BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
Petition of Emerald Polymer	)	
	)	AS 19-002
Additives, LLC for an Adjusted	)	
	)	(Adjusted Standard)
Standard from 35 Ill. Adm. Code	)	
	)	
304.122(b)	)	

NOTICE OF ELECTRONIC FILING

TO: Persons Identified on the Attached Certificate of Service

PLEASE TAKE NOTICE that I have today electronically filed with the Office of the Clerk of the Illinois Pollution Control Board this **Notice of Electronic Filing** and the attached **Emerald's Response to Agency's Closing Brief and Public Comments**, copies of which are attached herewith and served upon you.

Respectfully submitted,

Emerald Polymer Additives LLC

Date: March 25, 2020

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RESPONSE TO AGENCY'S CLOSING BRIEF AND PUBLIC COMMENTS

Emerald Polymer Additives, LLC ("Emerald") hereby submits this Response to the Agency's Closing Brief and Public Comments in support of its petition asking that the Illinois Pollution Control Board ("Board") grant an adjusted standard ("AS") pursuant to 35 Ill. Adm. Code 104 and Section 28.1 of the Illinois Environmental Protection Act ("Act").

I. Introduction

The Agency's Closing Brief ("ACB") is filled with misstatements of the law, conclusions without supporting facts, facts without related conclusions, conclusions that are refuted by the facts and *non sequiturs*. Agency counsel even argued positions with which its own witnesses disagreed. Those shortcomings aside, the ACB contains nothing new (except some curious graphs at 34-36). It could have been written before the hearings, save of course the couple of ideas inspired by the Pizza Peel restaurant in Lacon.

In Section II., we address each material point in the ACB and demonstrate how the evidence not only fails to support the Agency, but actually supports Emerald. When the public comment of the Illinois Chapter of the Sierra Club ("Sierra Club PC") raises similar issues, we address those along with the Agency's. In Section III., we address the Agency's new proposed conditions. Issues raised only by Sierra Club are addressed in Section IV.

II. Emerald Has Proven Each Statutory Element for Granting an AS.

A. The Requested AS Will Not Harm the Environment or Human Health.

Emerald's WET test results show no toxicity outside the ZID, and samples from the Illinois River at the mixing zone edge show that the ammonia concentration is at background. Emerald's Post-Hearing Brief, 21-25 (hereafter, "Emerald's PHB"). The Agency admits this. ACB, 31. This was the type of evidence on which the Board found Emerald's effluent posed no harm before. AS 13-2, Opinion and Order of the Board, 61-62 (April 16, 2015) (hereafter "AS 13-2 Opinion"). The Appellate Court affirmed on the same evidence. *Emerald Performance Materials, LLC v. The Illinois Pollution Control Board*, 2016 IL App(3d) 150526, ¶ 30.

Still, the Agency says that LC_{50} values as low as Emerald's "are not found at any other Illinois facility." ACB, 31. The record says otherwise. The Agency's own witness testified that he recalled at least one other facility in Illinois with an LC_{50} value less than 6.25%. HT 1/14/20, 316:7-21 (Koch).[1] While not in Illinois, Mr. Flippin had experience with a facility effluent more toxic than Emerald's. HT 1/14/20, 253:16 to 254:2 (Flippin). Even if the Agency's statement was true, it would be irrelevant. The relevant point is that there is no toxicity *outside* the ZID.[2]

The Agency said it is concerned with total dissolved solids ("TDS") in Emerald's effluent, ACB, 31, although it showed no such concern in evaluating treatment ideas. Emerald is concerned too. That is why it highlighted for the Board that nearly all of the ammonia treatment alternatives would add salt (and therefore increase TDS levels) to the effluent. Emerald's PHB, 24-25. Not only is the salt level in the effluent a concern, but it is a greater concern because the

[1] The testimony is now confirmed. Illinois EPA's Response to Board's Questions, 8-9 (Resp. to Quest. 7) (Mar. 18, 2018) (hereafter, "Agency Resp.") (referring to source with LC_{50} values of 2.0% and 2.9%).

[2] In a footnote, the Agency says Emerald's effluent is essentially toxic *inside* the ZID. ACB, 31, n. 15. No, it is not. The Agency's witness knew that toxicity levels are not set inside a ZID, but could not explain why. HT 1/14/20, 327:2-10 (Koch). Mr. Flippin knew that no state sets toxicity levels inside a ZID because the fauna being protected are so tiny that they cannot withstand the water velocity in the ZID and so will not be exposed. HT 2/4/20, 50:20 to 51:21 (Flippin). There is no risk and no toxicity when a pathway is incomplete.

salt is persistent in the environment whereas ammonia is known to breakdown. HT 1/14/20, 223:16-224:12 (Flippin); HT 2/4/20, 122:11 to 123:2 (Wrobel).

The Agency refers to the toxicity of MBT and data about reported releases. ACB, 1, n. 1, 30 and graphs at 34-36. The point is unclear. This proceeding seeks an AS from an ammonia effluent limit. It does not address the use of MBT or related discharge standards. This focus on MBT is also a little odd given that the Agency repeatedly touts the data showing that MBT is rarely present in the Henry Plant effluent. *Id.,* 30-31. The graphs at 34-36 are a *non sequitur* -- dropped into the record without any explanation of what they prove or how they are relevant.

The Sierra Club asserts that a permit issued to Emerald based on an AS would harm the environment and not be permissible under 35 Ill. Adm. Code 302.102(b)(12). Sierra Club PC, 2, n. 1. That section requires mixing zones to be "as small as is practicable" and in no event larger than 26 acres. The multi-port diffuser minimized the area and volume used for mixing. AS 13-2, Response to Hearing Officer Order, 11 (April 12, 2013). As a trapezoidal area, the mixing zone is less than 1.5 acres. *Id.* The multi-port diffuser achieves compliance with TDS and acute ammonia water quality standards within 20 feet and chronic standards are met within 300 feet. AS 13-2, Petition Ex. 4, Exec. Summ., p. vi. Sierra Club's charge ignores the evidence.

The Sierra Club statement that the Henry Plant effluent has environmental impacts within and downstream of the mixing zone, Sierra Club PC, 2, n.2, is also contrary to the evidence. The Henry Plant effluent meets toxicity standards at the edge of the ZID and water quality is at background levels at the edge of the mixing zone. *See* Emerald's PHB, 21-25. Even the Agency's witnesses agreed with these conclusions. HT 1/14/20, 325:6-15 (Koch); HT 1/15/20, 74:15 to 75:4 and 88:12-19 (Twait); HT 2/3/20, 283:5-13 (Liska).

The Sierra Club further argues that the Illinois ammonia water quality standard is not protective of mussels and finger nail clams by reference to USEPA's Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater 2013 (hereafter, the "2013 Criteria"). Sierra Club PC, 14. There are two problems with this argument. First, the Appellate Court was clear that concerns based on regulatory standards that have not been adopted provide no basis for finding environmental harm. *Emerald Performance Materials*, 2016 IL App(3d) 150526 ¶ 31 (rejecting Agency concern based on proposed stricter standards to protect mollusks that were not adopted). Second, the mollusk protection criteria that the Appellate Court rejected were USEPA's 2009 draft update that led to the 2013 Criteria and the 2013 Criteria, itself. The Board considered both when it concluded there was no environmental harm in 2015.[3] AS 13-2 Opinion, 59-60. The Board has already addressed the 2013 Criteria.

In a similar vein, Sierra Club expresses concern about dissolved oxygen ("DO") levels downstream of the Henry Plant and nitrate in the Mississippi River and the Gulf of Mexico. Sierra Club PC, 14. No segment of the Illinois River has been listed as impaired for DO by the Agency. Emerald's PHB, 8-9. Given that ammonia is at background levels outside Emerald's mixing zone, HT 1/15/20, 74:15 to 75:4 (Twait), it is hard to understand how Emerald's discharge is impacting DO three more miles downstream. Further, any concern for DO depends on further regulatory action to find an impairment and cannot be properly raised in this proceeding. *Emerald Performance Materials,* 2016 IL App(3d) 150526 ¶ 31. As to the Mississippi River and the Gulf of Mexico, the Appellate Court has already found that concerns

[3] The 2013 Criteria sets an acute standard of 17 mg/L and a chronic standard of 1.9 mg/L at pH of 7 and temperature of 20°C. The acute value is higher than Illinois' not to exceed level of 15 mg/L, which is also the acute standard for pH less than or equal to 7.6. *See* 35 Ill. Adm. Code 302.212(a) and Section 302 Table A. So, the 2013 Criteria should have no impact on Illinois' acute water quality standard. AquAeTer evaluated the performance of the multi-port diffuser against an acute standard of 6.62 mg/L and a chronic standard of 1.14 mg/L. AS 13-2, Response to Hearing Officer Order, 13 and Table A (April 12, 2013). Further, sampling just outside the mixing zone has consistently shown ammonia is rarely detected. Emerald PHB, 21. So, even if this issue was not foreclosed as a matter of law, it does not appear to be an issue on the facts.

for those water bodies are not the basis of Section 304.122(b) and thus are no basis for conditioning an AS from Section 304.122(b). *Id.*, ¶ 34. If those concerns are not a reason to condition the AS, they can be no reason to deny it either.

Twice before the Board has found that the ammonia in Emerald's effluent posed no harm to the environment. The Appellate Court emphatically affirmed the most recent finding. *Emerald Performance Materials,* 2016 IL App(3d) 150526, ¶ 31 ("Emerald has and continues to meet the clean water standards. There was no evidence that the discharge was having any effect on the mollusks or other aquatic life in the river or was any more harmful to the environment than the discharge allowed in the general standard."). All the more recent evidence supports the same conclusion. For the reasons stated in Emerald's PHB and above, the ammonia in Emerald's effluent will not cause more harm to the environment than compliance with the general standard.

B. Factors Relating to Emerald Are Substantially Different Than Those Considered by the Board in Adopting Section 304.122(b).

The Agency makes two arguments to support its assertion that there are no substantially different factors than those considered in adopting Section 304.122(b). First, it argues that Emerald accepts a waste stream from Mexichem which could be nitrified on its own. *See* ACB, 7. But, the fact that Mexichem's and Emerald's wastewaters are combined is not a basis to deny relief. Emerald previously evaluated separate nitrification of the PVC tank. HT 2/4/20, 21:5-6 (Flippin); AS 02-5, PHX 7, 26 (Flippin Written Testimony) and PHX 11, Figure 5. During AS 02-5, Mr. Flippin concluded that, by itself, this alternative would not achieve compliance with applicable limits and was economically unreasonable. *Id.*, 21:7-13. Indeed, directly treating the PVC tank wastewater would require Emerald to build an entirely separate treatment train and incur associated expenses. Emerald's PHB, 46. The Agency's argument also ignores that comingling of the two waste streams is actually advantageous in reducing ammonia in the Henry

Plant effluent. Mexichem's stream provides a consistent base flow roughly four times that of Emerald's. Without the base flow provided by Mexichem, the MBT concentration in Emerald's streams would be four times higher than it is now. Emerald's PHB, 45-46.

Further, the streams were not combined to avoid regulation. The Henry Plant was constructed in 1958, AS 02-5, PHX 6, 2 (Written Testimony of David Giffin), and the PVC portion of the plant opened in 1965. AS 02-5, PHX 1, p. 2. Both preceded the adoption of Section 304.122(b) by many years. The source that is different from those considered during the adoption of Section 304.122(b) is the Henry Plant, including its PVC process. *Cf. Sierra Club v. U.S. E.P.A.*, 499 F.3d 653, 657 (7th Cir. 2007) (alternatives analysis under Clean Air Act did not need to consider alternative that was inconsistent with the fundamental design of the emission source). The AS should not be denied simply because the Henry Plant continues to treat two waste streams, as it has always done.

Second, Agency counsel brings back the argument that the lack of MBT after the secondary clarifier makes Emerald the same as other plants. Beyond overstating the data, Emerald's PHB, 28, this argument misunderstands what distinguishes Emerald from other plants. The Henry Plant is different because MBT is present in the PC tank and the primary clarifier so that single-stage nitrification cannot occur in the bioreactors. *Id.* Even the Agency witnesses agreed this was the key difference. HT 2/3/20, 97:17 to 98:16 (Liska).

Sierra Club makes a different argument. It says Emerald is no different because there is insufficient evidence that MBT makes compliance more difficult. Sierra Club PC, 8. That just ignores the evidence. MBT is a powerful nitrification inhibitor. At low concentrations, only 3 mg/L, it inhibits nitrification. *See e.g.* AS 02-5, PHX 9 (article by Hockenbury, Table II). It makes the application of single-stage nitrification impossible and that is precisely what makes

compliance more difficult and what the Board did not consider in 1973. HT 2/4/20, 18:20-24, 19:9-24 (Flippin); Emerald's PHB, 28. The Board agreed with this evidence twice. AS 13-2, Opinion, 41; AS 02-5, Opinion and Order of the Board, 17 (Nov. 4, 2004).

Sierra Club also argues that the Board drew a distinction between POTWs and industrial dischargers in Section 304.122(a) and (b) so that the Board considered Emerald's category and it cannot have a substantially different factor. Sierra Club PC, 9-10. Beyond being contrary to the Board's prior decisions, that position would be the end of all adjusted standards. The consideration of industrial dischargers as a category is not the same as consideration of a particular industrial discharger. The Act commands that the substantially different factor finding is to be made "relating to the petitioner." 415 ILCS 5/28.1(c)(1). In 1973, the Board did not consider the circumstances of any plant having nitrification inhibitors or MBT in particular. That is sufficient to find that a substantially different factor applies to the Henry Plant.

In sum, the Board has twice found that the presence of MBT before the secondary clarifier, and the Henry Plant's resulting inability to achieve single-stage nitrification, are substantially different factors than those considered by the Board in adopting Section 304.122(b). Neither the Agency nor the Sierra Club has put forth any evidence disputing this fact.

C. The Substantially Different Factors Justify Granting an AS.

1. <u>The Agency Misunderstands the Standard for Economic Reasonableness</u>.

The General Assembly calls on the Board to evaluate the "economic reasonableness of measuring or reducing the particular type of pollution." 415 ILCS 5/27(a). The factor is in essence a cost/benefit analysis that "has involved measuring the cost of implementing pollution control technology against the benefit to the public in reducing pollution." *Env'l Protection Agency v. Pollution Control Board*, 308 Ill. App. 3d 741, 751 (2d Dist. 1999) (hereafter, "*EPA*"). Both the Board and the Agency have understood it the same way.

In a nearly identical case, the Board described the Agency's position as follows: "The Agency based its decision on a balancing of the projected cost to reduce mercury with the lack of a measured effect on water quality or aquatic life." *In the Matter of: Proposed Site-Specific Rule Change for Reilly Chemical Corp., Granite City Facility: 35 Ill. Adm. Code 307.1102,* R88-9, Opinion and Order of the Board, 8 (Oct. 18, 1989) (hereafter, "*Reilly Chemical*"). The Board followed suit: "In light of the high incremental cost of reducing the concentration of mercury in Reilly's effluent with respect to undetermined detrimental effect the higher concentration has on water quality or aquatic life, compliance with the general rule is not economically reasonable." *Id.* The Board also rejected consideration of Reilly's confidential financial information in deciding economic reasonableness. *Id.*, 6. The Agency cites *Reilly Chemical*, ACB, 25, but it never even tries to explain how this case is different or why the Agency changed position.

Instead, the Agency cites cases for irrelevant propositions or entirely misstates the holdings. The Agency says the Board should consider non-speculative benefits, ACB, 26, but never explains what benefits (speculative or not) would arise from further ammonia treatment. In fact, the ammonia is not causing environmental harm, but additional treatment risks detriments from increased salt loading. The Agency also says that the Board should consider partial compliance in assessing economic reasonableness, *id.*, but then ignores the evidence that Emerald did. Meeting the Section 304.122(b) limits would require upwards of 95% ammonia removal. PHX 12, 7 (95% removal by alkaline stripping inadequate to meet limits); AS 02-5, PHX 7, 26 (need 98% removal). Emerald evaluated ozonation, which would reduce ammonia by about 55%, PHX 12, 6, and spray irrigation, which would only reduce ammonia by 22%. PHX 12, 9-10. Moreover, ozonation and spray irrigation were the two highest cost options evaluated by Mr. Flippin. PHX 12, 11, Table 3. Further, the Board has previously found that Emerald has

"achieved reductions of ammonia in its effluent through a combination of strategies." AS13-002, Opinion, 56. Emerald has done so again in this proceeding. *See* Emerald's PHB, 13-17 (source reduction efforts).[4]

The Agency says that control costs should be viewed in comparison to other operating costs and environmental problems incurred by the petitioner. ACB, 26. That is not the holding in *Central Illinois Light Co. v. Pollution Control Board,* 159 Ill. App. 3d 389 (1987). CILCO wanted the Board to assess its compliance costs *solely* in relation to CILCO's other operational and environmental costs, but the Board and the court disagreed. 159 Ill. App. 3d at 394-95. The point is that compliance costs for the petitioner need to be compared to compliance costs for others and to "how serious [the environmental] problem is in comparison to other environmental problems." *Id.*, 395. That is exactly what Mr. Flippin did. PHX 12, 6-12.

The Agency asserts that the Board considered "affordability" in adopting the clean construction and demolition debris ("CCDD") regulations. ACB, 26. That is not true. In that rulemaking, the salient issue for present purposes was whether it would be economically reasonable to require groundwater monitoring by CCDD facilities. The Board heard testimony that adopting the groundwater monitoring requirement would impose high costs and might make facilities close and then weighed that cost against its conclusion that the less costly alternative of relying on soil certification and testing adequately protected groundwater. *County of Will v. Pollution Control Board*, 2019 IL 122798, ¶¶ 59-61 (2019). The Supreme Court held that the Board's balancing of control costs versus environmental benefits was not arbitrary and capricious. And, it did so without any reference to the financial statements or financial condition

[4] Agency counsel simply ignores the evidence and the Board's prior decisions when they claim that Emerald and its predecessors have done nothing for the last 17 years. Agency Resp., 1-2 (Resp. to Quest. 1).

of any particular company and whether or not any company could afford to monitor groundwater. That is a cost/benefit analysis – not an affordability analysis.[5]

Moreover, there are obvious reasons *not* to consider an individual company's ability to afford a treatment alternative. First, it could create an uneven playing field between different regulated entities based solely on financial resources. That is bad policy. Second, the Agency posited no principled manner by which to evaluate "affordability." It offered no financial expert testimony. It just dumped the financial information into the record and left the Board to sort it out. The Board should decline the invitation as it did in *Reilly Chemical*.

2. The Agency's General Attacks on Emerald's Evidence of Economic Reasonableness Are Contrary to Law and Not Supported by the Record.

In this case, three sets of facts are most important to evaluate economic reasonableness: (1) the estimated costs of ammonia treatment alternatives versus the ammonia reductions to be achieved; (2) the benefits to the environment, if any, from the projected reductions; and (3) the negative side-effects for the environment from additional treatment. Emerald's PHB, 30-31.[6] The Agency makes a number of general attacks on Emerald's evidence of economic reasonableness that are not related to any particular treatment alternative. Those attacks are often contrary to the law and are unsupported by the record. We address them in turn.

[5] A mere week before final briefs wee due, Agency counsel argued that USEPA guidance from 1995 suggests consideration of "affordability." Agency Resp., 4 (Resp. to Quest. 3(a)). That guidance is not relevant. The guidance explains USEPA's view of how a State may assess whether "substantial and widespread economic and social impacts" may justify downgrading a designated use for a water body. *Interim Economic Guidance for Water Quality Standards*, p. 1-1 (USEPA Mar. 1995). Emerald has not asked the Board to remove or downgrade a use of the Illinois River or to change the ammonia water quality standard.

[6] Agency counsel says that Emerald relied "solely on cost per pound" to evaluate economic reasonableness. Agency Resp., 4 (Resp. to Quest. 3(a)). That is not true. Mr. Flippin also considered impact to the environment from reducing ammonia as compared to the negative environmental impacts from the treatment alternatives. *See* PHX 12, 6-12.

The Agency's Affordability Discussion Has No Precedent and is Unprincipled.

Undeterred by the lack of precedent and with no attempt to explain its about-face from *Reilly Chemical*, the Agency argues that the Board should consider the company financial evidence and compel Emerald or its parent to pay for ammonia treatment. ACB, 27-28; *see also* Sierra Club PC, 11.[7] The Board should find the following discussion irrelevant as it did in *Reilly Chemical*. But, we cannot let the Agency's errors about financial matters go.

The following section contains Public Record Claimed Exempt/NON-DISCLOSABLE INFORMATION

[7] Sierra Club alone alleges that Emerald did not produce "its full financial information." Sierra Club PC, 12. Over objection, Emerald provided the financial statements and other information demanded by the Agency for five years (2015-2019). *See* AHX 9B, 11A, 11B and 11C.

End of Public Record Claimed Exempt/NON-DISCLOSABLE INFORMATION

Cost per Unit of Pollution Reduced Is the Most Useful Measurement of Cost.

The Agency makes two primary attacks on Mr. Flippin's comparison of treatment costs to projected ammonia reductions. First, it says, the focus should be on total costs (or maybe costs per day – Mr. Liska could not decide) citing Mr. Liska's $50 to reduce one pound of pollutant per day example. ACB, 23-24. The example has nothing to do with this case. Mr. Flippin estimated the ammonia reductions for different treatment alternatives to be between 77 and 331 lbs/day. PHX 12, 11, Table 2. By Mr. Liska's own admission his example is "a little bit extreme," HT 2/3/20, 136:9-13 (Liska), and a "long way from" the pollutant reductions in this case. *Id.*, 143:1-6. He could not name a single Board proceeding involving only a one pound per day reduction in a pollutant. *Id.*, 138:20-24. Mr. Flippin had never worked on that kind of project either. HT 2/4/20, 47:17-23 (Flippin). As with so much of Mr. Liska's testimony, it was so vague as to be meaningless. He said he would apply common sense, but then could not explain how we would apply his total cost or cost per day approach or what source of comparative total cost or cost per day data he would use. HT 2/3/20, 139:1 to 140:14 and 141:2-7 (Liska). He even ultimately admitted that he might want to consider how many pounds of pollution reduction would be achieved for a particular cost. *Id.*, 140:15-19. That is exactly what Mr. Flippin did and what Mr. Liska thought he was testifying against!

Mr. Flippin was right. The total cost approach has "no meaning." HT 2/4/20, 44:4-5 (Flippin). A project might cost several or tens of millions of dollars, but if most of those costs are being incurred to reduce pollutants other than ammonia, then the total cost is meaningless when attempting to evaluate ammonia reduction. *Id.*, 44:19 to 47:12. In contrast, measuring what "you're accomplishing for [a] cost" expressed as a "unit cost" is the very essence of a cost/benefit analysis. HT 2/4/20, 44:4-18. Not to consider unit costs would be "silly," *id.*, not to mention contrary to law. *EPA*, 308 Ill. App. 3d at 751 (balance costs and benefits).

Along the same lines, the Agency argues that the *estimated capital costs* for treatment alternatives are comparable to the *capital costs* incurred by POTWs. ACB, 28-30. This harkens back to one of Agency counsels' positions: they preferred a focus on capital costs[8] rather than present worth costs. Recommendation of the IEPA to Deny Petitioner's Request for an Adjusted Standard, 16 (July 19, 2019) (hereafter, "Agency Recommendation"). The position is strange because the Agency witnesses acknowledged that *operating costs* should be considered along with capital costs in evaluating economic reasonableness. HT 1/15/20, 79:24 to 80:4 (Twait); HT 2/3/20, 139:15-17 (Liska). Present worth cost estimates (sometimes also called net present value) estimate how much money would be needed today to fund *both capital costs and annual operating costs*. HT 1/14/20, 140:2-17. So, Mr. Flippin did exactly what the Agency witnesses said he should. Agency counsels' preference for capital costs is contrary to the evidence.

Even if one only considers capital costs, Mr. Twait did not know how the POTWs' capital costs in AHX 1 were calculated, acknowledged that all of the POTW projects included many elements unrelated to ammonia control, that none of them treated a chemical plant wastewater or one with nitrification inhibitors, and that he could not segregate the capital costs related to ammonia control. HT 1/15/20, 97:5-105:2 (Twait). Agency counsels' argument that Emerald's capital costs could be lower than the POTWs' capital costs because they treated more pollutants than ammonia defies common sense. Emerald has to incur the same level of costs as the POTWs for primary and secondary treatment *and* then has to incur additional costs solely for ammonia treatment. HT 2/4/20, 19:1-3 (Flippin). All of this capital cost only information is irrelevant because it does not help understand what those POTWs expended *for ammonia control*.

[8] Agency counsel seemed to claim the costs in AHX 1 include both capital and operating costs. Agency Resp., 6 (Resp. to Quest.5(a)). This is strange given their position that capital costs are the preferable benchmark. In any event, that claim is contrary to the record. The costs in AHX 1 were "the as-bid and as-constructed cost. That is when everything is done and all the bills are paid and everything is complete, actual construction costs and engineering costs." HT 1/14/20, 290:10-14 (Bingenheimer).

Mr. Flippin Used an Appropriate Benchmark for Comparing Estimated Treatment Costs.

The Agency criticizes Mr. Flippin's use of the NACWA ammonia surcharge rates for comparison to his treatment alternative cost estimates. ACB, 21-24. First, the Agency says they are not an appropriate benchmark because they are surcharge rates and do not consider the base cost of treatment. That makes no sense. The base treatment cost for the NACWA members is the same primary and secondary treatment as at the Henry Plant. The surcharge provides an estimate of the costs incurred "in treating each extra pound of ammonia over and above the base load of ammonia." HT 1/14/20, 142:10-15 (Flippin). The treatment alternatives for Henry would impose costs beyond primary and secondary treatment. They are directly comparable to the NACWA surcharge rates. To compare POTW base costs plus an ammonia surcharge to only the Henry Plant alternatives estimates would be an apples to oranges comparison. Also, the Agency offers no other benchmark for comparison. This argument also ignores that the base costs treat multiple pollutants whereas the alternatives evaluated for the Henry Plant would be solely for ammonia reduction. HT 2/4/20, 45:19 to 46:17 (Flippin).

The Agency also criticizes Mr. Flippin's use of the NACWA median surcharge for comparison as opposed to the average or highest. ACB, 23. The average, $1.60 per pound ammonia removed, is not materially different from the median of $1.50. The highest reported surcharge ($5.03) is not reliable because the methodology of its calculation is uncertain and it was about three times higher than the *highest* reported TKN surcharge. HT 1/14/20, 142:16 to 144:6 (Flippin). Most TKN is in the form of ammonia, so the treatment costs should not be materially different. *Id.* The Agency presented no evidence that the highest value was reliable.

The Agency says that Emerald failed to compare its estimated treatment costs to a "statistically significant sample of Illinois POTWs." ABC, 24. But, it suggests no source for that data. Moreover, the alternatives, with present worth costs of $12 to $44/lb ammonia

removed, PHX 12, 11, Table 3, can be compared to the range of costs reported by Decatur, Normal and Bloomington, Illinois for ammonia removal, $0.70/lb ammonia removed. PHX 11, Flippin Technical Memorandum, 11 (April 13, 2018). Emerald's estimated costs are much higher.

The Agency also says Emerald failed to compare its estimated treatment costs to those incurred by other industrial facilities. ABC, 24; *see also* Sierra Club PC, 12. Tertiary nitrification "is a step increase in unit cost for ammonia removal because the only reason it's there is to remove ammonia." HT 2/4/20, 19:1-3 (Flippin). In contrast, single stage nitrification treats multiple pollutants and thus has a much lower unit cost. *Id.* That same conclusion applies to any other form of treatment after single stage nitrification, that nearly all other facilities rely upon for ammonia removal. *Id.*, 68:7-19; *see also* HT 1/14/20, 145:8-23 (Flippin, municipalities and oil refineries can nitrify through single stage nitrification). Also, in response to a Board request, Mr. Flippin made a comparison of costs incurred at three other industrial projects on an oxygen equivalent basis. That comparison showed that the estimated treatment costs for Emerald's lowest cost alternative was 4.3 to 5.7 times higher than other industrial facilities incurred. Emerald's Written Answers to Board Questions, Appendix E (Flippin Technical Memorandum), 2-3 and 4 (Table 3) (March 6, 2020) (hereafter, "Emerald's Written Answers").

Mr. Flippin's Costs Estimates Were Precise.

The Agency complains that Mr. Flippin's cost estimates were imprecise. ACB, 17-19. The out-of-context recitation of terms from the AACE publication, AHX 17, do not accurately describe Mr. Flippin's estimates. HT 1/14/20, 215:6 to 216:11. His client's rely on his estimates prepared in the same manner as he prepared them for Emerald for budget level estimates that have proven accurate within 10%. *Id.*, 217:3-19. His estimates in PHX 12 are similar to the estimates that he prepared for AS 13-2. *See* AS 13-2 Motion to File Instanter, ¶ 7 and Appendix

A, 6 (June 20, 2014) (Flippin letter report stating cost estimates accurate to + or – 50%). The Agency did not object then, and the Board found them acceptable to conclude that none of the alternatives was economically reasonable. AS 13-2, Opinion, 56. As the Board requested, Mr. Flippin refined his cost estimates for two alternatives. They increased by only 8 to 14%. Emerald's Written Answers, Appendix E, 4 (Flippin Technical Memorandum with refined estimates to accuracy range of -30% to +50%). The Agency complaint has no basis.

The Agency's Other Issues Are Contrary to Law, Have No Factual Support and/or Make No Sense.

The Agency's arguments about taking out private loans or interest-free loans make no sense. ACB, 23. First, it assumes that economic reasonableness only considers the cost to Emerald, but elsewhere, the Agency argues that Emerald's parent should be made to pay. Second, Mr. Flippin estimated costs by evaluating the capital costs and operating costs over a 10-year or 20-year horizon. Those calculations assume a discount rate to calculate a present worth cost for each alternative. PHX 12, 11 (Table 2 note b); Emerald Written Answers, Appendix E, 4 (Table 4, note). Third, the idea of an interest-free loan from a third party is ridiculous. The Hearing Officer had a hard time understanding it, too. HT 1/15/20, 287:18-22. Even if Emerald received an interest-free loan from its parent, the parent would still be incurring the opportunity cost of not employing capital elsewhere. That opportunity cost could be reflected in a rate of interest that would be properly charged to the cost of ammonia treatment. That is Economics 101 and exactly what Mr. Flippin did.

The Agency's argument about Mexichem's contribution to the costs of the treatment system, ACB, 28, makes the same mistake. The question is not who pays how much of the cost. The question is whether the total cost of pollution reduction to all who may contribute is unreasonable in light of the benefits. *EPA*, 308 Ill. App. 3d at 751; *Reilly Chemical*, above.

The Agency also says that Mr. Flippin's failure to specify a ceiling for economic reasonableness dooms his analysis. ACB, 23. We fail to see why. No precedent is cited that the Board has *ever* required a petitioner to prove the precise dividing line between what cost is reasonable and what cost is not. Nor would that line be the same in every case. It could vary depending on the environmental impact of the pollution at issue. In this case, the ammonia has no discernible impact and that should be considered. Also, it seems the Board has resisted creating a bright line rule. In the usual case, the Board merely declares that the alternatives are economically reasonable or not. *See e.g. Reilly Chemical*, above. No petitioner could precisely define the dividing line given that the Board does not precisely define it.

Agency counsels' last general attack may be its most confusing. They say the Board must consider fair market value because the treatment alternatives considered are so common that Illinois has regulations with design standards for them. ACB, 19. For starters, the premise is not true. The Agency's main witness admitted that the regulations at 35 Ill. Adm. Code Part 370 only characterize single-stage nitrification as common. HT 2/3/20, 28:14 to 29:6 (Liska). He admitted that Part 370 does not establish design standards for the following alternatives evaluated by Mr. Flippin: breakpoint chlorination, ozonation, ion exchange and tertiary nitrification. *Id.*, 27:24 to 28:13 and 29:9-12. Even if the alternatives were common, it is not clear what Agency counsel means when they says they want "evidence on why the fair market value of these . . . solutions are not economically reasonable." ACB, 19. Perhaps they substituted "fair market value" for "estimated costs" because it sounded good. If this information is important, the Board should expect to find Agency questions or testimony about it. We searched all the transcripts and found no question or answer using the term "fair market value." Agency counsels' point –whatever it is – is unsupported by the record.

3. None of the Real Alternatives and None of the Agency's Ideas Are Both Technically Feasible and Economically Reasonable.

Emerald described its investigation of eight end-of-pipe treatment alternatives, as well as its current source reduction efforts. *See* Emerald's PHB, 13-17, 31-48. The source reduction work is ongoing and is the subject of a Process Improvement Project Plan ("Project Plan") submitted to the Board. As to the end-of-pipe alternatives, the evidence overwhelmingly proves that each one failed to meet the standard for economic reasonableness and that some are not technically feasible. *Id*., 32. Nothing in the ACB changes this. Indeed, the ACB says nothing about four of the alternatives, seemingly conceding that alkaline stripping, ion exchange, ozonation and breakpoint chlorination are inappropriate alternatives for the Henry Plant.[9]

The Agency proposed several treatment ideas. Most of them were half-baked proposals; no testimony was offered regarding the technical feasibility or cost of any idea as it might specifically apply to the Henry Plant. Some of these ideas were conceived on the same day as the hearing itself. HT 2/3/20, 130:11 to 132:6 and 232:2-22 (Liska). Regardless, Emerald will address each idea in turn, after it first addresses an issue of credibility raised by the Agency.

Witness Credibility

Mr. Flippin is a licensed professional engineer with thirty-five years of experience in his field. *See* PHX 9, ¶¶ 5, 7; HT 2/4/20, 5:10-19 (Flippin). He has conducted treatability testing of industrial wastewaters and developed treatment process design criteria. PHX 9, ¶ 6. He has designed wastewater treatment processes specifically for ammonia reduction. *Id*., ¶¶ 6, 9, 11-12. Mr. Flippin holds a masters degree in Environmental and Water Resources Engineering from Vanderbilt University. *Id*., ¶ 4. The Agency's witnesses had no comparable experience.

[9] Because the Agency has said nothing about these alternatives, Emerald stands on its discussion of the relevant evidence in its PHB: (1) alkaline stripping (p. 37); (2) ion exchange (pps. 37-38); (3) ozonation (pps. 42-43); and (4) breakpoint chlorination (pps. 40-41).

In spite of his expertise (or probably because of it), the Agency attacks his credibility by saying he was a hired gun. *See* ACB, 20. That is what you say when you have nothing to say of substance. Every finder of fact understands that expert witnesses are paid. That alone does not undermine credibility. Each of the Agency's witnesses is paid by the State, and each one knew that the Agency opposed Emerald's petition. Does that *alone* undermine their credibility? We do not think so.

Witness credibility can be assessed in a number of ways. Some key ones are whether a witness makes mistakes on basic concepts, whether she can express a clear opinion, whether she can rationally explain the basis for that opinion and whether she can distinguish one concrete application of a general principle from another. Mr. Flippin could do that. Consider his use of the NACWA surcharge rates. He explained why surcharges were comparable to the estimated treatment alternative costs and why he chose the median surcharge. When asked questions as to why he did not choose the average or highest surcharge rate, he could explain why. Contrast that with Mr. Liska. He rejected the NACWA surcharges in favor of total cost (or maybe cost per day – he could not decide). When asked to explain how he would apply his idea, he could not do it and ultimately undercut his own testimony by saying that yes he would like to know how many pounds of pollutant reduction were being achieved for a given cost. *See* above, 14.

Mr. Liska also made basic mistakes of science. *See e.g.* HT 1/15/20, 149:12-20 (Liska incorrectly stating that nitrogen gas would "bubble out" of wastewater during nitrification); HT 2/3/20, 259:20 (despite his chemistry degrees, incorrectly stating that MBT is a sulfide). And, if you scratched the surface, he could not support his ideas with details. *Id.*, 113:9-13 and 114:7-9 (Liska unable to explain what the watertight wall would be made of or how it would be installed). Mr. Flippin explained nitrification and denitrification, had actual experience

designing treatment at an oil refinery so that he could explain that MBT is an organosulfur compound rather than a sulfide and explained why the watertight wall was a disastrous idea.

Mr. Liska never could explain what data he reviewed to support the Agency's proposed numeric limits, Emerald's PHB, 57-58, and he also had to concede that his review missed data that was inconsistent with the proposed limits. HT 2/3/20, 206:22 to 207:6 and 210:3-15 (Liska). In contrast, Mr. Hathcock was clear on what data he reviewed and how he reached his conclusion as to what numeric limits were appropriate. PHX 1, ¶ 51. Similarly, Mr. Liska was unable to provide any real testimony about a laboratory research paper beyond acknowledging that Mr. Gradeless had located the paper and that he properly read sections of it into the record. *See* HT 2/3/20, 265:23 to 271:9 (Liska). In contrast, Chris Wrobel described the study conducted. HT 2/4/20, 112:23 to 113:11 (Wrobel). He acknowledged that it was a good study but pointed out differences between the laboratory conditions and conditions at the Henry Plant (differences that Mr. Liska either did not understand or ignored) that showed a lot of engineering would be needed to determine if it would be feasible in practice. *Id*., 115:1 to 116:12, 117:21 to 120:12.

When confronted with Mr. Flippin's level of expertise, Agency counsel was left up a creek without a paddle. No wonder they resorted to this desperate attack on him, which, ironically, has boomeranged and exposed the shortcomings of their main witness even more.

<u>Process Improvements/Running Reactions Further</u>

Emerald is investigating ways to further reduce levels of MBT, TKN and ammonia precursors in the Henry Plant wastewater. *See* Emerald's Written Answers, 5-6 (Resp. to Quest. 3) and Appendix A (Project Plan). Emerald will implement this plan and has proposed an AS condition related to it with regular reporting to the Agency. Nonetheless, in simplistic fashion, the Agency still suggests that Emerald should "drive[] its reactions to completion" in order to

react all of the MBT out of its waste stream. ACB, p. 13. This suggestion flies in the face of basic chemistry. HT 2/4/20, 103:13-17 (Wrobel). On a manufacturing plant scale, most chemical reactions simply cannot be run to completion to eliminate all waste streams. *Id.*, 100:10-14. There is just no way to take these chemical reactions and drive them to completion because the equilibrium constant does not change in a closed system. *Id.*, 102:1-19.

Although it is impossible to eliminate all MBT, the Henry Plant has a long and impressive history of pursuing source reduction. *See* Emerald PHB, 13-17. That history includes some significant strides in the last 18 months, and Emerald is hopeful that the Project Plan will lead to more positive strides. Despite that progress, cumulative improvements so far are insufficient to assure compliance with the Section 304.122(b) limits. HT 1/14/20, 101:1-8 (Hathcock). The Agency has presented no contrary evidence.

Tertiary Nitrification

Emerald demonstrated that tertiary nitrification is not economically reasonable. In the ACB, the Agency essentially repeats its earlier arguments, including the baffling watertight wall. ACB, 14-16. Emerald has already rebutted each of those ideas. Emerald's PHB, 32-37. There is nothing to add, except to correct three errors.

First, the Agency's statement about single-stage nitrification occurring at the Henry Plant, ACB, 15, is based on results in the fall of 2019 when MBT-related production was minimal or zero. Those results are not representative of a reasonable maximum operating scenario and there is no evidence that single-stage nitrification occurs at the Henry Plant when MBT-related production is at significant levels. HT 1/14/20, 49:4-22 (Hathcock); *see also* PHX 13 (ammonia effluent for 11/3/19 to 11/13/19 exceeding 6 mg/L).

Second, Agency counsel yet again mixes up single-stage nitrification and tertiary nitrification when it says the latter is done at almost every industrial and municipal plant. ACB, 15. That is not true. Single-stage nitrification is not the same thing as tertiary nitrification. HT 2/4/20, 18:20-24, 19:9-24 (Flippin). Single-stage nitrification is the process by which most industrial and municipal plants remove ammonia, BOD, TSS and other parameters at the same time, making it efficient and inexpensive on a unit cost basis. *Id.*, 19:5-13; HT 1/14/20 145:13-23 (Flippin). Even Mr. Liska admitted this. HT 2/3/20, 95:22 to 96:13 (Liska). And, he also admitted that it is single-stage nitrification, not tertiary nitrification, that is the common form of treatment. *Id.*, 28:14 to 29:12. Agency counsel just does not seem to get it.

Third, Agency counsel persists in describing the conversion of the three off-line bioreactors as a simple process of re-routing some pipes. ACB, 15. Mr. Flippin shredded that argument and proved it was just not true. Emerald PHB, 35. Moreover, the Agency witness did no engineering work on this idea, nor did he even attempt to calculate the cost. There is no evidence showing this idea is simple or economically reasonable.

Two of the Agency's tertiary nitrification ideas are not technically feasible (the hydraulically connected baffles and the disastrous watertight wall) and none are economically reasonable. Mr. Flippin's opinion that the rotating biological contactors were the best form of tertiary nitrification, and yet still economically unreasonable, was never dented.

Granular Activated Carbon

Mr. Flippin evaluated granular activated carbon ("GAC") and found that it was not economically reasonable. *See* Emerald's PHB, 38-40. The Agency's only argument with respect to this alternative is that Mr. Flippin did not evaluate GAC at all the various locations suggested by Mr. Liska in Lacon. ACB, 10; HT 1/15/20, 170:2-17 (Liska).

As explained by Mr. Flippin, there is no utility in evaluating GAC downstream of the PC and C-18 tanks at the primary clarifier because at that location soluble COD from Mexichem will compete with MBT to adsorb to the carbon. HT 2/4/20, 40:13 to 41:5 (Flippin). Evaluating GAC at the flocculation step or at the secondary clarifier is thoroughly discredited, too. Emerald's PHB, 39-40. Mr. Flippin carefully and thoroughly evaluated GAC treatment at the PC and C-18 tanks because they represent the highest concentration of MBT and lowest concentration of COD, and are therefore the most efficient and economical point in the treatment process to evaluate this alternative. HT 2/4/20, 40:1-12 (Flippin). The evidence shows that GAC is not economically reasonable and that no further evaluation of it is warranted.

River Water Dilution

Mr. Flippin comprehensively evaluated river water dilution. He found it would be difficult to reliably implement, was not economically reasonable and had significant negative side effects. Emerald's PHB, 41-42. The Agency's single comment regarding this alternative is that it should be evaluated for seasonal implementation. ACB, 10; HT 1/15/20, 84:12-22 (Twait). Emerald has already explained why this comment is immaterial and would not be economically reasonable. Emerald's PHB, 42. The evidence is overwhelming that the river water dilution alternative is not economically reasonable due to its high cost and negative environmental side-effects.

Land Application/Spray Irrigation

The Agency's position on spray irrigation is unclear. On one hand, ACB Exhibit A dropped the proposed condition 3.g. from the Agency Recommendation that would have required further evaluation and possibly implementation. On the other, the Agency dedicated a page of the ACB to spray irrigation, but even then, none of the commentary was substantive. ACB, 11-12. The Agency is grasping at straws. Mr. Flippin's proposal did not dictate his ultimate

conclusions with respect to land application. HT 1/14/20, 172:5-13, 213:22 to 214:3 (Flippin). Mr. Flippin's investigation and rational explanation of this alternative is described in his expert report and his extensive testimony. *See* PHX 12; HT 2/4/20, 7:13 to 18:9 (Flippin). Mr. Liska could only respond with generalities and seemed unfamiliar with many basic details of a spray irrigation analysis. *See* Emerald's PHB, 43-45.

The ACB repeats Mr. Liska's broad claim about the number of industrial sludge permits issued in Illinois and the single organic chemical plant spray irrigation system the Agency could find. ACB, 11-12.[10] But, in fact, Mr. Liska eventually had to admit that the Agency could not locate the permit for that plant. HT 2/3/20, 78:5-17 (Liska). As it turns out, that plant does not truly dispose of its wastewater through spray irrigation. It is collected by a drain tile system and discharged to a permitted outfall. *Id.*, 70:2-6. The Agency does not challenge Mr. Flippin's calculations of salt tolerance, or agronomic benefit or necessary dilution or any other technical detail. Given this limp response, the Board can only conclude that spray irrigation is neither technically feasible nor economically reasonable.

Separation of Waste Streams

As with many of the Agency's ideas, this one is based on a vague suggestion by Mr. Liska that the MBT-related wastewaters could all be segregated. ACB, 16. There is no engineering behind the idea or proof as to how it would work in practice. There is no estimate of the costs for it. Moreover, the idea is similar to the argument that Emerald should separately treat the PVC tank wastewater. *See* ACB, 8-9. Mr. Flippin previously studied the separate treatment of the PVC wastewater and found that it would not achieve compliance with applicable

[10] Agency counsels' list of alleged industrial spray irrigation permits, Agency Resp., 6 (Resp. to Board Quest. 4(b)), should be ignored. There is no evidence that these are for spray irrigation as opposed to sludge disposal. Further, it is fundamentally unfair for the Board to consider unverified statements of Agency counsel produced one week before the close of briefing when the Agency could have produced this information before the hearing. The list also does not rebut Mr. Flippin's testimony that spray irrigation is economically unreasonable.

limits and would not be economically reasonable. Emerald PHB, 45-46. In addition, both Mr. Flippin and Mr. Wrobel testified as to the negative aspects of separating the waste streams. *Id.* As presented in the ACB, this is not even a fully formed treatment idea. There is no evidence from which the Board could describe how the treatment would work, much less find it technically feasible or economically reasonable.

Hydrogen Peroxide With or Without Catalysts

The Agency presented evidence about hydrogen peroxide as if it had never been considered. That is not true. Before the hearing in AS 02-5, Mr. Flippin designed and oversaw batch treatability tests to evaluate if hydrogen peroxide, clay absorption or precipitation could adequately remove inhibitors in the wastewater influent to allow single-stage nitrification. AS 02-5, PHX 7, 19-20. Those tests found the "rate of biological nitrification was slower than would be expected for an uninhibited system indicating that bio-inhibitors were still present[.]" *Id.*, 19. The Agency apparently did not think much of this form of treatment in 2004 because the transcripts from AS 02-5 seem to reflect no questions about hydrogen peroxide.

The Agency's current fascination with hydrogen peroxide began with the testimony of Emerald's utilities foreman, Mark Winters. AHX 18, 6:19-21. He talked about hydrogen peroxide being able to eliminate MBT from wastewater, although acknowledging that he was "not familiar with the chemistry." *Id.*, 42:2-14 (Winters). Mr. Gradeless thought he had found the silver bullet. So, he asked about putting it into the bioreactor, only to learn that would "damage the bugs, cause BOD problems and whatnot in that location" and cause "a worse problem." *Id.*, 43:12-21. In Lacon, Mr. Liska testified that he did not have any knowledge of treating MBT with hydrogen peroxide. HT 1/15/20, 205:16-18 (Liska). Undeterred, he said that the Agency "would definitely want to see the possibility" of using hydrogen peroxide. *Id.*,

205:18-24. On redirect, he said that an oil refinery had used hydrogen peroxide to treat sulfides, that MBT was a sulfide and that hydrogen peroxide might treat it. HT 2/3/20, 259:13-22 (Liska). Through a series of leading questions about a research paper located by Mr. Gradeless, *id.*, 265:23-266:1, Mr. Liska also talked about using a soybean-based catalyst and hydrogen peroxide to oxidize MBT. The ACB repeats all this while ignoring the 2004 investigation and the evidence that Mr. Liska was fundamentally wrong about the most basic things. ACB, 13-14.

Now for a dose of reality. Chris Wrobel has a doctorate in chemistry and is the corporate health, safety and environmental manager of Emerald Kalama Chemical. HT 2/4/20, 91:18-23 and 92:19 to 93:1 (Wrobel). He reviewed Mr. Winters' testimony, and investigated the test on which that testimony was based. The test was performed by a supplier that was trying to sell Emerald a catalyst. *Id.*, 106:11-23. The supplier followed no clear method, ran only a single duplicate and did not record the volume or pH of his sample or the amount of acid used to adjust the pH. One of the treated samples even had a higher MBT concentration than the untreated sample and the duplicate result was not within the expected error range. Because of those shortcomings, no conclusions can be drawn from the test. *Id*., 106:24 to 108:17. Further, just as GAC does not selectively adsorb MBT, hydrogen peroxide will not selectively oxidize MBT. *Id*., 106:3-10 and 109:11-19. Therefore, a "tremendous amount of hydrogen peroxide" would be required in order to oxidize all of the MBT that is in Emerald's waste stream. *Id*., 109:20 to 110:10. Thus, the in-process changes Emerald is currently studying are more efficient and cost-effective than hydrogen peroxide treatment. *Id*., 110:11 to 111:11.

As to Mr. Liska's refinery example, Mr. Flippin knocked that out. He recommended using hydrogen peroxide to selectively remove sulfides at a California refinery. *Id.*, 35:11-36:7 (Flippin). That is a different solution to a different problem. *Id.*, 38:2-17. Mr. Liska was wrong

about the chemistry. Sulfide is an inorganic constituent with a double negative charge that is readily oxidizable in water. MBT is an organosulfur[11] compound; it is not a sulfide and cannot become a sulfide. *Id.,* 37:9-22. Confirming Mr. Wrobel's conclusion, Mr. Flippin testified that hydrogen peroxide will not remove MBT selectively at the Henry Plant because of the other wastewater constituents competing for the peroxide's oxidation potential. *Id.,* 38:11 to 39:4.

There are also several issues with Mr. Gradeless's research paper. The paper describes a laboratory study in which a soybean enzyme successfully catalyzed the reaction of hydrogen peroxide with MBT in reagent grade lab water. HT 2/4/20, 113:3-111 (Wrobel). Unlike the lab water used in the study, the wastewater at the Henry Plant contains many different chemicals other than MBT giving it a higher chemical oxygen demand. *Id*., 116:24 to 118:7. The study removed the MBT dimer that precipitated out of solution by using a small 0.2 micron filter, which would not be feasible in a wastewater treatment system. *Id*., 115:8-17 and 119:1-13. Also, the enzyme used in the laboratory study could potentially be affected by various factors in a wastewater treatment system, such as temperature, pH or various ions and chemicals present in the wastewater. *Id*. 119:14 to 120:12. Regardless of the catalyst used, this idea suffers from the same problem that hydrogen peroxide simply is not selective for MBT. *Id*., 120:13 to 121:3.

In sum, hydrogen peroxide is no silver bullet. Mr. Winters realized there is none. AHX 18, 47:6-8. The Agency's evidence, such as it is, fails to spell out a concrete application of hydrogen peroxide to the Emerald wastewater system that the Board could even find is technically feasible. And, because the Agency put forth no concrete application, it also presented no evidence on the cost of any application of hydrogen peroxide. So, the Board also

[11] The court reporter transcribed Mr. Flippin saying MBT is an "organelle sulfur." That makes no sense. Organelle is a cell biology term for a specialized subunit with a specific function. *See* https://en.wikipedia.org/wiki/Organelle (last visited 3/10/20). He really said MBT is an organosulfur, i.e., an organic compound that contains sulfur. We attribute this innocent error to Mr. Flippin's charming drawl.

cannot find that any such application is economically reasonable. At this point, the Project Plan has a better chance at achieving further ammonia reductions. HT 2/4/20, 120:13 to 121:3 (Wrobel). The theoretical possibility of hydrogen peroxide pre-treatment needs no further investigation and is no reason to deny the AS.

Combinations of Approaches

Finally, the Agency claims that Emerald should have evaluated combinations of two or more end-of-pipe alternatives. ACB, 16-17. The only evidence the Agency cites for this is testimony by Emerald's witnesses that they had not evaluated certain combinations. None of the Agency witnesses supported these combinations. This is just a lawyer's trick: take the alternatives, combine them haphazardly and then say Emerald did not study all of them. The possible permutations are almost endless, and it lacks any credibility.

Giving this idea more than was due, Mr. Flippin considered whether to apply the end-of-pipe alternatives in combination, but decided against it because it would only make the unit cost of treatment higher. HT 1/14/20, 133:2-14 (Flippin). If Emerald combined two alternatives it would need to build two separate treatments system, including separate capital and operating costs. *Id*., 133:16-21. In other words, by employing a treatment alternative that only operates part-time, Emerald is incurring the full capital and most of the operating cost of any given alternative to achieve a fraction of the removal. *Id*., 133:22-24. Mr. Flippin testified regarding two specific examples and both times found them economically unreasonable. *Id*., 134:3-23. No matter what combination of approaches is proposed, the reality is the same. *Id*., 135:8-12. This idea is just a creation of Agency counsel, has no credibility and should be rejected.

D. Emerald Applies the Best Degree of Treatment.

Best degree of treatment means applying treatment that is technically feasible and economically reasonable and that reflects sound engineering judgment. 35 Ill. Adm. Code §

304.102(a). The Board has twice found that the Henry Plant applies best degree of treatment and Mr. Flippin's testimony supports the same conclusion today. Emerald PHB, 48-50. The Agency says that the addition of a lower LC_{50} level dilution to its WET testing means Emerald is not applying best degree of treatment. It cites a long passage by Mr. Koch in supposed support. ACB, 31-32. We do not see the connection. Mr. Koch was called to discuss the WET test results and what they showed about effluent toxicity. He was asked no questions about best degree of treatment, HT 1/15/20, 305-328, and the testimony quoted in the ACB gives no indication that Mr. Koch understood he was testifying about best degree of treatment. The dilution series is set to demonstrate a lack of toxicity outside the ZID. It has nothing to do with applying sound engineering judgment to treatment facility design or evaluating technical feasibility or economic reasonableness of a treatment facility. The argument is a *non sequitur*.

For the reasons presented in Emerald's PHB and amply supported by the record, the Board should find that Emerald applies the best degree of treatment.

III. The Agency's New Proposed Conditions Are Duplicative or Are Not Justified.

Exhibit A to the ACB lists 15 recommended conditions. The following table correlates the Exhibit A conditions with those in the Agency's Recommendation.

Exhibit A Condition No.	Similar Condition in Agency Rec.		Exhibit A Condition No.	Similar Condition in Agency Rec.
1	1		4.f.	New
2	2		4.g.	New
3	New		4.h.	3.k.
4.a.	3.j./3.m./3.n.		4.i.	3.l.
4.b.	3.p.		4.j.	3.o.
4.c.	3.c.		4.k.	3.q.
4.d.	3.h.		4.l.	3.r.
4.e.	3.a.			

Exhibit A conditions 2, 4.a., 4.c., 4.d., 4.h., 4.i., 4.j., 4.k. and 4.l. are similar enough to the corresponding earlier conditions that Emerald refers the Board to its comments on the earlier conditions in Emerald's PHB. The remaining new recommendations are discussed below.

Numeric Limits – Recommendation 1

The Agency criticizes Emerald's proposed numeric limits as being "arbitrary."[12] ACB, 36. The irony is that the Agency's explanation for its numeric limits keeps changing and it made obvious errors in reviewing the DMR data. We will address those issues below, but first we will demonstrate that Emerald's proposed limits are sound.

First, the Agency criticized Emerald for proposing numeric limits that provide a "buffer" and for not running any models. ACB, 33. Limits in NPDES permits are never to be exceeded, so of course, the limits should be set so that they do not limit production. The Agency's witnesses agreed. HT 1/15/20, 52:4-11 and 53:11-13 (Twait); HT 2/3/20, 209:3-6 (Liska). Since the adoption of AS 13-2 in April 2015, Emerald's highest daily maximum was 130 mg/L (July 2015), PHX 14, compared to the limit of 140 mg/L. For the same time period, the highest 30-day average was 102 mg/L (July 2016), PHX 14, compared to the limit of 110 mg/L. The "buffer," if that is what you want to call it, is a whopping 7% for both. That seems pretty minimal. Further, the Agency did not run any models, and no one testified that setting limits requires a model. Models were not used to arrive at the numeric limits imposed in AS 02-5 and AS 13-2. There is no requirement to use a model.

Second, the Agency repeats Mr. Liska's charge issued in Lacon that Emerald's proposed load limits were arbitrarily set without considering the DMR data. ACB, 33 (citing HT 1/15/20, 184 (Liska)). That charge was never true. As Mr. Hathcock explained, Emerald reviewed its monthly DMR load data and compared it to the AS 13-2 limits. From April 2015 when AS 13-2 was adopted through 2019, the daily maximum load never exceeded 34% of the AS 13-2 limit and the 30-day average load never exceeded 51%. PHX 1, ¶ 51 (Written Testimony of

[12] The Agency displays three graphs regarding MBT from USEPA's TRI Explorer. ACB, 34-36. We do not understand how these show Emerald's proposed limits are arbitrary or even relate to setting ammonia limits.

Hathcock); *see also* PHX 14, numbered p. 3. Based on that review of the DMR data and knowledge of the plant, Emerald exercised its judgment that it could reliably comply with load limits that were 25% lower than the AS 13-2 limits. PHX 1, ¶ 51.

Beyond that, did Agency counsel forget that Mr. Liska recanted his charge? After Mr. Hathcock's testimony was read back, Mr. Liska testified as follows:

> Q. And so what this is – what this calculation is doing is it's comparing the maximum for each year from the DMRs –
> **A. Okay.**
> Q. -- to the load limit that was set by the Board in AS 13-2?
> **A. Okay.**
> Q. So doesn't – isn't that a method of considering the DMR data?
> **A. Yes, yes, it is.**
> Q. Yes, it is. So when you testified that Emerald did not take into account the DMR data, that testimony, in fact, was not true, was it?
> **A. It was a mistake. I – I was mainly about where the 25 percent came from. I must have missed that it was based off of the – that – the calculation was originally based off of the DMR.**

HT 2/3/20, 216:20 to 217:15 (Liska). He took it all back! Citing testimony that was later recanted undermines the credibility of the Agency's entire presentation.

To arrive at its proposed numeric limits, Emerald reviewed the DMR data, compared it to the AS 13-2 limits and exercised judgment – just like the Agency claimed it did. The difference is this. Emerald's witness coherently explained the basis for proposing those limits. The Agency never found a single inconsistency or error. In contrast, the Agency first had Mr. Twait testify to support its proposed limits, then dropped him for Mr. Liska and now presents yet a third explanation in the ACB. Each time, there were figures that could not be explained or the data reviewed could not be explained or errors were made in reviewing the data. Emerald's PHB, 57-59. If anyone's numeric limits are arbitrary, it is the Agency's.

That brings us to the Agency's third attempt to explain its proposed numeric limits. Recommendation 1 in Exhibit A to the ACB contains the same limits as in the Agency

Recommendation. Strangely, the Agency provides a different basis for those limits. ACB, 33 and 37, n. 16. Footnote 16 says the limits were derived as follows:

- Daily maximum concentration = highest DMR value from 1/31/14 to 7/31/19
- Daily maximum load = highest DMR value from 1/31/14 to 7/31/19
- 30-day average concentration = highest DMR value from 10/31/16 to 7/31/19
- 30-day average load = highest DMR value from 1/31/14 to 7/31/19

The above bullets say the Agency chose the highest DMR value because Footnote 16 says that Emerald "has not exceeded Illinois EPA's proposed load limits in that 5.5-year period." *Id.*, 37 n. 16. We assume the Agency meant the same for the concentration limits because Footnote 16 offers no other explanation.

The time periods chosen in Footnote 16 are unexplained. The Board will recall that Mr. Twait said all of the Agency's proposed numeric limits were derived from a mere nine months of data (September 2018 through May 2019) – five of which he admitted might not be appropriate to use. Mr. Liska relied on the same nine months to support the concentration limits. For the load limits, he reviewed DMR data from some month in 2014 through some month in 2019, but his testimony as to exactly which months he relied on was confusing. Emerald's PHB, 57-58. Footnote 16 offers no explanation as to why the Agency chose these time periods, why they are different from the periods used by its witnesses or what support the time periods have in the record. By themselves, the time periods are arbitrary and capricious.

Even worse, the Agency's statement that Emerald has not exceeded the proposed limits is not true. As shown in the following chart, Emerald had at least one month of reported data in excess of each of the Agency's proposed limits.

Limit Description	Footnote 16 Time Period	Agency Proposed Limit	DMR Values Greater Than Proposed Limit (from PHX 14)
Daily Max (mg/L)	1/31/14 - 7/31/19	110	130 (July 2015) 120 (July 2016) 120 (April 2018)

Limit Description	Footnote 16 Time Period	Agency Proposed Limit	DMR Values Greater Than Proposed Limit (from PHX 14)
Daily Max (lb/day)	1/31/14 - 7/31/19	553	573.0 (March 2014) 757.8 (April 2014)
30-day Avg (mg/L)	10/31/16 - 7/31/19	89.9	99 (March 2018)
30-day Avg (lb/day)	1/31/14 - 7/31/19	475	494.4 (April 2014)

How did Agency counsel make this mistake? Emerald summarized the DMR data in three short pages in PHX 14, and Mr. Liska verified that those values were correct. HT 2/3/20, 210:16 to 211:1 (Liska). Emerald asked Mr. Liska why he failed to notice DMR values greater than the Agency's proposed limits, *id.*, 206:22 to 207:6 and 210:3-15, so, Agency counsel surely knew there were higher DMR values. *See also* PHX 1, ¶¶ 49-50 (identifying DMR concentrations that exceeded the Agency's proposed limits). It is almost as if the author of Footnote 16 tried to block out PHX 1, PHX 14 and the Springfield testimony. We hope this was just an oversight. Regardless, it reinforces the arbitrariness of the Agency's proposed numeric limits.

In addition to the three months identified in the preceding chart, there are 10 more months from January 2014 through July 2019 in which the reported daily maximum concentration was equal to the Agency's proposal. PHX 14, numbered pps 1-3. Limits in NPDES permits are never to be exceeded and so should have some leeway so that production is not limited. The Agency's proposed daily maximum has no leeway and no rational basis, and Emerald's proposed daily maximum (140 mg/L) should be adopted.

In addition to the month identified in the preceding chart, there are another four months between January 2014 and September 2016 that exceed the Agency's proposed 30-day average concentration. PHX 14, numbered pps 1-3. The Agency offers no explanation for the Footnote 16 time period for this concentration limit or why it is rational to choose a different time period for the 30-day average. Thus, it would be arbitrary and capricious not to consider the data from

January 2014 to September 2016. The Agency's proposed 30-day average has no rational basis, and Emerald's proposed 30-day average (110 mg/L) should be adopted.

As to the load limits, Emerald has already demonstrated that the Agency's proposed limits are arbitrary and capricious, inconsistent with the NPDES permit writer's manual and contrary to the manner in which the Agency set load limits for other ammonia dischargers. Emerald PHB, 58-60. The Agency's proposed load limits have no rational basis. Emerald's proposed limits (daily maximum of 1,225 lbs/day and 30-day average of 631 lbs/day) are rationally explained above and should be adopted. Emerald PHB, 52.

Construction Permit (within 6 months) – Recommendation 3

This recommendation is essentially a "heads I win; tails you lose" condition. It says that even if the Board grants an AS (meaning the Board has found for the third time that the treatment alternatives are not economically reasonable), Emerald must submit a construction permit to the Agency within six months to implement a pre-treatment alternative or an end-of-pipe treatment alternative. Emerald applauds the Agency's creativity, but this is obviously ridiculous. Emerald has proven that every requirement for issuing an AS is met. Because granting the AS is justified, there is no factual or rational basis for this condition.

Reporting – Recommendation 4.b.

This recommendation is similar to Agency Recommendation condition 3.p. Its proposal for Emerald to submit a written report six months after the Board's grant of an AS and annually thereafter is not much different than the reporting proposed in the Project Plan (first report July 31, 2020, annual reports beginning January 31, 2021). Emerald prefers its schedule just because the dates need not be calculated in reference to the Board's decision date.

Mexichem Conditions – Recommendations 4.e. and 4.f.

Recommended condition 4.e. would require Emerald to "continue quantifying" ammonia and TKN from Mexichem. Emerald has already submitted to the Board (and the Agency) a large amount of ammonia and TKN data regarding Mexichem. More is being collected pursuant to the Project Plan. A condition requiring Emerald to "continue quantifying" that data is unnecessary and potentially wasteful. Data being collected for the Project Plan is targeted toward providing information that will contribute to process improvements. That data will be reported to the Agency, and they can suggest gathering more data if they think it inadequate. If that data shows consistent patterns with little variation, there may be no point in collecting more data.

Recommended condition 4.f. would require Emerald to evaluate "the removal and the pre-treatment of Mexichem's waste stream and any impact such changes" would have on Emerald's waste streams and treatment. The condition is a little vague, which is reason enough to reject it. Emerald PHB, 67. Perhaps it is meant to require Emerald to evaluate separate treatment of Mexichem's waste stream. In AS 02-5, the Board found that partial treatment alternative (it was then projected to reduce ammonia by only 47%) was not economically reasonable. In this proceeding, the testimony is that it is a bad idea that would make Emerald's waste stream harder to treat. Emerald PHB, 49. This condition should not be adopted.

Construction Permit (at AS expiration)– Recommendation 4.g.

If the Board grants an AS, this recommendation would require Emerald to submit a construction permit to install a treatment alternative if it is unable to meet the Section 304.122(b) limits by the expiration of the AS. This is another "heads I win; tails you lose" condition, like recommendation 3, except that the coin flip is delayed. That is reason enough not to adopt it. This recommendation would also operate like a pre-condition on Emerald's right to request a

new AS. If Emerald is compelled to submit a construction application that makes a petition for a new AS moot, that is a pre-condition. The Board cannot put pre-conditions on a company's right to petition for an AS. *Emerald Performance Materials,* 2016 IL App(3d) 150526, ¶¶ 26-27. If the Board grants this AS, there will be time enough to evaluate what action is appropriate when the expiration of the AS arrives. This condition should not be adopted.

IV. Responses to Issues Only Raised in Public Comments.

The public comment of the Sierra Club raises a few factual and legal issues not raised by the Agency. In each instance, Sierra Club is wrong as a matter of law, misstates the facts or has no factual support for its position. Emerald addresses those in turn.

The Sierra Club seems to believe that the standard from which Emerald seeks an AS is the regulation for determining ammonia water quality based effluent limits at 35 Ill. Adm. Code Part 355. Sierra Club PC, 4 and n. 5. That is incorrect. As it did in AS 02-5 and AS 13-2, Emerald has requested an AS from the ammonia *effluent* standard applicable to the Illinois River and certain tributaries at 35 Ill. Adm. Code 304.122(b). *See* Emerald's PHB, 22.

The Sierra Club also recycles the most tired of environmental group clichés -- that industry is trying to avoid compliance and/or avoid incurring costs. *See e.g.* Sierra Club PC, 4-5. To support this charge, in part, the Sierra Club incorrectly cited a quote as being from an Emerald response in October 20**19**. *Id.*, 5, n. 10. In fact, the quote was from Emerald's October 8, 20**13** Response to Hearing Officer Order submitted in AS 13-2. That sloppiness caused Emerald significant inconvenience in trying to locate the source of the quote. Further, the statement made in 2013 does not reflect Emerald's current position. Emerald supports AS conditions requiring implementation of its Project Plan and setting an expiration to the requested AS. Emerald's PHB, 54-56. Moreover, Emerald's position is not that it should avoid necessary expenditures. Rather, the costs of end-of-pipe control alternatives, the only alternatives that

could now ensure compliance with Section 304.122(b), are not economically reasonable. *Id.*, 31-48; *see also* above, 22-30. Thus, those expenditures are not necessary.

The Sierra Club states that Emerald's proposal to eliminate AS 13-2 Conditions 2.e, 2.g and 2.h is an effort to avoid costs. Sierra Club PC, 6. And, then it later states that "Emerald is similarly unwilling to evaluate GAC followed by biological treatment . . .." *Id.*, 10. The first statement might be hyperbole; the second is recklessly false. Condition 2.e required evaluation of GAC, river water dilution and spray irrigation. In fact, Emerald incurred the costs and had those specific studies prepared in 2018. *See* PHX 11; HT 1/14/20, 181:16 to 182:3 (Flippin). They were the subject of extensive testimony at hearing. We understand that public commenters are not as familiar with the record as parties. Still, Sierra Club should take more care to not misstate facts. As to Conditions 2.g and 2.h, they imposed no costs on Emerald.

Sierra Club argues that there may be alternatives to MBT that could be used, Sierra Club PC, 8, but it points to no evidence. MBT-based accelerators are inexpensive and efficient and are essential to the manufacture of tires and industrial rubber products. It is highly unlikely they will be replaced. PHX 1, ¶ 24 (Written Testimony of Hathcock).

If an AS is granted, Sierra Club states that the Board should include a plethora of conditions. Sierra Club PC, 2. The record does not support the need for the conditions on mixing zones, mussel protection or DO issues. *See* above, 3-5. Conditions related to mussels, DO or nitrate loading would be contrary to established law that conditions should not be based on future regulatory action and must be connected to the general standard from which an AS is requested. *Emerald Performance Materials*, 2016 IL App(3d) 150526 ¶¶ 31 and 34.

CONCLUSION

For all the reasons stated in Emerald's PHB and above, Emerald has met its burden of proof as to all four elements required for the grant of an adjusted standard. The Board should grant the adjusted standard with the conditions set forth in Emerald's PHB at 50-52.

Respectfully submitted,

Emerald Polymer Additives LLC.

March 25, 2020

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CERTIFICATE OF SERVICE

I, the undersigned, certify that on March 25, 2020, I have served the attached **Notice of Electronic Filing** and **Emerald's Response to Agency Closing Brief and Public Comments** upon the following persons by electronic mail:

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