

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

THE PHILLIPS 66 COMPANY,)	
Petitioner,)	
)	
v.)	PCB 12-101
)	(Permit Appeal – Water)
)	
ILLINOIS ENVIRONMENTAL)	
PROTECTION AGENCY,)	
Respondent)	

NOTICE OF FILING

TO: Illinois Environmental Protection Agency	Rachel R. Medina
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I filed with the Clerk of the Pollution Control Board of the State of Illinois, James R. Thompson Center, 100 W. Randolph St., Suite 11-500, Chicago, IL 60601, **Brief in Response to Petitioner’s Reply Brief**, a copy of which is herewith served upon you.

Respectfully submitted,

/s/ David L. Rieser

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CERTIFICATE OF SERVICE

I, David L. Reiser, an attorney, hereby certify that on January 14, 2013, I served the foregoing **Brief in Response to Petitioner's Reply Brief** upon those listed below via the Illinois Pollution Control Board Clerk's Office Online (COOL) electronic filing system and via U.S. mail to:

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BRIEF IN RESPONSE TO PETITIONER'S REPLY BRIEF

The Phillips 66 Company, ("Phillips") through its attorneys, Much Shelist, P.C. files this brief in response to Respondent's Reply Brief ("Reply") filed on December 31, 2012. The Reply does nothing to disprove Phillips' arguments in its initial Post-Hearing Brief ("Brief") that the Agency's determination to deny Phillips' request for a mixing zone for mercury was arbitrary and capricious and that a permit with a mixing zone for mercury and without a mass limit could be issued consistent with the Illinois Environmental Protection Act ("Act") and the Board's regulations. Respondent's Reply merely recites most of Respondent's claims made at the hearing without refuting or rebutting any of Phillips' claims in its Brief. Instead, the Reply attempts to overcome its factual and legal deficits by bringing in information outside of the record and making post hoc rationalizations for Agency decisions. As a result, the Board should grant the relief requested by Phillips.

I. Respondents' contentions regarding mercury are not addressed in the Agency's record and are contradicted by Agency testimony in other proceedings.

Respondents' claims regarding mercury were the focal point of its case in support of its decision. Bob Mosher testified that even small amounts of mercury discharged by Phillips might

have a significant impact on the environment. He claims that Phillips erred in relying on IEPA monitoring data and failed to show that the ambient water quality was already compliant with the Board's human health water quality standard for mercury. Respondent then used this information in its Reply to argue that the exorbitant costs of mercury treatment were reasonable in light of the potential for environmental harm and that Phillips was not entitled to a mixing zone because it failed to document that the water quality outside of its proposed mixing zone met water quality standards as required by 35 Ill. Adm. Code 304.125.

These statements should have no bearing on the Board's decision because they were never raised by the Agency prior to the hearing and there is no basis in the record to believe that the Agency considered these issues in making its decision. As Respondent acknowledges, Illinois law requires that the Board's review be based solely on information before the Agency during its consideration of the permit. The Board has also held that the issues in the Appeal are framed by the Agency's specific determinations in its denial letter. *ESG Watts v. PCB*, 676 N.E.2d 299 (3rd Dist. 1997). This requirement is absolute and not a matter of form over substance. As the Board has explained, the petitioner in a permit appeal has the burden of proof and the Board's hearing is its sole opportunity to challenge the Agency and rebut its position. *Pulitzer Community Newspapers, Inc. v. IEPA*, 1990 WL 276143, PCB 90-142, December 20, 1990. Since the Board is limited to reviewing the Agency's record and essentially steps into the Agency's decisionmaking position, raising new issues and arguments for the first time at the permit hearing significantly undermines the statutory process and is not consistent with fundamental fairness. The Agency is not entitled to develop new bases to support its already made permit decisions while the permit appeal is being considered by the Board.

The record and testimony state clearly that these concerns were never previously raised with Phillips and that they were not part of the Agency's decision making process. Bob Mosher testified that he never raised with Phillips the issue of whether the Mississippi River complied with the human health water quality standard. (T. 127). Jim Huff testified that the Agency never requested that Phillips collect upstream water quality data to address this point. (T. 170). At the hearing the Agency introduced a document describing potential aquatic life impacts from Phillips' discharge (Exhibit I) but Bob Mosher acknowledged that this document had been prepared immediately before the hearing and neither it nor the information it contained had been conveyed to Phillips. (T. 107). In addition, no Agency decision making documents address this issue; including Bob Mosher's 2008 water quality memo (Exhibit A), Jaime Rabins' 2008 30 day review notes (Exhibit J), the Agency's responsiveness summary for the 2009 permit (Doc. 114), Jaime Rabins' 2011 30 day review notes (Exhibit K), and the Agency 2011 responsiveness summary (Doc. 52). As a result, this issue should not even be discussed in this proceeding.

In light of the Agency's failure to raise this issue during the multi-year permitting process, the Board can reasonably find that the Agency believed that Phillips met this portion of the mixing zone requirements and that a permit with a mixing zone can be validly issued. Courts have found that the Agency has a duty to identify additional facts necessary for a permit decision. *IEPA v. PCB*, 896 N.E. 2d 479, 486 (3rd Dist. 2008). Indeed, Jim Huff testified that he assumed that ambient water quality was not an issue because the Agency never mentioned it despite their other requests for mercury testing. (T.170).

The Board need not rely on suppositions here because the Agency testified in another matter before the Board that the human health water quality standard is met near Petitioner's facility and that water column mercury is not related to aquatic life uptake. In *Proposed New 35*

Ill. Adm. Code 225 Control of Emissions from Large Combustion Sources (Mercury), R06-25 (“Power Plant Mercury Rules”), the Agency presented extended testimony regarding the impacts of mercury on aquatic and human life and the mechanics by which aquatic organisms become contaminated by mercury. In that testimony, the Agency discussed its Technical Support Document (“TSD”) which documented the results of a water quality study the Agency performed in 2004. This study showed that the human health water quality standard for mercury was met in almost all of the samples taken from rivers and streams, including one taken from a location which appears to be in the vicinity of the Wood River Refinery.¹ These findings document that neither the Agency nor Phillips had any reason to believe that the mercury human health water quality standard was being violated in the area of the mixing zone.

In addition, Marcia Willhite, Chief of the Bureau of Water and Bob Mosher's boss testified that there is no correlation between dissolved mercury in the water column and levels of mercury in fish tissue.² She testified regarding the TSD’s description of the uptake of mercury by aquatic life and how this results from a complex series of chemical and biological reactions associated with the methylization of mercury primarily in sediments. This testimony demonstrates that Bob Mosher's testimony regarding this issue is at best a gross

¹ The first page and Section 4.43 of the TSD discussing the study are attached hereto and incorporated herein as Exhibit 10. The map at Figure 4.4 shows the sampling location J-05, which appears to be closest to Wood River. The entire TSD can be found on the Board's website at <http://www.ipcb.state.il.us/documents/dsweb/Get/Document-51468>. Although the TSD references an Appendix D from the 2004 303(d) listing as a further discussion of the study, this appears to be an incorrect citation. It is not clear that the actual study was included in the record of this proceeding. The Board can take judicial notice of the Agency's factual testimony presented in a prior proceeding and the Agency should not be heard to object to the use of its own water quality data of which its own Manager of Water Quality Standards Section should have been aware.

² The portion of Ms. Willhite's testimony addressing the correlation is attached hereto and incorporated herein as Exhibit 11. The entire transcript discussing these issues can be found on the Board's website at <http://www.ipcb.state.il.us/documents/dsweb/Get/Document-53303>. The Board can take judicial notice of the Agency's factual testimony presented in a prior proceeding.

oversimplification.³ The TSD findings regarding the mechanics of mercury uptake by aquatic biota also contradict the statement in the Reply that "mercury is a not a constituent that with dilution becomes less of a threat to aquatic life" (p. 28). This statement is completely baseless, finding no support in the Record, Bob Mosher's testimony or the Board's regulations which set concentration based water quality standards and allow mercury mixing zones.

Indeed this testimony and argument further demonstrate that the Agency's assessment here completely failed to support its denial of the mixing zone. The Agency's own water quality data demonstrates that almost all of the streams sampled, including the Mississippi near Phillips' refinery meet the human health water quality standard for mercury. If this were insufficient, the Agency certainly could have requested Phillips to perform the requisite water quality sampling, but as Bob Mosher and Jim Huff testify, the Agency never raised this issue with Phillips.

The Agency's handling of this issue reflects the impact of the Agency's admitted and illegal rule against issuing mixing zones for mercury in that the actual conditions and facts associated with the mixing zone request were irrelevant to the Agency's decisionmaking. As a result, the Agency made its decision either without considering important facts of which it was aware or by considering important facts to be irrelevant. Either way, its claims that the environmental issues associated with minute amounts of mercury discharged by Phillips justify the exorbitant cost of control or that ambient water quality at the mixing zone violates the water quality standard are baseless. The Board should find the Agency's decision to deny a mixing zone was arbitrary and that a mixing zone can be issued consistent with Illinois law.

³ Section 4.4.1 of the TSD is attached hereto and incorporated herein as Exhibit 12.

II. Respondent's Contentions Regarding Cost Fail to Demonstrate that Mercury Control is Economically Reasonable.

The Agency contends that it correctly denied Phillips' request for a mixing zone because Phillips failed to comply with the threshold requirement of 35 Ill. Adm. Code 302.102(a) to make "every effort to comply with the requirements of 35 Ill. Adm. Code 304.102." The Agency contends that Phillips failed to make "every effort" because it failed to demonstrate that the mercury control program evaluated in its pilot program was not the "best degree of treatment consistent with technical feasibility, economic reasonableness, and sound engineering judgment." The Agency claims that once Phillips documented the potential to control mercury through a Granular Media Filtration ("GMF") system, that system became the best degree of treatment ("BDT"). The record and the testimony at the hearing demonstrate that the Agency's determination was arbitrary in that it ignored, without basis or apparent evaluation, any evidence showing that the system was not technically feasible, economically reasonable or consistent with sound engineering judgment.

A. The Agency failed to consider BAT.

As an initial point, the Agency, without explanation failed to apply EPA's determination that mercury control was not required as the Best Available Treatment for the refining industry (40 CFR 419, "BAT"). The Agency's refusal to consider BAT is quintessentially arbitrary. Agency engineer Jaime Rabins stated at the public hearing regarding the draft permit (which did not contain any mercury limits) that federal effluent regulations (referring to BAT) did not require control of mercury and there was "no need" to regulate mercury in the permit. (Ex. 8). The Agency applied 40 CFR 419 as its base in setting all other effluent standards for the permit. (See Jaime Rabins' permit review notes, Doc. 68). Jim Huff testified that in his experience he had never seen the Agency identify a BDT which was more stringent than the federal BAT. (Ex.

6, p. 9, T. 74). In the record, the Agency provided no explanation, let alone a rational basis as to why it ignored the federal determination that mercury control was not BAT for the refinery industry.

In its Reply, the Agency notes simply that states are entitled to adopt more stringent standards and the IEPA was entitled to require more advanced technology than required by EPA. (Reply p. 21). The argument that states may adopt more stringent standards is correct as far as it goes, which in this case is not very far. As an initial matter, with very few exceptions, the IEPA is not authorized by the Act to adopt any water quality or effluent standards, which are the sole province of the Board. (415 ILCS 5/5(b); 415 ILCS 5/11(b)). To the extent that Illinois wants to adopt more stringent standards than the federal government, that is a policy decision to be made by the Board after notice and comment rulemaking proceedings and not by the Agency pursuant to an illegal, secret rule.

More importantly, the issue here is not the extent of the Agency's authority but the support for and rationality of the Agency's factual determination that the untried GMF system was BDT in light of EPA's determination that no mercury control is required as BAT. The EPA based its determination on an updated review of refineries and available mercury control technologies and in light of a long history of technical assessments in this area. (Ex. 5, p. 2). In contrast, the Agency had not previously evaluated a mercury limit and evinced no knowledge of available technologies, to the extent of claiming, without any basis whatsoever, that mercury limits could be achieved in two years from the date of the original permit (T. 31). It adopted its BDT findings on the basis of one pilot test and by willfully ignoring all of the technical caveats presented with those results as well as the extraordinary cost. As a result, the weight of this

evidence is on the side of the BAT determination that no mercury control is required and the Agency's decision to the contrary is simply arbitrary.

B. The Agency's decision that mercury control is technically feasible and economically reasonable is arbitrary.

The Agency's determination is also arbitrary in that it considered the capital and operation cost of the technology of \$6.9 million per pound of mercury removed economically reasonable. In its Reply, the Agency suggests numerous explanations for its determination, few of which are reflected in the record and none of which support its claim.

The Agency argues that the cost is not unreasonable because the project will provide "non-speculative, tangible benefits" to the environment by controlling additional mercury. As discussed above, however, it is not clear that the benefits would even be measurable, let alone tangible or non-speculative. Bob Mosher's testimony on the importance and potential benefits of Phillips controlling the minute quantities of mercury associated with its discharge was not part of the Agency's permit decision and is completely contradicted by Agency testimony on the same subject before the Board in the Power Plant Mercury Rules. Further, in 35 Ill. Adm. Code 302.208(d) the Board has already determined that a mixing zone is an appropriate tool for meeting the human health water quality standard for mercury, which represents a determination that the amount of mercury in a mixing zone is an acceptable environmental condition. Requiring control of a condition already approved by the Board cannot be deemed a benefit that justifies an extraordinary cost.

The Agency further claims that Phillips will receive a benefit in that the same system will allow Phillips to meet its fecal coliform requirements. Yet this too is an apparent post hoc rationalization which finds no documentation in the record. Nothing in the Agency's decision making discussion either in the Record or at the hearing supports the concept that the Agency

considered this issue in making its decision. This is demonstrated by the language of the Reply which claims "it is reasonable to conclude that the Agency presumed..." that the GMF system was the preferred method for treating fecal coliform. (Reply p. 27). The point of creating a record is that neither the permittee, nor the public nor the Board should have to guess at why the Agency made a specific permit decision and the fact that the Agency asks the Board to do so here, disqualifies this issue from the Board's consideration. Further, Phillips withdrew its challenge to the Agency's fecal coliform requirement thus decoupling any connection between mercury and fecal coliform control.

In a similar vein, the Agency claims that the proposed costs are unsupported because Phillips never presented technical data supporting its cost assessment, particularly that a smaller system could treat half the effluent and that it was not necessary to pump the effluent past the existing treatment lagoon. These claims are just as baseless. As an initial matter, the Agency could not specify when or even if it asked Phillips to provide this information (T. 166-167). These issues appear in the record merely as internal questions from Bob Mosher (Ex. F) which are repeated verbatim in Jaime Rabins' 30 day review memo (Ex. K) without any indication that the Agency sought and failed to receive answers to these questions from Phillips.

Although the Agency failed to share these questions with Phillips during the permit process, Phillips was always in a position to answer these questions, which it did through Jeff Allen's testimony at the hearing. Allen testified that he selected a design value of 5.0 ng/l in order to achieve consistent compliance with the 8.5 mg/l standard required by the Agency's mass limit. (Ex. 5, p. 3; T. 42). This required substantially more reductions than those envisioned by Bob Mosher when he recommended internally that Phillips should evaluate the cost of treating only half of the effluent. (In his email he stated, "Removing mercury for 14.8 ng/l to 12 ng/l is all

that is necessary." Ex. F). Allen further testified that reducing the size of the unit would not significantly reduce the cost, since the size of the equipment was only one factor to be considered. (T. 43, 52). He also explained that given the extremely low levels of mercury to be attained, he recommended bypassing the treatment lagoon in order to assure compliance and avoid potential cross contamination from the sediments in the lagoon. (T.44)

With respect to technical feasibility, the Agency clearly did not evaluate any of the uncertainties or caveats associated with the presentation of the pilot program in meetings with Phillips. The PowerPoint from the June 28, 2011 meeting plainly outlines a series of uncertainties discussed with the Agency in conjunction with the presentation. (Ex. E). Jeff Allen reiterated that discussion before the Board, testifying that the system relies upon mercury maintaining the same level of solubility over time, but that the actual behavior of mercury through the refinery has not been studied and is not possible to predict. (T. 45 - 46). Both Bob Mosher (T. 129 - 130) and Jaime Rabins (T. 160 - 162) testified that they did not evaluate the information regarding these uncertainties. Therefore, the Agency determination that the system was technically feasible was arbitrary in that it was based solely on the results of the one pilot test, without evaluating any of the uncertainties associated with that testing and without considering the broader analysis and findings of EPA that mercury control was not required for BAT.

Finally, the Agency's determination was arbitrary to the extent that it was based on Phillips' refusal to submit the USEPA affordability analysis contained in its Interim Economic Guidance for Water Quality Standards. While the Agency correctly states that there is no rule precluding the Agency from requesting this information, it would be clearly arbitrary for the Agency to base its permit decision on Phillips' refusal to comply with a request for information

not mandated by the Board or the Act. As the Illinois Supreme Court has held, agency action is arbitrary when it "relies on factors which the legislature did not intend for the agency to consider." *Greer v. Illinois Housing Development Authority*, 524 N.E.2d 561, 581 (Ill. 1988).

While the Agency claims in its Reply the guidance is mostly about assessing costs, Phillips asserts that the guidance⁴ is mostly focused on whether the economic impact component of the anti-degradation assessment is met, *i.e.*, whether sources can document that they are entitled to discharge increased levels of pollutants due to the economic impact of requiring compliance. That assessment looks at the social cost of not performing the subject project as well as whether the cost of controls can be afforded by the permittee. This is quite a different assessment from whether a technology is economically reasonable under the Act.

In fact, the record clearly shows that the only economic issue the Agency considered was affordability. The Agency universally refers to the EPA document as an "affordability guidance" at all parts of the Record. (See Bob Mosher discussion, Ex. F; Jaime Rabins review, Ex. K). In Debbie Williams' e-mail of October 30, 2011⁵, she notes the absence of economic information in the record and suggests the inclusion of "publicly available information that demonstrates a project of this size is easily affordable by the company." In his 30 day review notes (Ex. K) Jamie Rabins does exactly that by reviewing and including Phillips' corporate documents to compare the cost of the project to the overall capitalization of the company. Consistent with Debbie Williams' e-mail this is done for the express purpose of determining not whether these costs are not reasonable but whether they are affordable by a company the size of Phillips. All of this is consistent with Bob Mosher's testimony that to the Agency "affordability is the same thing

⁴ <http://water.epa.gov/scitech/swguidance/standards/economics/>

⁵ The e-mail and another memo prepared by IEPA attorney Debbie Williams were included in the Record with the Agency's Supplemental filing, April 11, 2012.

as economic reasonableness." (T. 120). While the Reply attempts to excuse Bob Mosher's reference to affordability as a colloquialism, in fact, affordability is the only economic issue the Agency evaluated.

The Agency's sole focus on affordability is legally baseless and contradicted by every court and Board decision which has evaluated the issue. "Economic reasonableness" is not defined in the Act but its drafters sought to convey a sense that environmental decisionmaking should be based on an evaluation of both costs and benefits (Currie, *Rulemaking under the Illinois Pollution Law*, U. of Chi. L. Rev., Vol. 42, pp. 459-460). In court decisions evaluating economic reasonableness, the courts focus solely on the actual cost without any discussion as to whether the particular company can afford the cost. (See *EPA v. PCB*, 721 N.E.2d 723,730).

Similarly, while the Board has not articulated a fixed standard for "economic reasonableness" in no case has the Board evaluated economic reasonableness in terms of affordability. Even in cases involving other large refiners, the Board did not consider or even mention affordability as a basis to evaluate economic reasonableness. (*Petition of Mobil Oil for Relief from 35 Ill. Adm. Code 304.122*, R97-28, January 22, 1998; *Petition of Citgo Petroleum Corporation for an Adjusted Standard from Ammonia Nitrogen Discharge Levels at 35 Ill. Adm. Code 304.122*, AS08-8, December 18; 2008.) Generally, the Board has evaluated costs in absolute terms or by using cost per pound comparisons. It was arbitrary and contrary to law for the Agency to focus solely on affordability in evaluating whether the costs were economically reasonable and by demanding that Phillips submit information consistent with the EPA's affordability guidance.

Finally, the Agency attempts to minimize the cost by positing a series of irrelevant comparisons. (Reply at 28 – 30). While acknowledging that the costs are too large to reduce a

small amount of mercury, the Agency attempts to explain away both the immense size of the costs and the lack of any environmental benefit. Yet none of this demonstrates that the Agency's permitting decision was not arbitrary. First, none of this appears in the Agency record as being issues considered by the Agency when it reached its decision. As stated above, the only issues apparently considered by the Agency were Phillips' refusal to respond to the affordability guidance, the overall size and value of the company, and Phillips' failure to provide answers to technical questions which were not asked by the Agency.

Second, there can be no question that in both absolute and comparative terms, the mercury control is economically unreasonable and is not BDT. Again the project is expected to cost more than \$20 million to remove 0.2 pounds per year of mercury from a system which already provides 98% removal efficiency. This results in a cost per pound removal of \$6.9 million. Jim Huff presented uncontradicted testimony that he was not aware of any Board regulation that required this level of costs and further testified that these costs were clearly economically unreasonable. (Ex 5, p. 10; T. 76).

Further, as discussed above, this control will provide no measurable environmental benefit. The Agency's last water quality evaluation in the area showed compliance with the mercury water quality standards and while the Mississippi is impaired based on fish tissue sampling, both Bob Mosher and Marcia Willhite acknowledge the lack of connection between water quality and fish tissue impacts. As a result, the Agency had no rational basis to find that the proposed mercury controls were BDT and to deny a mixing zone for mercury.

III. The Agency's decision to impose a mass limit was arbitrary and capricious.

At the hearing and in its initial Brief, Phillips documented that the Agency's imposition of the mass limit was arbitrary and capricious and not necessary to achieve compliance with the

Act. Phillips noted that the Agency did have the authority generally to establish a mass limit but that in exercising that authority here the agency's decision was inconsistent with other decisions in the same permit. For example, the Agency did not assign mass limits to three other constituents which were included in the mixing zone and the permit, namely chloride, sulfate and nickel. Although Phillips raised this issue in its initial Brief, the Agency provided no response within its Reply. This clearly indicates that in the event the Board determines that mercury should be included in the mixing zone, then there should not be a mass limit.

The Agency also did not address what Jim Huff identified as its unprecedented failure to apply a statistical uncertainty factor in determining the mass limit. (Ex. 6, pp. 6-8). As its water quality documents indicate, the Agency routinely applies an uncertainty factor to its determination of current effluent levels based on the nature of the information supporting those levels including the number of samples. (See *e.g.*, Ex. A). This factor is necessary to use an effluent level which is representative of the discharge. If the Board finds that a mass limit is appropriate the Board should require a limit based on the uncertainty factor the Agency applied to every single other effluent.

IV. Conclusion

Prior to issuing either of these permits, the IEPA determined that it would not provide a mercury mixing zone to Phillips. This determination was made with respect to the 2009 permit in following an illegal and unpublished internal Agency policy on mercury which directly contradicted applicable Board regulations. With respect to the 2011 permit, the Agency claimed that it had withdrawn this policy, but this claim is not supported by the facts of its decision making process. In its Public Comment, IERG stated that it was advised by Agency personnel that the policy was still in effect. Jim Huff testified that in his vast experience, the Agency's

actions here were unprecedented. He had never before seen the Agency deny a mixing zone for failing to meet BDT or assert that its BDT was more stringent than BAT.

The Agency's actions were not only unprecedented, they were without factual or legal support. The Agency's sole basis for finding the GMF system was BDT was a single pilot test and the Agency essentially dismissed any concerns regarding the technical feasibility of the system to provide consistent results over time and dismissed the obviously exorbitant cost. In attempting to make this cost appear more reasonable, the Agency raised for the first time at the hearing, both the potential environmental impact of the minute levels of mercury in Phillips' discharge and the issue of whether the human health water quality standard was being met in the area of the mixing zone. Yet both of these claims were belied by data and testimony the Agency provided to the Board in the Power Plant Mercury Rules.

As a result, Phillips has conclusively shown that mercury can be removed from the permit limits, included in the permitted mixing zone consistent with the Act and Board regulations and that the Agency's determination that Phillips had failed to show that it demonstrated BDT was unnecessary and arbitrary.

WHEREFORE, for the reasons stated in this Response Brief, Phillips respectfully requests the Board to grant Phillips' permit denial appeal and to order the Agency to include mercury within the mixing zone described in Special Condition 18 and to delete the mercury effluent limit, mass limit and Special Condition 27 from the 2011 Permit.

THE PHILLIPS 66 COMPANY

By: /s/ David L. Rieser
One of Its Attorneys

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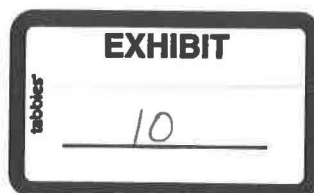
drieser@muchshelist.com

**TECHNICAL SUPPORT DOCUMENT
FOR
REDUCING MERCURY EMISSIONS FROM
COAL-FIRED ELECTRIC GENERATING UNITS**

AQPSTR 06-02

MARCH 14, 2006

**AIR QUALITY PLANNING SECTION
DIVISION OF AIR POLLUTION CONTROL
BUREAU OF AIR
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
SPRINGFIELD, IL**



ADL = Above detection limit

= potential maximum

** = watersheds with ADL facilities but not on 2004 303(d) List Load
(tons/years)

The lowest (0.0000005 mg/L) and highest (33.7 mg/L),(probably an outlier) concentrations of mercury were found in the effluent of Cordova Energy Company (IL0074438) in March 2003 and 2004 and Deerfield WRF (IL0028347) in May 2005, respectively. After eliminating potential outliers from consideration, it was determined that on a statewide basis, the contribution of mercury from all point sources to surface waters on an average was 0.02229791 tons (44.5958 pounds) per year. This average contribution includes, in some cases, the average value of daily maximum concentration of mercury in the effluent of point source due to unavailability of 30-day average concentration values.

The statewide average of all point source discharges of mercury (0.02229791 ton per year) was only 0.745 % of the base year total emissions of mercury (2.99466 tons per year) in Illinois.

In summary, wastewater discharges to receiving streams and rivers in Illinois provide an average annual loading of 45 pounds of mercury per year. However, several of the lakes in Illinois that are listed for fish consumption impairment due to mercury, and have the highest fish tissue levels of mercury detected in the state, have no point source discharges at all.

4.4.3 Study of Mercury Concentrations in Ambient Water

In 2004, Illinois EPA sampled water from selected streams and lakes in Illinois. One goal of the study was to measure concentrations of total mercury in a subset of Illinois surface waters and compare the results to the Illinois human health-based water quality standard of 12 parts per trillion. Samples were collected from 52 stream locations and 32 lake locations spread geographically throughout the State as shown in the two maps below. The lakes sampled included several that are listed as impaired for fish

consumption due to mercury. Sample collection was made using EPA Method 1699 and sample analysis by EPA Method 1631, the preferred methods for accurate low-level mercury measurement. A complete discussion of this study is provided in *Appendix D of Illinois 2004 Section 303(d)List* (Illinois EPA, "Illinois 2004 Section 303(d) List," November 2004).

Figure 4.3

2004 Lake Mercury Sampling Sites

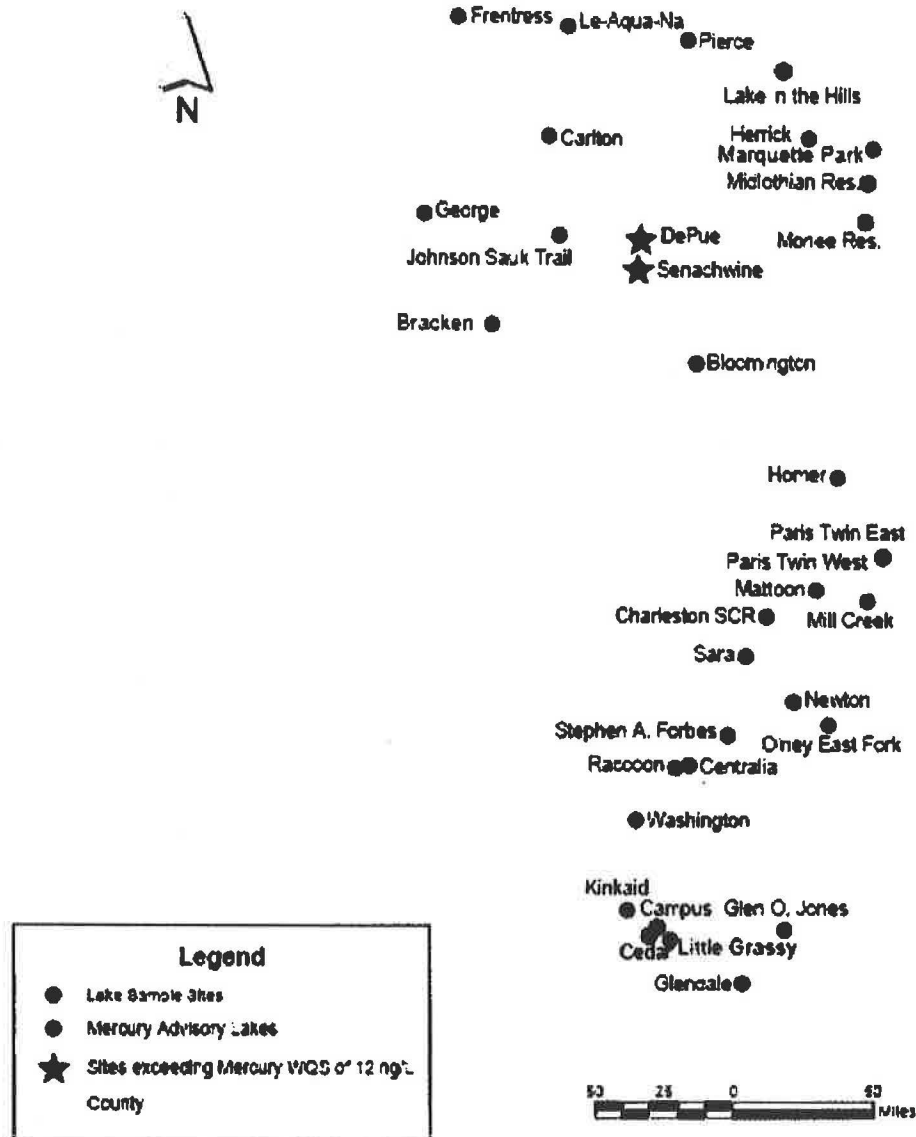
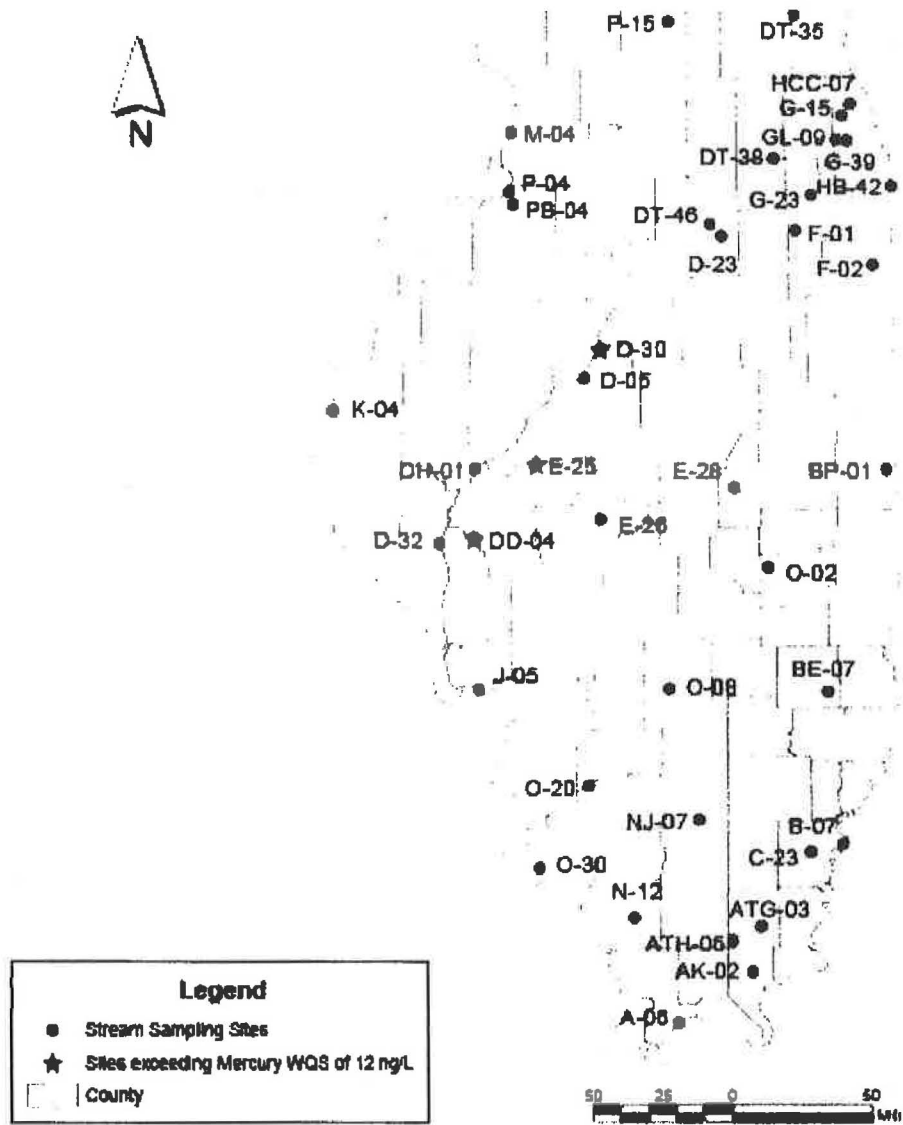


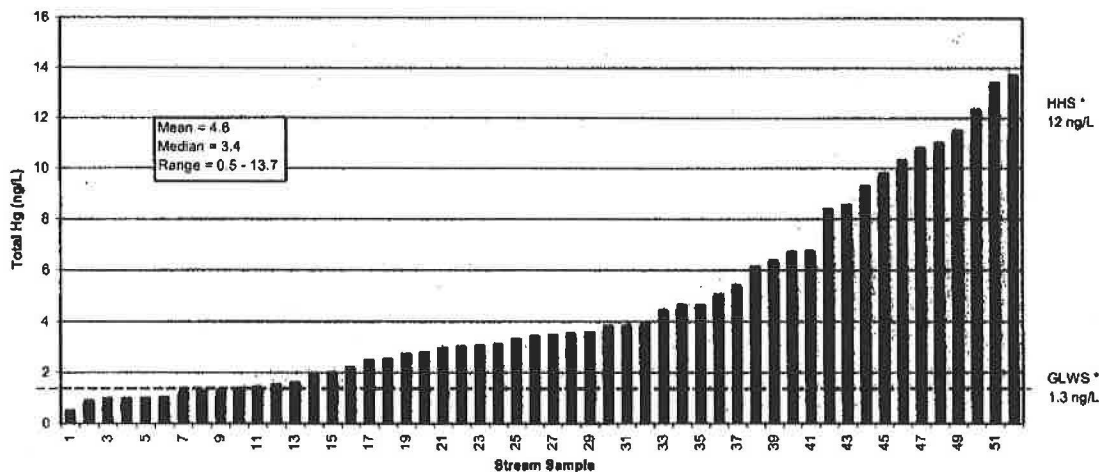
Figure 4.4

2004 Stream Mercury Sampling Sites



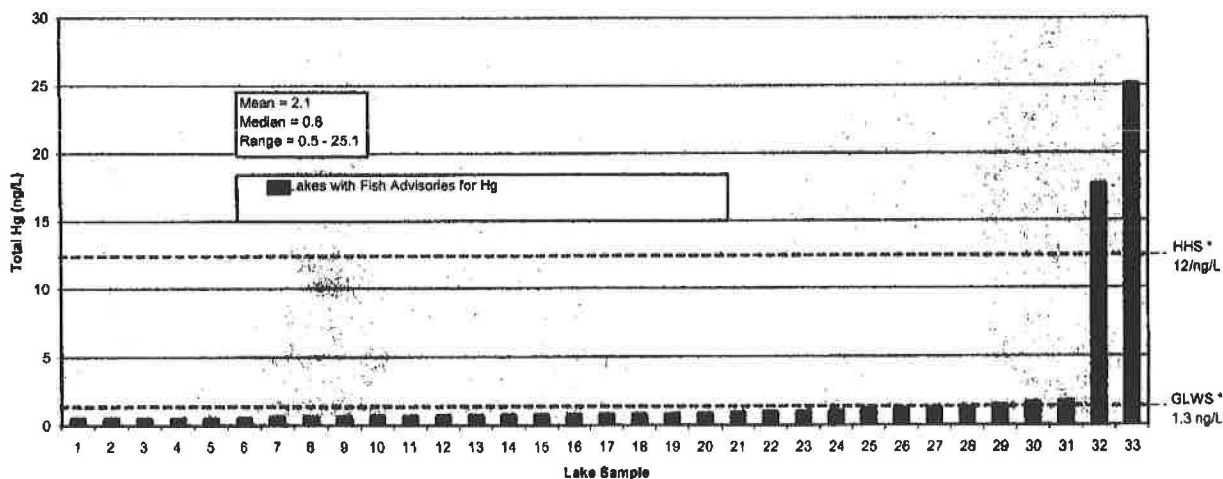
The results found concentrations of total mercury in most samples did not exceed the human health water quality standard of 12 parts per trillion (see Figure 4.5 and 4.6). Three of 52 stream samples and two of 32 lake samples exceeded the standard. Interestingly, the lakes where the ambient mercury levels were higher than the standard are not lakes with specific fish consumption advisories (i.e., not listed as impaired).

Figure 4.5 Illinois Ambient Water Quality Monitoring Network Core Stream Samples, Mar-Oct 2004



* HHS = human health standard; GLWS = Great Lakes Water Quality Standard

Figure 4.6 Illinois Ambient Lakes Samples, Aug - Oct 2004



* HHS = human health standard; GLWS = Great Lakes Water Quality Standard

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ILLINOIS POLLUTION CONTROL BOARD
June 14, 2006

IN THE MATTER OF)
)
PROPOSED NEW 35 ILL ADM. CODE) R06-25
225 CONTROL OF EMISSIONS FROM) (Rulemaking - Air)
LARGE COMBUSTION SOURCES)
(MERCURY))

TESTIMONY OF MARCIA WILLHITE
IN PANEL WITH DR. THOMAS HORNSHAW AND
DR. GERALD KEELER

BEFORE MARIE E. TIPSORD
HEARING OFFICER

The testimony of Marcia Willhite, a witness called in the rulemaking proceeding before the Illinois Pollution Control Board beginning on June 14, 2006, at 9:00 a.m., at the offices of the Environmental Protection Agency, Springfield, Illinois, before Holly A. Schmid, Notary Public and Certified Shorthand Reporter, CSR No. 084-98-254587 for the State of Illinois.



1 MADAM HEARING OFFICER: The
2 preliminary modeling I believe is what he's asking for,
3 the picture you saw.

4 MS. WILLHITE: Believe it or not, I
5 didn't retain a copy. I don't know.

6 MR. KIM: I don't know that there's
7 any testimony that's been given that that was relied
8 upon in generating the rule, so I'm not sure what the
9 relevance of that would be, anyway.

10 MADAM HEARING OFFICER: I think it's
11 -- personally, I would find it very relevant. It's one
12 of the issues we're talking about, the deposition of
13 mercury on surface waters and the effect of that. I
14 think that whether you relied on it or not has some
15 relevance in these hearings, and if the Agency does have
16 a copy of that, I think we would all be interested in
17 seeing that, so if you can check to see if there's
18 another source than Ms. Willhite that might have it.

19 MR. KIM: We can look.

20 MADAM HEARING OFFICER: Thank you.
21 Anything else on D? Moving on to E, then.

22 MS. WILLHITE: "What is the extent of
23 loading to impaired waters from Illinois emission
24 sources? What studies and reports support this

1 contention? Please provide copies of any such studies
2 or reports." As previously noted, we have not noted --
3 we have not conducted this analysis. 48: "The Agency's
4 TSD at page 73, states that the lakes where the ambient
5 mercury levels were higher than the water quality
6 standard are not the lakes with the specific fish
7 consumption advisories, i.e. not listed as impaired. A:
8 Of the 52 stream samples and 32 lake samples cited on
9 this page of the TSD, were samples from only three
10 streams and only two lakes above the water quality
11 standards for mercury?" Yes. The significance is that
12 the amount of mercury in water is not necessarily
13 correlated to the amount in fish tissue. 48 B and C:
14 "Which lakes and streams were above the standard? C:
15 Are the locations of these two lakes and three steams
16 identified on figures 4.3 and 4.2 respectively?" Yes.
17 Question 49 --

18 MADAM HEARING OFFICER: You didn't
19 answer B. Which lakes and streams?

20 MS. WILLHITE: I'm sorry. The lakes
21 were Depew and Sunashwein (phonetic), both are shallow
22 back-water lakes of the Illinois River. The three
23 stream sites were Moveterre Creek (phonetic) which is
24 identified as DDO-4 that's the watershed ID similar to

1 what you saw on the table earlier. The Sangamon River
2 at Oakford, location E-25 and the Illinois River at
3 Peoria, D-30. Samples from each of these sites --

4 MR. BONEBRAKE CONTINUES: I did,
5 although were you still answering some part of 48?

6 MS. WILLHITE: Samples from each of
7 these sites had exceedences of 0.012 micrograms per
8 liter at high flows and spring samples. Samples
9 collected from none of the three sites at the lower flow
10 time, in the fall, had exceedences of 0.012 micrograms
11 per liter.

12 MR. BONEBRAKE CONTINUES:

13 Q. I think you said that the level of mercury
14 in the water, the ambient water, was not correlated to
15 levels of mercury in the fish tissue. Is that right?

16 A. That's what I concluded from the fact that
17 we didn't see in the lakes that had fish consumption
18 advisories high levels in the water.

19 Q. Do you have an explanation for that lack
20 of correlation?

21 A. Not entirely. It's like it must be some
22 place else, in the sediment, or some place else.

23 DR. HORNSHAW: I just asked
24 Ms. Willhite if the measurement is as total mercury or

1 as methylmercury? She indicated that it's total mercury
2 and that pretty much explains why it has to really be in
3 the methyl form before it can be significantly taken up
4 by the fish.

5 MR. HARRINGTON CONTINUES:

6 Q. Am I correct that the methylation process
7 takes place in a zone that's collected at the innerface
8 of the water and sediment, primarily, in anaerobic
9 conditions and the presence of sulfur.

10 MS. WILLHITE CONTINUES: Yeah. I
11 mean, I would probably add to it that where ever you
12 have anoxic conditions and sulfate type of bacteria, and
13 most likely, that's at the innerface there. I suppose
14 it could also happen in suspended particulates in the
15 anoxic zone of a lake.

16 Q. So the mercury that usually is methylated
17 is in the sediment, or at that point, in the water
18 column, the sediment, water innerface, correct, just in
19 general?

20 A. Where ever the critters are, yeah.

21 Q. So basically, the mercury -- to enter into
22 this process has to be in a sediment form at the point
23 the process is entered into?

24 A. I think it just needs to be where the

Table 4.6. Mercury Reductions needed to attain unlimited consumption (mg/kg, unless otherwise shown).

	All LMB (n = 397) Detection Limit = 0.10	All LMB (n = 397) Detection Limit = 0.05
95 th Percentile	0.544	0.523
Reduction needed	0.494	0.473
Percent reduction	90.8%	90.4%

The reduction required for unlimited consumption by childbearing age women and children under 15 years of age, the most sensitive and restrictive sub-population, is about 90%.

4.4 Inputs of Mercury to Illinois Waters

Where does mercury come from and how does it get into the fish in Illinois waters? As in other parts of the United States, it is presumed that the mercury comes from natural and man-made sources. The man-made sources can directly discharge into waters or can release emissions into the air. Atmospheric deposition of mercury can come from local, regional and global emission sources.

4.4.1 Fate of Mercury in the Environment

The following discussion, reprinted from Section 2.4 of the Michigan Mercury Report (June, 2005), provides the basic information on the mercury cycle.

The mercury cycle is quite complex. Mercury is released into the atmosphere from anthropogenic emissions as either a gas or attached to particles and is transferred to the earth's surface via wet or dry deposition or gas transfer. Mercury is emitted to the atmosphere in three basic forms: elemental mercury (Hg^0); reactive gaseous mercury or RGM (RGM is also known as $Hg(II)$ and oxidized gaseous mercury); and particulate mercury [$Hg(p)$]. (NOTE: These three abbreviations for mercury [Hg^0 , RGM, and $Hg(p)$] will be utilized

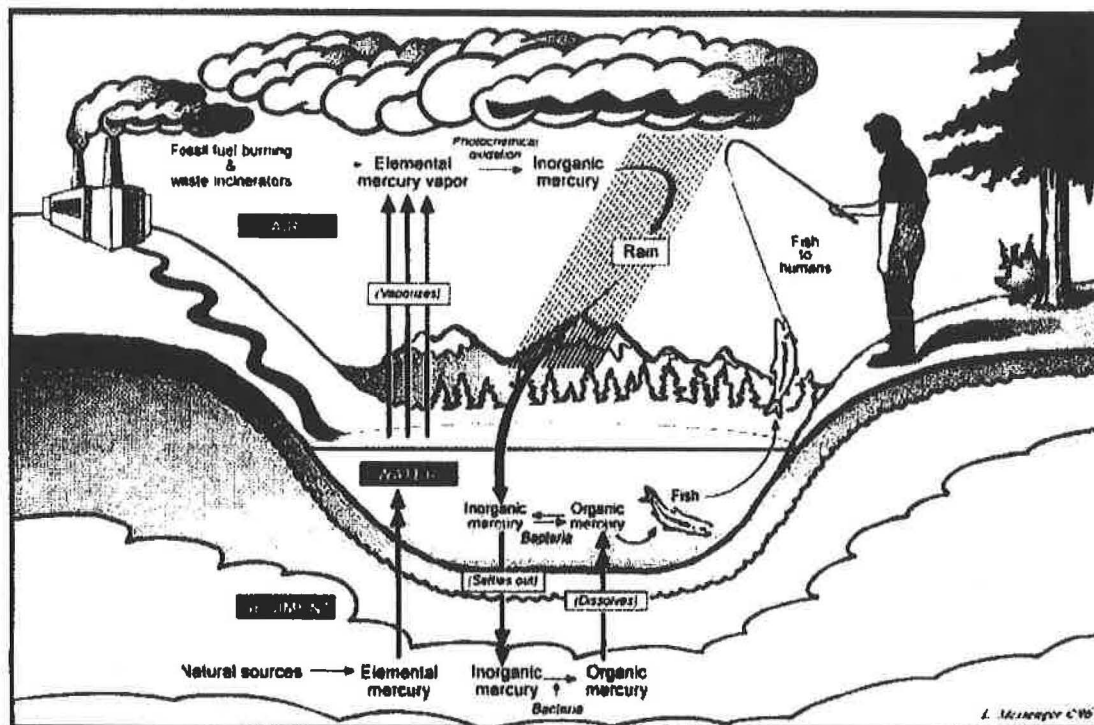


throughout the remainder of this document.) Natural emissions are mainly in Hg^0 form. Hg^0 may reside in the atmosphere for up to one year, allowing global circulation systems to transport Hg^0 releases from the source to anywhere on earth before transformation and deposition take place. Figure 4.2 shows the mercury cycle.

Mercury is continuously mobilized, deposited, and re-mobilized in the environment. The only means to permanently capture mercury from the biosphere include deep-sea sediments, well-controlled landfills or amalgamation processes. For example, to isolate mercury from the biosphere, Sweden has recommended that mercury waste be stabilized and stored in a permanent deep bedrock repository (Swedish EPA, 2001).

The majority of mercury in surface soil is in the form of oxidized mercury compounds, such as mercuric sulfide. However, a small fraction is methylmercury and Hg^0 . Mercury complexes deposited in soils can be transformed back into gaseous mercury by light and humic substances and re-enter the atmosphere. Mercury can also be taken up by plants, both via root uptake in soils and through absorption of elemental or inorganic mercury through the air.

Figure 4.2: Mercury Cycle



As part of a whole-ecosystem mercury cycling study, mercury was measured in the foliage of deciduous trees in Pellston, Michigan over the course of the growing season (Rea et al., 2002). This study found that total foliar mercury accumulation was substantially less than vapor phase Hg₀ deposition as estimated by a different study (Lindberg et al., 1992). It was determined that Hg(p) and RGM dry deposition were rapidly washed off foliar surfaces, and therefore foliar accumulation of mercury most likely represents vapor phase Hg₀ assimilation (Rea et al., 2001). Recently, independently performed controlled pot and chamber studies with aspen trees determined that all foliar accumulation of mercury was due to vapor uptake, regardless of soil mercury concentration (Ericksen et al., 2003), supporting the Rea 2001 study conclusions. In addition, monitoring of mercury has been done through the use of mosses and lichens, including near industrial facilities (Lodenius, 1994).

In addition to direct deposition, mercury can also reach water from soil run-off, although the amount partitioning to run-off is expected to be small since mercury binds to soil. Mercury in run-off is probably bound to suspended sediments. Once in water, mercury can either enter and biomagnifying in the food chain, settle into sediment, or volatilize back into the atmosphere (see previous Figure 4.2). Entrance into the food chain begins with bacteria in water, which can take mercury in its inorganic form and metabolize it to methylmercury. All inorganic forms of mercury that are not bound to sediment are potentially available for methylation by microorganisms. A number of factors effect the potential for methylation of mercury in aquatic systems, but key variables are the potential of hydrogen ([pH] – a measurement of a solution), the oxidizing state (i.e., redox conditions), the levels of sulfur, and the presence of sulfate-reducing bacteria (Ullrich et al., 2001).

Methylmercury-containing bacteria may be consumed by the next level in the food chain, or the bacteria may excrete methylmercury into the water where it can adsorb to plankton and be consumed by the next level in the food chain and so on. Even small environmental concentrations of mercury in water can readily accumulate to potentially harmful concentrations in fish and fish-eating animals, including humans.

The concentration of methylmercury in predatory fish such as largemouth bass or walleye can be 1 to 10 million times higher than the surrounding surface water as a result of biomagnification (Ullrich et al., 2001). In general, fish higher in the food chain such as walleye, pike, shark and swordfish have higher mercury concentrations than fish lower on the food chain like perch. The ratios of methylmercury in fish can vary depending on fish age, size and species as well as watershed characteristics.