cfs, or 16 percent of the CSSC flow immediately before the merger. We note that U.S. EPA approved the TDS standard of 1,686 mg/L which the Board adopted in 2006, shortly before this proceeding began for the Des Plaines River downstream of the Lemont Refinery.

We note that IEPA is now proposing to keep the TDS water quality standard of 1500 mg/L,[1] and implicitly asserts that this will be protective of downstream aquatic life uses. In light of the above referenced data showing a 23% decline in peak TDS levels from the Refinery intake to the I-55 Bridge, the proposed seasonal acute chloride of 990 mg/L in the Lower CSSC would result in a predicted maximum level of chlorides approaching 750 mg/L at the I-55 Bridge. The data in the record is contrary to the assertion made that the proposed seasonal chloride standard for the CSSC might not be protective.

[1] It is not clear why the 1,686 mg/L TDS standard which begins above the I-55 Bridge would not be more appropriate for the entire CSSC as the TDS water quality standard. See Attachment C.

6. Comment. U.S. EPA continues to question deletion of the *Ceriodaphnia* GMAV from the data used for deriving the proposed CSSC wintertime criteria since *Ceriodaphnia* and other untested Cladoceran genera occur at the site at other times of year (See U.S. EPA's April 28, 2014 comments that Cladocerans **may be** present in the winter and that information documenting the absence of *Ceriodaphnia* and other untested Cladoceran genera such as *Bosmina* at the site in the winter is lacking).

6. Response. Our response to U.S. EPA comments were provided in previous comments to the Illinois Pollution Control Board on May 13, 2014. Comments addressed the issue of *Ceriodaphnia* presence, no winter collections and presented collection data through November 2013, which showed a dramatic decrease in plankton with no Cladocerans present in the colder months. Subsequently, Huff & Huff has continued collections in 2014 from May to November, and that data are presented in Attachment A. *Ceriodaphnia* have not been collected in 2014, and by the October 29th collection date, the entire order of Cladocera was absent from the CSSC collections. Similarly, the November 29, 2014 collection (at Western Avenue) was also total void of the order of Cladocera. As mentioned in the response to Comment 1, the primary food source for Cladocerans (single celled algae, phytoplankton) is also absent from the waterway during the winter months, making the presence of free swimming adult Cladocerans during these months unlikely. The available data does not support the U.S. EPA hypothesis that *Ceriodaphnia* are present in the winter months in the CSSC.

7. Comment. EPA questions deletion of the *Sphaerium* GMAV since information suggests that *Sphaerium* and/or other untested genera of fingernail clams occur at the site, and also questions deletion of the *Lampsilis* GMAV since little information is available to document that this species or other untested species of mussels do not occur at the site.

7. Response. Please see response 1b and 1c in this document. There are no records of native freshwater mussels from the CSSC among the thousands of museum records in various databases. The physical habitat of the CSSC is simply not conducive to the establishment of the *Lampsilis* mussel or the vast majority of other native mussels.

8. Comment. EPA continues to question rejection of rotifer data since evidence suggests that rotifers are present in the waterway and information documenting their absence in winter is lacking.

8. Response. Rotifers are known to overwinter in thick shelled, protective eggs that are tolerant of physical and chemical environmental extremes. The U.S. EPA indicated the winter chloride calculations should include the rotifer genus *Brachionus* spp. because they are a resident species. The genus of rotifers, *Brachionus* spp. are known to be present in the CSSC from previous studies, and have also been collected in the H&H 2014 plankton collections.

A study conducted on multiple stations of the Chicago Area Waterway System (CAWS) and Illinois River by Havera et al. (1980) contains sections on plankton findings including rotifers. Havera et al. list ten species of rotifers in the genus *Brachionus* found during their studies, including one oligohaline variety, *B. plicatilis.* The rotifer *B. plicatilis* was found by Havera in

the LaGrange Pool, Dresden Lock and Dam, and Starved Rock Pool. Butler (2013) has found *Brachionus* sp. in the CSSC during 2010-2012. *Brachionus* and some of the other rotifers can be difficult to separate into species due to the morphological plasticity within the species (Ansari et al. 2014, Athibi et al. 2013).

As no authority has identified to the species level the *Brachionus* spp. found in the CSSC, the rotifers present in the CSSC would likely be a mixture of species which includes *B. plicatilis (Havera, op cite.), Drake and Lodge, 2007).* The rotifer *B. plicatilis* is known to actively reproduce in seawater salinities of up to 60,000 milligrams per liter (Lowe et al. 2007). Standard seawater is considered to have a salinity of 34,500 milligrams per liter, with a chloride content of 18,980 milligrams per liter (Sverdrup et al. 1942).

All members of a genus used in a site specific re-calculation should be included in the calculations to obtain a *Genus Mean Acute Value* (Stephen et al. 1985). Inclusion of *B. plicatilis* would yield a very high genus mean acute value, making inclusion of rotifers not essential for a re-calculation of winter chloride standards for the CSSC. The resultant GMAV would result in **higher** derived water quality criteria for winter chloride.

9. Comment. U.S. EPA questions use of a *Musculium* GMAV value that is not normalized to the appropriate hardness concentration.

9. Response. *Musculium* has an acute toxicity value of 1,930 mg/L for chlorides at a low hardness of 48 mg/L. Adjusting this hardness to the critical hardness found in the Lower CSSC yields an adjusted acute value of 2,259 mg/L for *Musculium*, which **increases** the proposed winter chloride water quality criteria.

10. Comment. U.S. EPA questions the appropriateness of the proposed criteria because (1) the proposed chloride criteria were calculated at a hardness of 300 mg/L, but information in the record suggests that the CAWS and LDPR have hardness concentrations less than or equal to 200 mg/L; and, (2) appropriate duration and frequency of the criteria are not included in the proposal. U.S. EPA recommended that the Board consider each of those points in determining whether there is a sound scientific rationale for the proposed site-specific winter criteria for the CSSC and whether the proposed site-specific winter criteria are protective of designated aquatic life uses.

10. Response. The EPA is correct that the derivation of the water quality criteria were not adjusted for hardness; however, they are not correct that the derivations were based on 300 mg/L hardness. Most of the species GMAVs were derived from the Iowa data at 300 mg/L hardness; however, as noted in Response to Comment 9, for the species *Musculium*, the unadjusted hardness used was 48 mg/L.

Huff & Huff has calculated the resultant water quality criteria based on the Illinois critical hardness procedure. First, using the Storet data from December 1 through March 31, from 1999 to 2011, the critical hardness for the CSSC is **238 mg/L**. Attachment D includes the Storet data for the winter months. Sulfate levels in the Lower CSSC are also included in Attachment D. The sulfate water quality data were collected prior to the Lemont Refinery Wet Gas Scrubber came

on line. The mean sulfate concentration before the Wet Gas Scrubber was 92 mg/L in the CSSC, and the Wet Gas Scrubber contribution would be expected to add approximately 10 mg/L. So for the recalculation, the sulfate concentration in the winter of 100 mg/L was used.

The Iowa methodology notes that the Normalized Acute Value (NAV) can be determined from the Acute Value (AV) using the following equation:

$$NAV = AV(300/Hardness)^{0.205797} (65/Sulfate)^{-0.07452}$$

So this same equation can be used to adjust the NAV values to the CSSC critical hardness (228 mg/L) and mean sulfate (100 mg/L) for the winter AV.

$$AV_{CSSC} = NAV\ (228/300)^{0.205797} (100/65)^{-0.07452}$$

Or in the case of the *Musculium*:

$$AV_{CSSC} = AV\ (238/48)^{0.205797} (100/58.9)^{-0.07452}$$

Using this methodology, as presented in Attachment E, the Criterion Maximum Concentration or acute water quality criteria is **1,130 mg/L** and the Criterion Chronic Concentration is **710 mg/L**. Adjusting for hardness increases the criteria, attributed to the *Musculium* test adjustment for hardness.[2] Thus the water quality limits proposed by CITGO and contained in the Board's First Notice has an additional **margin of safety** built into the numbers, based on this most recent analysis.

As to the U.S. EPA other comment regarding appropriate duration and frequency of the criteria, we assume it is referring to the four sample average for the chronic water quality criteria, which is generic to many pollutants under the Illinois regulations. We would simply note that these regulations have been previously approved by U.S. EPA, and if the U.S. EPA wishes to have this part of the regulations amended, it is free to petition the Illinois Pollution Control Board to open up such a docket.

11. **Comment.** U.S. EPA believes the proposed 500 mg/L chloride criterion is scientifically defensible.

11. **Response.** The only *scientifically defensible* rationale in the record is that this is the General Use Standard. Yet at the same time, U.S. EPA argues that the Board's proposal is inappropriate because of the duration and frequency of the criteria. It is very difficult to understand the scientific basis for claiming the single not-to-exceed 500 mg/L limit for chlorides while arguing the CITGO proposal is not based on a scientifically defensible rationale. Our understanding of IEPA's prior testimony in this record is that U.S. EPA would not support a 500 mg/L chloride standard.

[2] If for some reason one didn't adjust for hardness for the Musculium, but adjust downward for the other species, then the CMC is 980 mg/L and the CCC is 610 mg/L. These calculations are also presented in Attachment E.

12. Comment. If the Board opens a new sub docket, then the 1,500 mg/L TDS standard should be retained.

12. Response. The U.S. EPA continues to ignore the central issue. Maintaining the 1,500 mg/L TDS water quality will result in all dischargers on the Chicago Area Waterways to receive **effluent limits** of 1,500 mg/L TDS, whenever the water body is above this value. This is an impossible standard for all dischargers to meet, so if dischargers accept this permit limit, they will be in violation and subject to enforcement, for a situation caused solely by de-icing practices. CITGO has attempted for ten years to address this 1,500 mg/L TDS limit, without resolution. Continued adoption of this standard, when U.S. EPA has previously determined a TDS limit of 1,686 mg/L is protective of aquatic uses and without addressing how NPDES permits are to be issued going forward simply results in gridlock.

13. Comment. U.S. EPA recommends a new total recoverable chronic selenium criterion of 5 ug/L.

13. Response. We know from its Comment 11 that U.S. EPA is not supportive of the four sample average for determining compliance with chronic standards; however, the sound scientific rationale for the chronic selenium limit was not provided, and instead the basis was a statement from a website.

What U.S. EPA has not addressed is what levels of selenium are present on the Chicago Area Waterways. Attachment F, from the MWRDGC Ambient Water Quality Network Data, presents just the CSSC data for 2012. It is apparent from a review of these data that exceedances of the U.S. EPA total selenium of 5 ug/L routinely occur and that most of the selenium appears to be dissolved selenium. So if adopted, then NPDES permits written for dischargers to the Chicago Area Waterways, including the MWRDGC, would have effluent limits of 5 ug/L total selenium, and no one has addressed the economic implications of this.

As selenium in water can be from natural causes, it seems premature to propose a limit that is not currently achieved without understanding the current levels and the contributing sources. Regulating point source discharges, when they may not be the primary source of selenium, makes no sense from a societal perspective, similar to U.S. EPA's suggested approach for chlorides. Further study should be conducted before proposing a water quality limit on selenium at the 5 ug/L level.

We certainly support the Environmental Groups suggestion on selenium that IEPA should begin to measure selenium levels in water bodies and plan on taking something to the Board in the future, if determined appropriate. We would recommend that total and dissolved be measured and some effort to identify sources be included to better understand the control strategy that may be necessary.

Responses to Illinois EPA Comments

1. **Comment.** With respect to chlorides, the Agency notes that the board proposed standard "only helps CITGO, and fails to address the widespread problem with a 500 mg/L standard." The Agency goes on further to recommend maintaining the 1,500 mg/L TDS standard.

1. **Response.** We certainly concur that a 500 mg/L chloride standard under the Agency's current policies will indeed cause "widespread problems." However, IEPA does not provide any technical justification for this reversal of its original and amended proposals for chlorides. CITGO has gone through ten years of variance petitions and seven years in this rulemaking trying to get the implementation of a chloride/TDS effluent limit corrected, and has spent considerable sums of time and money in this effort. Keeping the TDS standard while deferring the chloride standard accomplishes nothing. That is exactly the standards in place now, and CITGO is incapable of getting an NPDES permit without an effluent TDS limit that is impossible to meet. Presumably the on-going permit cycle will impose the exact same impossible 1,500 mg/L TDS effluent limit on all other discharges to the Chicago Area Waterways that exceed 1,500 mg/L. IEPA included in its attachments the percent of the time in the winter months waterways are above 500 mg/L chlorides. A comparison of the percentages of exceedances to CITGO's data would suggest that the Agency is underestimating the percentage of time above 500 mg/L. Similarly, TDS values above 1,500 mg/L are well documented by CITGO in the CSSC, and if others were doing more intensive monitoring would find this to be the case on other Chicago Area Waterways.

   CITGO is fully supportive of the BMP work group, and will actively participate, but this should not be a justification for the calculated chloride water quality standards that have been developed in accordance with 40 CFR 131.

2. **Comment.** "The Agency does not believe that the minimal effort expended on winter collection has sufficiently determined that the species is wholly absent from these water during the winter months."

   2. Response. The Agency is mischaracterizing the information that has been presented, and mischaracterized the efforts made by CITGO. The absence of *Ceriodaphnia* in the winter is also predicated upon the lack of available food source and the cold water temperature. See Response 1a to the U.S. EPA for further discussion. If the Agency believes additional winter collection is appropriate, beyond what CITGO has done and continues to do, certainly they have the resources to do this work.

3. **Comment.** "The Agency is concerned that other organisms closely related to this species (*Ceriodaphnia*) may be present and exhibit similar sensitivity to chloride exposure."

   3. Response. After at least a year since we provided our recalculation analysis to the Agency, it still has yet to identify a single species which is or **may** be present. If these

related species can be specified, then whether they are adequately covered by the existing analysis or whether further analysis is warranted can be determined. We believe that the 23 species covered in our analysis is sufficiently representative of stream organisms.

4. **Comment.** "*Ceriodaphnia dubia* is a common test organism in aquatic toxicology, recognized as a surrogate species for other planktonic crustaceans."

4. Response. The Agency seems to be confusing aquatic bioassays with establishing water quality criteria. Typically only a single fish and the single daphnia are tested for in bioassay studies, as applied to **effluents.** For **water quality criteria**, the methodology here was far more extensive involving 23 species. That *Ceriodaphnia* commonly used in laboratory testing has no relevance as to whether they are present on the Lower CSSC in the winter months.

Works Consulted

ANSARI, Samaneh., Alireza Shayestehfar and Seyed Mehdi Talebi 2014. The Inter and Intrapopulation Variations in Two Species of Genus *Brachionus* (Rotifera), in Iran: An Ecological Review. European Journal of Experimental Biology, 4(1):420-430

ATHIBAI, Sujeephon., Hendrik SEGERS, and La-orsri SANOAMUANG. 2013. Diversity and Distribution of Branchionidae (Rotifera) in Thailand, with a Key to the Species. J. Limnol., 72(s2): 345-360.

Bailey, Sarah A., Ian C. Duggan, Colin D.A. Van Overdjik, Thomas H. Johengen, David F. Reid, and Hugh J. Macisaac. 2004. Salinity tolerance of diapausing eggs of freshwater zooplankton. Freshwater Biology, V49, 286-295.

Bass, David. 2009. A Comparison of Macroinvertebrate Communities and Their Freshwater Habitats in the Cayman Islands. J. Trinidad and Tobago Field Naturalists, 2009.

Butler, Steve. 2013. Personal communication. Unpublished plankton data 2010-2012 (excel) and figures collected by the Illinois Natural History Survey.

Drake, John M., and David M Lodge. 2007. Rate of Species Introductions in the Great Lakes Via Ships Ballast Water and Sediments. Abstract. Canadian Journal of Fisheries and Aquatic Sciences, 64(3): 530-538.

Field Museum Natural History (2014). Mollusca Collection Database. Accessed 12-2-14. http://emuweb.fieldmuseum.org/iz/mollusks.php?

Havera, Stephen P. Frank C. Bellrose, H. Kathleen Archer, Fred Paveglio, Jr., Donald W. Steffeck, Kenneth S. Lubinski, Richard E. Sparks, Warren U. Brigham, Larry Coutant, Stephen Waite, Dee McCormick. 1980. *Projected Effects of Increased Diversion of Lake Michigan Water on the Environment of the Illinois River Valley.* Illinois Natural History Survey. Urbana, IL.

Illinois State Museum. 2014. Unionid (Mussel) Database. Accessed 12-2-14. http://www.museum.state.il.us/ismdepts/zoology/mussels/database.html

INHS. 2014. Illinois natural History Survey Mollusca Database. Accessed 12-2-2014. http://ellipse.inhs.uiuc.edu:591/INHSCollections/mollsearch.html

Kaya, Murat and Sevil Erdogan. 2013. Turkish Journal of Zoology. Morphological examination of the resting egg structure of 3 cladoceran species [*Ceriodaphnia quadrangula* (O. F. Müller, 1785), *Daphnia longispina* (O. F. Müller, 1776), and *D. magna* Straus, 1820].

Kofoid, C.A. 1908. The Plankton of the Illinois River 1894-1899, with Notes Upon the Hydrography of the Illinois River and its Basin. Part II. Constituent Organisms and Their Seasonal Distribution. Bulletin of the Illinois State Laboratory. Vol. VIII. Article I. pp. 1-361.

Lowe, C.D., S. J. Kemp, C. Díaz-Avalos, D. J. S. Montagnes. 2007. How Does Salinity Tolerance Influence the Distributions of *Brachionus plicatilis* sibling species? Mar Biol 150:377–386.

MWRDGC 2011. A Study of the Benthic Macroinvertebrate Community in Selected Chicago Metropolitan Area Waterways During 2009. Prepared for the Metropolitan Water Reclamation District of Greater Chicago by EA Engineering, Science, and Technology, Inc.

Museum of Zoology, University of Michigan. Mollusk Database. 2014. Accessed 12-2-14. http://www.lsa.umich.edu/ummz/Mollusks/collections/default.asp

Ohio State University. 2014. Mollusca Collection Database. Accessed 12-2-14. http://www.biosci.ohio-state.edu/~molluscs/OSUM2/biv_base4.html

Sparks, Richard E. and Frank S. Dillon. 1993. Illinois River Fingernail Clam Toxicity Study. Final Report .Illinois Natural History Survey. Report 93/5.

Stephen, Charles E., Donald I. Mount, David J. Hansen, John R. Gentile, Gary A. Chapman, and William A. Brungs. 1985. Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses. PB85-227049. Washington, D.C.

Sverdrup, H. U., Martin W. Johnson, Richard H. Fleming. 1942. The Oceans Their Physics, Chemistry, and General Biology. Prentice-Hall, Inc.

ATTACHMENT A, continued
PLANKTON COLLECTIONS NEAR LOCKPORT, ILLINOIS AND WESTERN AVENUE, CHICAGO DURING 2014
NUMBERS OF ORGANISMS PER LITER

	Lockport Dock May 5, 2014	Lockport Dock June 6, 2014	Lockport Dock July 9, 2014	Lockport Dock Aug. 22, 2014	Lockport Dock Sept. 23, 2014	Lockport Dock Oct. 29, 2014	Western Avenue Nov. 29, 2014
Cladocera - Water Fleas							
Bosmina longirostris	0	33.9	28.1	10.5	1.7	0	0
Diaphanosoma sp.	0	0	0	0	0.1	0	0
Chydorus cf sphaericus	present	1.0	4	0	0	0	0
Daphnia spp.	0	1.0	0	0	0	0	0
Ceriodaphnia spp.	0	0	0	0	0	0	0
Copepods							
Diacyclops thomasi (bicuspidatus)	....	0	7.9	6.7	....	0	....
Cyclopoid copepods (unidentified)	1.1	0	0	....	0	0	present
unidentified copepod nauplii	0	present	0	0.3	1.2	0.2	present
Rotifers							
Brachionus sp.	1	present	common	common	present	present	0.004
Keratella sp./ and other rotifers	....	abundant	present	common	....	present	present
Other Associates							
Aquatic mites - (Hydrachnida)	present	0	0	0	0	0	0
Plumatella sp. cysts (Bryozoa)	present	present	present	0	0	0	0
Number Diatom species (minimum)	present	present	0	7	present	7	5
Number algae (non-diatom) species	present	present	present	9	abundant	5	5
Ostracods (Ostracoda-Seed Shrimp)	....	0.0	abundant	0.2	0.2	present	0.0
Sponge spicules**	....	0	0	common	present	abundant	present
Arcella sp., shelled ameba	....	0	present	abundant	abundant	abundant	common
fish larvae (Cyprinidae)	....	0	0	present	0	0	0
Asiatic clam veligers/newly transformed	....	....	....	present	present	0	0
zebra mussels ** Dreissena spp.	....	0	0	present	0	0	0
zebra mussel eggs/(veligers)	....	....	....	abundant	present	common	0
snails** Physella gyrina	....	0	0	present	0	0	0
Amphipods, Hyalella sp.	0	0	0	0	0	0	0
Physical & Gear							
Water Temperature °F	51	77	78	77	72	65	48
Dissolved Oxygen in mg/L	....	4.5	6.1	6.5	5.4	9.3	9.4
Conductivity as us/cm	....	....	....	....	560	530	669
pH in pH units	....	....	....	....	7.8	7.9	7.8
Net mesh	55 micron	55 micron	55 micron	55 micron	55 micron	55 micron	55/23 micron
Minimum # mililiters sample examined	6	6	6	6	6	6	6
Tow in feet	250	500	90 L	1000	1500	1500	1500
Cubic feet processed*	55.7	111.4	1.4	223	334	334	334
approximate liters processed	1,569	3,155	90	6308	9462	9462	9426/200
depth of collection in feet	1 to 2	1 to 2	1 to 2	1 to 3	1 to 3	1 to 3	1 to 3

Key: Present = 1-9 organisms, Common = 10-50 organisms, Abundant = > 51 organisms

Counts based on Motodo Plankton Splitter results, readings of one milliliter of water, duplicated then averaged and reported as nearest tenth (0.1) of number

*0.262 ft^2 diameter x 0.85 efficiency of water passage x length of tow

** picked up in net by scraping sheet pile when lifting net from water

Lockport Dock located at RM 292.5, at 41.589813°, -88.067277°, approximately 1.7 miles upstream of Lockport Lock and Dam

Rotifer samples at Western Avenue based upon 200 Liter sample poured through a 23 micron net

Notes: July 9, 2014 - No Diatoms present in collection, few copepods present, many Cladoceran valve fragments present but fragments (from previous dead cladocerans) are unidentifiable

ATTACMENT A
PLANKTON COLLECTIONS NEAR LEMONT and LOCKPORT, ILLINOIS 2013
NUMBERS OF ORGANISMS PER LITER

	Upstream of Lemont Regulated Zone July 12, 2013	Downstream of Lemont Regulated Zone July 12, 2013	Lockport Dock Nov. 18, 2013
Cladocera - Water Fleas			
Bosmina longirostris	152.6	172.6	0.8
Diaphanosoma sp.	5.1	3.5	0
Chydorus cf sphaericus	present	present	present
Daphnia spp.	0	0	0
Ceriodaphnia spp.	0	0	0
Copepods			
Diacyclops thomasi (bicuspidatus)	17.5	22.0	0
Cyclopoid copepods (unidentified)	....	....	0
unidentified copepod nauplii	0	0	0
Rotifers			
Brachionus sp.	net too large	net too large	net too large
Keratella sp./ and other rotifers	....	....	....
Other Associates			
aquatic mites - (Hydrachnida)	present	present	0
Plumatella sp. cysts (Bryozoa)	common	common	common
Number Diatom species (minimum)	net too large	net too large	net too large
Number algae (non-diatom) species	net too large	net too large	net too large
Ostracods (Ostracoda-Seed Shrimp)	....	....	....
Sponge spicules**	....	....	....
Arcella sp., shelled ameba	....	....	....
fish larvae (Cyprinidae)	....	....	....
Asiatic clam veligers/newly transformed	....	....	....
zebra mussels ** Dreissena spp.	....	....	....
zebra mussel eggs/(veligers)	....	....	....
snails** Physella gyrina	....	....	....
Amphipods, Hyalella sp.	0	0	0
Physical & Gear			
Water Temperature °F	53.5	53.5	52.0
Dissolved Oxygen in mg/L	7.5	7.5	....
Conductivity as us/cm	....	....	....
pH in pH units	....	....	....
Net mesh	153 micron	153 micron	153 micron
Approximate % sample examined	2	2	5
Tow in feet	4,000	4,000	500
Cubic feet processed*	891	891	111.4
approximate liters processed	25,230	25,230	3,155
depth of collection in feet	1 to 8	1 to 8	1 to 2

Key: Present = 1-9 organisms, Common = 10-50 organisms, Abundant = > 51 organisms

Counts based on Motodo Plankton Splitter results, readings of one milliliter of water, duplicated then averaged and reported as nearest tenth (0.1) of number

*0.262 ft^2 diameter x 0.85 efficiency of water passage x length of tow

** picked up in net by scraping sheet pile when lifting net from water

Lockport Dock located at RM 292.5, at 41.589813°, -88.067277°, approximately 1.7 miles upstream of Lockport Lock and Dam

Notes: July 9, 2014 - No Diatoms present in collection, few copepods present, many Cladoceran valve fragments present but fragments (from previous dead cladocerans) are unidentifiable

ATTACHMENT B			
DES PLAINES RIVER TDS SAMPLING			
I-55 Bridge		CSSC WATER INTAKE AT LEMONT REFINERY	
	Total Dissolved Solids,		Total Dissolved Solids,
Date	mg/L	Date	mg/L
1/2/2007	600	1/2/07	689
1/3/2007	580		
1/5/2007	440	1/5/07	657
1/8/2007	420	1/9/07	454
1/10/2007	520		
1/12/2007	500	1/12/07	576
1/15/2007	690	1/16/07	632
1/17/2007	620		
1/19/2007	740	1/19/07	662
1/22/2007	750	1/23/07	666
1/24/2007	720		
1/26/2007	710	1/26/07	876
1/29/2007	940	1/30/07	**1,656**
1/31/2007	960		
2/2/2007	860	2/2/07	800
2/5/2007	740	2/6/07	459
2/7/2007	800		
2/9/2007	770	2/9/07	666
2/12/2007	770	2/13/07	619
2/14/2007	710		
2/16/2007	730	2/16/07	532
2/20/2007	700	2/20/07	1,181
2/21/2007	1,000		
2/23/2007	1,100	2/23/07	1,245
2/26/2007	1,200	2/27/07	**1,520**
2/28/2007	**1,300**		
3/2/2007	1,200	3/2/07	1,487
3/5/2007	1,100	3/6/07	1,332
3/7/2007	1,100		
3/9/2007	980	3/9/07	1,076
3/12/2007	1,000	3/13/07	1,131
3/14/2007	1,000		
3/16/2007	870	3/16/07	1,075
3/19/2007	790	3/20/07	950
3/22/2007	790	3/23/07	761
3/26/2007	700	3/27/07	1,170
3/28/2007	720		
3/29/2007	690		
3/30/2007	740	3/30/07	792
Average	**762**	**Average**	**910**
Maximum	**1300**	**Maximum**	**1656**

H:\Client\Citgo\Des Plaines River Sampling 2006\TDS Influent and efflunet from refinery.xls

ATTACHMENT B	
DES PLAINES RIVER TDS SAMPLING	
I-55 Bridge	
	Total Dissolved Solids,
Date	mg/L
1/2/2007	600
1/3/2007	580
1/5/2007	440
1/8/2007	420
1/10/2007	520
1/12/2007	500
1/15/2007	690
1/17/2007	620
1/19/2007	740
1/22/2007	750
1/24/2007	720
1/26/2007	710
1/29/2007	940
1/31/2007	960
2/2/2007	860
2/5/2007	740
2/7/2007	800
2/9/2007	770
2/12/2007	770
2/14/2007	710
2/16/2007	730
2/20/2007	700
2/21/2007	1,000
2/23/2007	1,100
2/26/2007	1,200
2/28/2007	**1,300**
3/2/2007	1,200
3/5/2007	1,100
3/7/2007	1,100
3/9/2007	980
3/12/2007	1,000
3/14/2007	1,000
3/16/2007	870
3/19/2007	790
3/22/2007	790
3/26/2007	700
Average	**817**

H:\Client\Citgo\Des Plaines River Sampling 2006\TDS I-I55 Bridge 2007 .xls

ATTACHMENT C

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 – (217) 782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601 – (312) 814-6026

ROD R. BLAGOJEVICH, GOVERNOR DOUGLAS P. SCOTT, DIRECTOR

217/558-2012

January 24, 2006

Ms. Linda Holst
USEPA Region 5
WQ-16J
77 West Jackson Blvd.
Metcalfe Federal Building
Chicago, IL 60604

RE: ExxonMobil Oil Refinery, Joliet, Site-Specific Water Quality Standard
NPDES Permit No. IL0002861

Dear Ms. Holst:

The subject facility (ExxonMobil) has presented Illinois EPA with a draft petition regarding relief from total dissolved solids standards for the Des Plaines River in both the Secondary Contact and Indigenous Aquatic Life Use and General Use designated use categories. The purpose of this letter is to inform you of the position of Illinois EPA in this matter and to obtain an indication of whether this change in water quality standards is approvable by Region 5 under the Clean Water Act.

The impending site-specific rule-making is necessitated by a change in plant operations. A consent decree between ExxonMobil and USEPA has been signed that requires the company to reduce air emissions. A Wet Gas Scrubber must be constructed at the Joliet refinery. This device will result in an increase of sodium sulfate in the effluent. No sulfate standard currently exists for Secondary Contact Use waters and the 500 mg/L sulfate standard applicable to General Use waters will be met outside a mixing zone. However, the total dissolved solids (TDS) standard of 1,500 mg/L for Secondary Contact waters and 1,000 mg/L for General Use waters cannot be met through use of a mixing zone because the standards are already periodically exceeded. The reason for this is believed to be road salting in the Chicago area. Violations of the TDS standards occur during the winter season. The Illinois mixing zone standard of 35 IAC 302.102(b)(9) prohibits mixing zones where water quality standards are already exceeded.

The Illinois EPA has concluded that ExxonMobil and the water body segment meet the requirements set forth in Section 27(a) of the Illinois Environmental Protection Act for for a site-specific water quality standard for TDS. See 415 ILCS 5/27(a) (2004). Thus, the Agency plans to support a site specific water quality standard for TDS in this case. ExxonMobil is committed to employing a sulfur recovery system that will capture some of the sulfur that would have gone to the wastewater, thereby reducing sulfate (and therefore TDS) as much as possible. All other treatment options are energy intensive. Here as in past cases, Illinois EPA concludes that no alternative exists but to discharge the TDS to waters of the state.

EXHIBIT 2

ExxonMobil has conducted mixing studies, which along with estimations of effluent quality once the new scrubber is operational, allow a prediction of river TDS concentrations. Under conditions of low river flow and high upstream TDS due to road salting, the addition of the proposed higher TDS ExxonMobil effluent will potentially cause the concentration in the river to reach 1,686 mg/L. The highest existing value for the river is 1,595 mg/L, which is predicted to increase by 91 mg/L when the new effluent completely mixes with the river. Under these worst case conditions, the river concentration is not expected to return to the 1,000 mg/L water quality standard until the Des Plaines River receives dilution from other streams. Hence, ExxonMobil will request that the Illinois Pollution Control Board (IPCP) adjust the TDS standard to 1,686 mg/L for the Des Plaines River from their discharge just upstream of the I 55 interstate bridge to the confluence of the Kankakee River. Reviewing the segment of the lower DesPlaines River that is the subject of the Petition for a site-specific water quality standard for TDS, the Agency notes that there are currently no other dischargers in that segment would be expected to desire to take advantage of a site-specific TDS standard—none have an effluent that is anything like what ExxonMobil is proposing to discharge, none are considered a "major" discharger, and none have been under review for needed water quality based effluent limits, either past or present.

No other water quality standards including chloride will be exceeded as a result of the changes at ExxonMobil. The proposed site-specific water quality standard will only be in force during the months when road salt contributes to stream TDS, November through April. During the remainder of the year, mixing alone will allow the general standards to be met. As you are aware, Illinois EPA is endeavoring to delete the existing TDS standard from IPCB regulations. Given that existing chloride and sulfate standards will be met, the TDS standard is not in of itself a good indicator of water quality. Aquatic life toxicity data verify that under the conditions predicted below the discharge, no adverse impact is anticipated. Since the consent decree involves a date certain for operation of the air scrubber, the site-specific water quality standard must be sought immediately.

In conclusion, Illinois EPA supports the draft site-specific water quality standard proposed by ExxonMobil. We would like to proceed before the Board as soon as possible. Tentative approval from Region 5 is requested. We are expecting a final draft of the petition from ExxonMobil very soon and we will forward it to you as soon as it becomes available. Scott Twait can answer any questions you may have at the letterhead phone number.

Sincerely,

Robert Mosher. Manager
Water Quality Standards Section
Bureau of Water

ATTACHMENT C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 24 2006

REPLY TO THE ATTENTION OF:
WQ-16J

Mr. Robert Mosher
Water Quality Standards
Division of Water Pollution Control
Illinois Environmental Protection Agency
PO Box 19276
Springfield, IL 62794-9276

Dear Mr. Mosher:

Thank you for your January 24, 2006, letter to the United States Environmental Protection Agency (USEPA) regarding a proposed site-specific rule making to revise the total dissolved solids (TDS) standard for portions of the Lower Des Plaines River affected by the ExxonMobil Oil Refinery at Joliet, Illinois. In your letter, you requested that USEPA evaluate the information contained in the letter and provide a preliminary evaluation of whether or not the proposed site-specific rule making described in the letter would be consistent with the Clean Water Act (CWA) and Federal regulations if it were to be adopted by the Illinois Pollution Control Board (IPCB) and submitted to USEPA for review and approval.

For USEPA to further understand the proposed site-specific rule, a Petition for a Site-specific Rule water quality change was sent to Linda Holst from Tom Andryk, Assistant Counsel for Illinois Environmental Protection Agency (Illinois EPA) dated March 16, 2006. This was followed by a phone conversation on March 29, 2006, between Illinois EPA and USEPA and an email sent the same day explaining the recalculation procedure used to arrive at the proposed site-specific TDS standard (enclosed).

Summary of the proposed site-specific rule making

Under the conditions of a consent decree between USEPA and ExxonMobil, ExxonMobil is required to reduce its air emissions. To comply with the consent decree, Exxon Mobil intends to install wet gas scrubbers. As a result of the new air pollution controls, the concentrations of sodium sulfate in the wastewater discharge from the refinery will increase. ExxonMobil is seeking a site-specific standard change of the TDS standard for the Lower Des Plaines River from 1500 mg/L upstream of the I-55 bridge and 1000 mg/L downstream of the I-55 bridge to 1686 mg/L from the point of discharge to the confluence with the Kankakee River during the months of November to April. According to the letter, the applicable secondary contact and general use water quality standard cannot be met under winter low flow conditions because of high upstream TDS loads resulting from road salting. The letter indicates that even without the additional TDS loading from ExxonMobil due to the wet gas scrubber effluent, the highest observed ambient TDS concentration in the segment is 1595 mg/L; greater than either of the

Agency Ex F

ATTACHMENT D
CHICAGO SANITARY AND SHIP CANAL /
DES PLAINES RIVER
SULFATE, mg/L

Date	Lockport Forebay Chicago S&S Canal	Jefferson Street Des Plaines River	Empress Casino Des Plaines River	I-55 Bridge Des Plaines River
1/4/2001	115	114	114	
1/11/2001	121	113	114	112
1/18/2001	131	130	133	
1/25/2001	120	121	129	127
2/1/2001	123	124	121	115
2/8/2001	99	95	99	100
2/15/2001	93	82	74	87
2/22/2001	112	103	99	
3/1/2001	85	78	77	
3/8/2001	112	97	106	92
3/15/2001	117	115	117	112
3/22/2001	103	94	103	99
3/29/2001	119	112	118	106
4/5/2001	126	118	127	126
4/12/2001	109	108	105	
4/19/2001	87	81	96	96
4/26/2001	83	77	82	89
5/3/2001	123	110	110	110
5/10/2001	123	120	124	122
5/17/2001	84	83	92	93
5/24/2001	102	93	94	98
5/31/2001	77	74	76	72
6/7/2001	101	82	90	
6/14/2001	93	86	97	92
6/21/2001	75	70	85	86
6/28/2001	86	85	88	85
7/5/2001	95	96	86	89
7/12/2001	67	69	81	82
7/19/2001	83	82	92	87
7/26/2001	66	65	65	70
8/2/2001	69	69	69	
8/9/2001	82	78	86	
8/16/2001	73	82	88	94
8/23/2001	71	68	76	87
8/30/2001	67	67	70	
9/6/2001	63	63	64	67
9/13/2001	77	82	84	
9/20/2001	62	65	70	
9/27/2001	64	62	64	
10/4/2001	65	64	68	64
10/11/2001	70	73	80	
10/15/2001	46			
10/18/2001	62	57	61	
10/25/2001	64	57	61	
11/1/2001	79	77	87	
11/8/2001	104	100	102	
11/15/2001	98	101	101	
11/19/2001	96			

ATTACHMENT D
CHICAGO SANITARY AND SHIP CANAL /
DES PLAINES RIVER
SULFATE, mg/L

Date	Lockport Forebay Chicago S&S Canal	Jefferson Street Des Plaines River	Empress Casino Des Plaines River	I-55 Bridge Des Plaines River
11/20/2001	93	92	92	
11/29/2001	96	92	99	
12/6/2001	93	89	94	
12/13/2001	95	94	91	
12/20/2001	103	98	99	
12/27/2001	95	95	99	
1/14/2002	99			
1/22/2002	104			
1/28/2002	107			
2/4/2002	107			
2/11/2002	98			
2/19/2002	98			
2/25/2002	104			
3/4/2002	115			
3/11/2002	83			
3/18/2002	107			
3/25/2002	119			
4/1/2002	119			
4/8/2002	89			
4/15/2002	90			
4/22/2002	107			
4/29/2002	104			
5/6/2002	100			
5/13/2002	60			
5/20/2002	94			
5/28/2002	106			
6/3/2002	103			
6/10/2002	85			
6/17/2002	85			
6/24/2002	84			
7/1/2002	89			
7/8/2002	76			
7/15/2002	75			
7/22/2002	77			
7/29/2002	69			
AVERAGE	**92**	**89**	**92**	**95**
MAXIMUM	**131**	**130**	**133**	**127**

H:\Client\Citgo\UAA\2014\Response to USEPA\[ATTACHMENT D SULFATE DATA.xls]Sulfate

ATTACHMENT D
WINTER HARDNESS DATA ON THE CSSC AT STATION GI 02

Parameter	HARDNESS, CA,MG mg/l
Site	GI 02

START_DATE	ResultValue	Unit
12/9/1999	164	mg/l
1/18/2000	212	mg/l
1/18/2000	220	mg/l
2/22/2000	349	mg/l
3/23/2000	245	mg/l
3/23/2000	249	mg/l
12/5/2000	235	mg/l
12/5/2000	234	mg/l
1/12/2001	260	mg/l
1/12/2001	263	mg/l
3/21/2001	299	mg/l
12/6/2001	240	mg/l
1/9/2002	263	mg/l
2/22/2002	317	mg/l
01/17/2003	244	mg/l
03/03/2003	228	mg/l
12/18/2003	243	mg/l
02/18/2004	260	mg/l
03/16/2004	290	mg/l
12/02/2004	230	mg/l
01/10/2005	290	mg/l
03/01/2005	320	mg/l
12/28/2005	240	mg/l
3/1/2006	270	mg/l
3/21/2006	280	mg/l
12/6/2006	270	mg/l
1/18/2007	240	mg/l
2/28/2007	240	mg/l
3/26/2007	300	mg/l
3/25/2008	321	mg/l
02/17/2009	264	mg/l
03/23/2009	354	mg/l
12/01/2009	247	mg/l
01/21/2010	280	mg/l
03/15/2010	271	mg/l
12/16/2010	217	mg/l
03/08/2011	258	mg/l
12/07/2011	223	mg/l
25 PERCENTILE HARDNESS	**238**	**mg/L**

ATTACHMENT E: TABLE 9
CHLORIDE GENUS and SPECIES MEAN ACUTE VALUES (GMAV, SMAV)
FOR TAXA WITH PRESENCE IN CHICAGO SANITARY & SHIP CANAL
NEAR LOCKPORT, ILLINOIS-MUSCULIUM TOXICITY ADJUSTED TO CRITICAL HARDNESS

Rank, R	Genus	species	Site-Specific SMAV (mg/L)	Site-Specific GMAV (mg/L)	Cumulative Probability, P	Species Present	Genus Present	Family Present	Order Present	Class Present	Reference SMAV (mg/L)	Reference GMAV (mg/L)	Reference Hardness (mg/L as $CaCO_3$)	Reference Sulfate (mg/L)	Reference
23	Crayfish,	*Cambarus sp.*	14,830	14,829	0.9583	Yes					16,203	16,203	300	65.0	Stephan 2009
22	Plains killifish	*Fundulus kansae*	13,634	13,634	0.9167						14,897	14,897	300	65.0	Stephan 2009
21	Dragonfly,	*Libellulidae*	13,585	13,585	0.8750	No	No	No	No	Yes	14,843	14,843	300	65.0	Stephan 2009
20	Mosquitofish,	*Gambusia affinis*	9,091	9,091	0.8333	Yes					9,933	9,933	300	65.0	Stephan 2009
19	Green sunfish,	*Lepomis cyanellus*	9,129	8,381	0.7917	Yes					9,975	9,157	300	65.0	Stephan 2009
18	Red shiner,	*Notropis lutrensis*	8,211	8,211	0.7500	No	Yes				8,971	8,971	300	65.0	Stephan 2009
17	Rainbow trout,	*Oncorhynchus mykiss*	7,361	7,361	0.7083	No	No	No	Yes		8,043	8,043	300	65.0	Stephan 2009
16	Black bullhead,	*Ameiurus melas*	6,812	6,811	0.6667	No	Yes				7,442	7,442	300	65.0	Stephan 2009
15	Fathead minnow,	*Pimephales promelas*	5,963	5,963	0.6250	No	Yes				6,515	6,515	300	65.0	Stephan 2009
14	Tubificid worm,	*Tubifex tubifex*	5,691	5,692	0.5833	Yes					6,219	6,219	300	65.0	Stephan 2009
13	Bannerfin shiner,	*Cyprinella leedsi*	5,593	5,593	0.5417	No		Yes			6,111	6,111	300	65.0	Stephan 2009
12	Midge,	*Chironomus dilutus*	5,557	5,557	0.5000	Yes					6,072	6,072	300	65.0	Stephan 2009
11	Bullfrog (tadpole),	*Lithobates (Rana) catesbeiana*	5,397	5,397	0.4583	No	Yes				5,897	5,897	300	65.0	Stephan 2009
10	Aquatic worm,	*Lumbriculus variegatus*	4,983	4,983	0.4167	No	Yes				5,444	5,444	300	65.0	Stephan 2009
9	Amphipod,	*Hyalella azteca*	4,647	4,648	0.3750	Yes					5,078	5,078	300	65.0	Stephan 2009
8	Leech,	*Nephelopsis obscura*	3,999	3,999	0.3333	No	No	No	Yes		4,369	4,369	300	65.0	Stephan 2009
7	Copepod,	*Diaptomus clavipes*	3,612	3,611	0.2917	No	Yes				3,946	3,946	300	65.0	Stephan 2009
6	Isopod,	*Lirceus fontinalis*	3,561	3,561	0.2500	No	No	Yes			3,891	3,891	300	65.0	Stephan 2009
5	Snail,	*Gyraulus parvus*	3,412	3,412	0.2083	No	No	Yes			3,728	3,728	300	65.0	Stephan 2009
4	Snail,	*Physa gyrina*	3,066	3,066	0.1667	Yes					3,350	3,350	300	65.0	Stephan 2009
3	Mussel,	*Villosa delumbis*	3,497	2,824	0.1250	No	No	No	No	Yes	3,821	3,086	300	65.0	Stephan 2009
2	Fingernail clam,	*Musculium* sp.	2,557	2,557	0.0833	Yes					1,930	1,930	48	58.9	Soucek 2011
1	Cladoceran,	*Daphnia ambigua*	1,510	2,129	0.0417	No	Yes, August and September				1,650	2,326	300	65.0	Stephan 2009

GMAV = Genus Mean Acute Value, SMAV = Species Mean Acute Value

Number of Data Points, N = 23
Cumulative Probability, P = R / (N + 1)

Notes:

a) GMAVs referenced from Stephan (2009) were normalized to a reference hardness concentration of 300 mg/L and reference sulfate concentration of 65 mg/L. The regression equation used by Stephan to normalize the GMAVs was used to adjust the reference GMAVs to the following site specific value of hardness and sulfate:

Site-Specific Critical Hardness (mg/L)	**228**
Site-Specific Sulfate (mg/L)	**100**

The following equation provides GMAV for chloride as a function of hardness and sulfate concentration (all units are mg/L):

$$GMAV = (Ref\text{-}GMAV) * (Hardness / Ref\text{-}Hardness)^{0.205797} * (Sulfate / Ref\text{-}Sulfate)^{-0.07452}$$

b) The fingernail clam *Musculium sp.* GMAV reference provides only the LC50 at only 48 mg/L hardness. The regression equation used in Stephan (2009) is based on a data set which included the fingernail clam *Sphaerium sp.* The regression equation was applied to the *Musculium sp.* for estimation of the site-specific GMAV.

ATTACHMENT E: TABLE 10
RECALCULTION VALUES FOR
CHICAGO SANITARY AND SHIP CANAL MUSCULIUM TOXICITY ADJUSTED TO CRITICAL HARDNESS

Rank	Site-Specific[a,b] GMAV	Type, Genus species	Cumulative Probability, P	$Ln(GMAV)^2$	Ln(GMAV)	$P^{1/2}$
4	3,066	Snail, *Physa gyrina*	0.1667	64.451	8.028	0.408
3	2,824	Mussel, *Villosa delumbis*	0.1250	63.140	7.946	0.354
2	2,557	Fingernail clam, *Musculium* sp.	0.0833	61.567	7.846	0.289
1	2,129	Cladoceran, *Daphnia ambigua*	0.0417	58.727	7.663	0.204
			Σ P	**Σ ($ln(GMAV)^2$)**	**Σ ln(GMAV)**	**Σ $P^{1/2}$**
			0.417	**247.885**	**31.484**	**1.255**
					$(\Sigma ln(GMAV))^2/4$	**$(\Sigma P^{1/2})^2/4$**
					247.811	**0.394**

$S^2 = [\Sigma (ln(GMAV)^2) - (\Sigma ln(GMAV))^2/4] / [\Sigma P - (\Sigma P^{1/2})^2/4]$

$S^2 = [S(\Sigma P^{1/2})]^2 = [247.885 - 247.811] / [0.417 - 0.394]$

$S^2 = [S(\Sigma P^{1/2})]^2 = 3.197$

$S = S(\Sigma P^{1/2}) = 1.788$

$L = [\Sigma ln(GMAV) - S^*(\Sigma P1/2)] / 4$

$L = [31.484 - 1.788*1.255] / 4$

$L = 7.310$

$A = S^*(0.05)^{1/2} + L$

$A = 1.788*0.05\text{^}(1/2) + 7.31$

$A = 7.710$

$FAV = e^A = exp(A)$

$FAV = exp(7.71)$

$FAV = 2,231$

FCV = Chronic Toxicity =FAV / ACR

ACR for invertebrates is 3.178

FCV = 702

	Rounded Values
Criterion Max Concentration (CMC) = FAV/2= 1115 mg/L	**1120 mg/L**
Criterion Chronic Concentration (CCC) = FCV= 702 mg/L	**700 mg/L**

ATTACHMENT E: TABLE 9
CHLORIDE GENUS and SPECIES MEAN ACUTE VALUES (GMAV, SMAV)
FOR TAXA WITH PRESENCE IN CHICAGO SANITARY & SHIP CANAL
NEAR LOCKPORT, ILLINOIS - NO ADJUSTMENT FOR MUSCULIUM FOR HARDNESS

Rank, R	Genus	species	Site-Specific SMAV (mg/L)	Site-Specific GMAV (mg/L)	Cumulative Probability, P	Species Present	Genus Present	Family Present	Order Present	Class Present	Reference SMAV (mg/L)	Reference GMAV (mg/L)	Reference Hardness (mg/L as $CaCO_3$)	Reference Sulfate (mg/L)	Reference
23	Crayfish, *Cambarus sp.*		14,830	14,829	0.9583	Yes					16,203	16,203	300	65.0	Stephan 2009
22	Plains killifish *Fundulus kansae*		13,634	13,634	0.9167						14,897	14,897	300	65.0	Stephan 2009
21	Dragonfly, *Libellulidae*		13,585	13,585	0.8750	No	No	No	No	Yes	14,843	14,843	300	65.0	Stephan 2009
20	Mosquitofish, *Gambusia affinis*		9,091	9,091	0.8333	Yes					9,933	9,933	300	65.0	Stephan 2009
19	Green sunfish, *Lepomis cyanellus*		9,129	8,381	0.7917	Yes					9,975	9,157	300	65.0	Stephan 2009
18	Red shiner, *Notropis lutrensis*		8,211	8,211	0.7500	No	Yes				8,971	8,971	300	65.0	Stephan 2009
17	Rainbow trout, *Oncorhynchus mykiss*		7,361	7,361	0.7083	No	No	No	Yes		8,043	8,043	300	65.0	Stephan 2009
16	Black bullhead, *Ameiurus melas*		6,812	6,811	0.6667	No	Yes				7,442	7,442	300	65.0	Stephan 2009
15	Fathead minnow, *Pimephales promelas*		5,963	5,963	0.6250	No	Yes				6,515	6,515	300	65.0	Stephan 2009
14	Tubificid worm, *Tubifex tubifex*		5,691	5,692	0.5833	Yes					6,219	6,219	300	65.0	Stephan 2009
13	Bannerfin shiner, *Cyprinella leedsi*		5,593	5,593	0.5417	No		Yes			6,111	6,111	300	65.0	Stephan 2009
12	Midge, *Chironomus dilutus*		5,557	5,557	0.5000	Yes					6,072	6,072	300	65.0	Stephan 2009
11	Bullfrog (tadpole), *Lithobates (Rana) catesbeiana*		5,397	5,397	0.4583	No	Yes				5,897	5,897	300	65.0	Stephan 2009
10	Aquatic worm, *Lumbriculus variegatus*		4,983	4,983	0.4167	No	Yes				5,444	5,444	300	65.0	Stephan 2009
9	Amphipod, *Hyalella azteca*		4,647	4,648	0.3750	Yes					5,078	5,078	300	65.0	Stephan 2009
8	Leech, *Nephelopsis obscura*		3,999	3,999	0.3333	No	No	No	Yes		4,369	4,369	300	65.0	Stephan 2009
7	Copepod, *Diaptomus clavipes*		3,612	3,611	0.2917	No	Yes				3,946	3,946	300	65.0	Stephan 2009
6	Isopod, *Lirceus fontinalis*		3,561	3,561	0.2500	No	No	Yes			3,891	3,891	300	65.0	Stephan 2009
5	Snail, *Gyraulus parvus*		3,412	3,412	0.2083	No	No	Yes			3,728	3,728	300	65.0	Stephan 2009
4	Snail, *Physa gyrina*		3,066	3,066	0.1667	Yes					3,350	3,350	300	65.0	Stephan 2009
3	Mussel, *Villosa delumbis*		3,497	2,824	0.1250	No	No	No	No	Yes	3,821	3,086	300	65.0	Stephan 2009
2	Cladoceran, *Daphnia ambigua*		1,510	2,129	0.0833	No	Yes, August and September				1,650	2,326	300	65.0	Stephan 2009
1	Fingernail clam, *Musculium* sp.		1,930	1,930	0.0417	Yes					1,930	1,930	48	58.9	Soucek 2011

GMAV = Genus Mean Acute Value, SMAV = Species Mean Acute Value

Number of Data Points, N = 23
Cumulative Probability, P = R / (N + 1)

Notes:

a) GMAVs referenced from Stephan (2009) were normalized to a reference hardness concentration of 300 mg/L and reference sulfate concentration of 65 mg/L. The regression equation used by Stephan to normalize the GMAVs was used to adjust the reference GMAVs to the following site specific value of hardness and sulfate:

Site-Specific Critical Hardness (mg/L)	**228**
Site-Specific Sulfate (mg/L)	**100**

The following equation provides GMAV for chloride as a function of hardness and sulfate concentration (all units are mg/L):

$$GMAV = (Ref\text{-}GMAV) * (Hardness / Ref\text{-}Hardness)^{0.205797} * (Sulfate / Ref\text{-}Sulfate)^{-0.07452}$$

b) The fingernail clam *Musculium sp.* GMAV reference provides only the LC50 at only 48 mg/L hardness. The regression equation used in Stephan (2009) is based on a data set which included the fingernail clam *Sphaerium sp.* The regression equation was not applied to the *Musculium sp.* for estimation of the site-specific GMAV.

ATTACHMENT E: TABLE 10
RECALCULTION VALUES FOR
CHICAGO SANITARY AND SHIP CANAL - NO ADJUSTMENT FOR HARDNESS FOR MUSCULIUM

Rank	Site-Specific[a,b] GMAV	Type, Genus species	Cumulative Probability, P	$Ln(GMAV)^2$	Ln(GMAV)	$P^{1/2}$
4	3,066	Snail, *Physa gyrina*	0.1667	64.451	8.028	0.408
3	2,824	Mussel, *Villosa delumbis*	0.1250	63.140	7.946	0.354
2	2,129	Cladoceran, *Daphnia ambigua*	0.0833	58.727	7.663	0.289
1	1,930	Fingernail clam, *Musculium* sp.	0.0417	57.233	7.565	0.204
			Σ P	**Σ ($ln(GMAV)^2$)**	**Σ ln(GMAV)**	**Σ $P^{1/2}$**
			0.417	**243.551**	**31.203**	**1.255**
					$(\Sigma ln(GMAV))^2/4$	**$(\Sigma P^{1/2})^2/4$**
					243.403	**0.394**

$S^2 = [\Sigma (ln(GMAV)^2) - (\Sigma ln(GMAV))^2/4] / [\Sigma P - (\Sigma P^{1/2})^2/4]$

$S^2 = [S(\Sigma P^{1/2})]^2 = [243.551 - 243.403] / [0.417 - 0.394]$

$S^2 = [S(\Sigma P^{1/2})]^2 = 6.353$

$S = S(\Sigma P^{1/2}) = 2.521$

$L = [\Sigma ln(GMAV) - S*(\Sigma P1/2)] / 4$

$L = [31.203 - 2.521*1.255] / 4$

L = 7.010

$A = S*(0.05)^{1/2} + L$

A = 2.521*0.05^(1/2) + 7.01

A = 7.574

$FAV = e^A = exp(A)$

FAV = exp(7.574)

FAV = 1,946

FCV = Chronic Toxicity =FAV / ACR

ACR for invertebrates is 3.178

FCV = 612

	Rounded Values
Criterion Max Concentration (CMC) = FAV/2= 973 mg/L	**970 mg/L**
Criterion Chronic Concentration (CCC) = FCV= 612 mg/L	**610 mg/L**

ATTACHMENT F
ALL SELENIUM VALUES FOR 2012, CHICAGO SANITARY & SHIP CANAL
FROM METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO RESULTS

MWRDGC Site #	17		18		19	
Site Description	River Mile 302.6		Romeoville Road		Lockport Powerhouse	
Tested For	Se total,	Se dissolved,	Se total,	Se dissolved,	Se total,	Se dissolved,
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
January 9, 2012	**0.008**	**0.007**	<0.005	<0.005	**0.006**	<0.005
February 6, 2012	**0.007**	<0.005	0.005	<0.005	**0.006**	0.005
March 5, 2012	0.005	0.005	<0.005	**0.008**	<0.005	**0.006**
April 2, 2012	<0.005	<0.005	0.005	**0.006**	<0.005	<0.005
May 7, 2012	<0.005	....	<0.005	....	<0.005	....
June 4, 2012	<0.005	....	<0.005	....	**0.007**	....
July 9, 2012	<0.005	....	<0.005	....	<0.005	....

Source: MWRDGC. Ambient Water Quality Monitoring Network Data for 2012

EXHIBIT C

CERTIFICATE OF SERVICE

I, the undersigned, certify that on December 12, 2014, I served electronically the attached RESPONSIVE COMMENTS OF LEMONT REFINERY ON FIRST NOTICE OPINION AND ORDER upon the following:

John Therriault, Clerk
Pollution Control Board
James R. Thompson Center
100 West Randolph St., Suite 11-500
Chicago, IL 60601

and by U.S. Mail, first class postage prepaid, to the following persons:

Marie Tipsord, Hearing Officer
Illinois Pollution Control Board
James R. Thompson Center
100 W. Randolph St., Suite 11-500
Chicago, IL 60601

Stefanie N. Diers, Assistant Counsel
Illinois Environnemental Protection Agency
1021 N. Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

SEE ATTACHED SERVICE LIST

/s/ Jeffrey C. Fort
Jeffrey C. Fort

SERVICE LIST

Frederick M. Feldman, Esq.
Margaret T. Conway
Ronald M. Hill
Metropolitan Water Reclamation District
100 East Erie Street
Chicago, IL 60611

Matthew J. Dunn-Chief
Susan Hedman
Office of the Attorney General
Environmental Bureau North
69 West Washington Street, Suite 1800
Chicago, IL 60602

Roy M. Harsch
Drinker Biddle & Reath
191 N. Wacker Drive, Suite 3700
Chicago, IL 60606-1698

Bernard Sawyer
Thomas Granto
Metropolitan Water Reclamation District
6001 W. Pershing Road
Cicero, IL 60650-4112

Claire Manning
Brown Hay & Stephens LLP
700 First Mercantile Bank Blvd.
205 S. Fifth St., P.O. Box 2459
Springfield, IL 62705-2459

Lisa Frede
Chemical Industry Council of Illinois
1400 E. Touhy Ave.
Suite 110
Des Plaines, IL 60018

Fredric Andes
Erika Powers
Barnes & Thornburg
1 N. Wacker Dr., Suite 4400
Chicago, IL 60606

Katherine D. Hodge
Matthew C. Read
N. LaDonna Driver
Hodge Dwyer & Driver
3150 Roland Avenue
P.O. Box 5776
Springfield, IL 62705-5776

James L. Daugherty-District Manager
Thorn Creek Basin Sanitary District
700 West End Avenue
Chicago Heights, IL 60411

Erin L. Brooks
Bryan Cave LLP
211 North Broadway, Suite 3600
St. Louis, MO 63102

Jessica Dexter
Environmental Law & Policy Center
35 E. Wacker Dr., Suite 1600
Chicago, IL 60601

Keith Harley
Elizabeth Schenkier
Chicago Legal Clinic, Inc.
211 West Wacker Drive, Suite 750
Chicago, IL 60606

Robert VanGyseghem
City of Geneva
1800 South St.
Geneva, IL 60134-2203

Frederick D. Keady, P.E.-President
Vermillion Coal Company
1979 Johns Drive
Glenview, IL 60025

Cindy Skrukrud
Jerry Paulsen
McHenry County Defenders
110 S. Johnson Street, Suite 106
Woodstock, IL 60098

W.C. Blanton
Husch Blackwell LLP
4801 Main St., Suite 1000
Kansas City, MO 64112

Dr. Thomas J. Murphy
2325 N. Clifton St.
Chicago, IL 60614

Stacy Meyers-Glen
Openlands
25 E. Washington, Suite 1650
Chicago, IL 60602

Lyman Welch
Alliance for the Great Lakes
150 N. Michigan Ave.
Suite 700
Chicago, IL 60601

James Huff-President
Huff & Huff, Inc.
915 Harger Road, Suite 330
Oak Brook, IL 60523

Kenneth W. Liss
Andrews Environmental Engineering
3300 Ginger Creek Drive
Springfield, IL 62711

Albert Ettinger
Environmental Law & Policy Center
53 W. Jackson, Suite 1664
Chicago, IL 60604

Mark Schultz
Navy Facilities and Engineering Command
201 Decatur Avenue Building 1A
Great Lakes, IL 60088-2801

Irwin Polls
Ecological Monitoring and Assessment
3206 Maple Leaf Drive
Glenview, IL 60025

James E. Eggen
City of Joliet,
Director of Public Works & Utilities
150 W. Jefferson St.
Joliet, IL 60431

Jack Darin
Sierra Club, Illinois Chapter
70 E. Lake St., Suite 1500
Chicago, IL 60601-7447

Kay Anderson
American Bottoms RWTF
One American Bottoms Road
Sauget, IL 62201

Susan Charles
Thomas W. Dimond
Ice Miller LLP
200 West Madison Street, Suite 3500
Chicago, IL 60606

Vicky McKinley
Evanston Environment Board
223 Grey Avenue
Evanston, IL 60202

Kristen Laughridge Gale
Susan M. Franzetti
Nijman Franzetti LLP
10 South LaSalle St.
Suite 3600
Chicago, IL 60603

Ann Alexander, Senior Attorney
Natural Resources Defense Council
20 N. Wacker Drive, Suite 1600
Chicago, IL 60606

Bob Carter
Bloomington Normal Water Reclamation
P.O. Box 3307
Bloomington, IL 61711

Jared Policicchio
Chicago Department of Law
30 N. LaSalle Street
Suite 1400
Chicago, IL 60602

83502156\V-9