BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	No. AS 19-002
	)	(Adjusted standard)
Petition of Emerald Polymer	)	
Additives, LLC, for an	)	
Adjusted Standard from 35	)	
Ill. Adm. Code 304.122(b)	)	

REPORT OF THE PROCEEDINGS held in the above entitled cause before Hearing Officer Carol Webb, called by the Illinois Pollution Control Board, taken by Steven Brickey, CSR, for the State of Illinois, 1021 North Grand Avenue, Springfield, Illinois, on the 4th day of February, 2020, commencing at the hour of 8:07 a.m.

A P P E A R A N C E S

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HEARING OFFICER WEBB: All right. Good morning. My name is still Carol Webb and this is still the hearing for AS19-2 Petition of Emerald Polymer Additives for an Adjusted Standard From the Total Ammonia-Nitrogen Effluent Standard in 35 Ill. Adm. Code in 304.122(b).

Joining me today is the Board's chief scientist Anand Rao and I believe our Chicago personnel will be joining us a little later here. It is February 4th, 2020, and we are beginning at 8:00 a.m. or a few minutes past. Today we will resume with the Agency's case.

Does the Agency wish to call another witness?

MR. GRADELESS: The Agency has no further witnesses.

HEARING OFFICER WEBB: Do you have anything further to present in your case?

MR. GRADELESS: We do not.

HEARING OFFICER WEBB: Okay. Mr. Dimond, I understand that you would like to call several rebuttal witnesses?

MR. DIMOND: We would, and I would turn it over to Ms. Weyhing. Okay.

MS. WEYHING: Emerald would like to call our first rebuttal witness Houston Flippin.

HEARING OFFICER WEBB: Mr. Flippin, please take a seat in the witness chair and I will remind you that you're still under oath.

R E B U T T A L E X A M I N A T I O N

BY MS. WEYHING:

Q. Mr. Flippin, good morning.

A. Good morning.

Q. First of all, are you a licensed professional engineer in the State of Illinois?

A. Yes, I am.

Q. Are you licensed in other states, too?

A. I am. Fifteen others.

Q. Are any of those 15 adjacent to Illinois or in the Midwest?

A. Yes, the ones that are adjacent are Ohio and Indiana, also Michigan.

Q. Are you board certified in your field?

A. I am, by the American Academy of Environmental Engineers.

Q. What is involved in obtaining Board

certification?

A. Board certification, much like the professional engineering license, first of all, requires that they verify that you're -- that you have the degrees that you say you have, that it came from an ABET accredited university and that you do, in fact, have your PE, your professional engineering license, and I sat before a written exam in my specialty and an oral exam both -- my specialty is water and wastewater. That's what I'm certified in.

Q. Okay. Now, you've been present for all the hearing testimony both in Lacon and here yesterday, correct?

A. Yes.

Q. Can you explain for us how nitrification works?

A. I will be glad to. Nitrification is a process that happens in the presence of surplus oxygen, residual DO in which one set of organisms takes ammonia to nitrite in O2. The second set of organisms takes nitrite to nitrate and so in nitrification you basically go from ammonia to nitrate when it's completed.

Q. So at the end of the nitrification step, is nitrogen bubbling out as bubbling gas?

A. It is not.

Q. Well, is there anything that happens after nitrification?

A. If one -- if one removes the presence of the oxygen after nitrification and still provides some BOD, then what happens is the organism takes nitrate to nitrogen gas in what's known as denitrification that is found in the presence -- in the absence of oxygen and that nitrogen gas does bubble out.

Q. Okay. Now, you previously testified that you evaluated spray irrigation as one of the alternatives for Henry plant and I want you to walk me through it.

A. Okay.

Q. What was the first thing that you did in order to evaluate that alternative?

A. The first thing we did was we characterized the effluent to see what was in it and then once we saw what was in it, particularly in terms of nitrogen content, because we were picking a crop that would have a certain nitrogen

uptake rate. The second something we did is we looked at the salinity, salt content, of the effluent which is expressed as electroconductivity, which is expressed as some say mmhos/cm. It's easier for me to say mS/cm and so we -- we look at those two things, the nitrogen -- we had to pick a crop that would have a nitrogen uptake and a crop that was salt tolerant.

Q. Why is it important for the crop to be salt tolerant?

A. Each crop has a threshold concentration known as its EC threshold above -- above which the yield on the crop starts deteriorating and you can actually quantify the deterioration you get for how extra salty it is above its threshold and then based on that decrease in yield, you'll know how many more acres you need depending on the salt level.

Q. Okay. What was the electrical conductivity of Emerald's wastewater?

A. Approximately, 15.5 mS/cm.

Q. How did you know that?

A. We measured, again, the total

dissolved solids. We measured calcium, sodium, potassium, chlorides, sulphates. We looked at that comp- -- we looked at the composition of the salt content and their published factors for scaling from total dissolved solids to electroconductivity. We applied that and got the 15.5 EC.

Q. Okay. So you have the 15.5 number which is a specific conductance of Emerald's wastewater?

A. Yes.

Q. Then what did you do?

A. Then we picked a crop that could -- that, again, had a high nitrogen uptake and could tolerate the saltiness of the effluent and what we found is there was no crop that would -- that would take that saltiness without seeing a decrease in yield.

Q. What crops did you study as part of this alternative?

A. The best one we could find was Bermuda grass or hay and the other two we looked at were the two most popular grown in the area which are soybeans and corn.

Q. How did you go about determining the feasibility of spray irrigating corn or soybean with Emerald's wastewater?

A. We looked at the threshold EC concentration for soybeans and corn and then we asked ourselves "How far would we have to dilute the effluent so that we don't kill them and could we even land apply the effluent undiluted without killing them?"

Q. How did you know what the threshold was for corn or soybean?

A. It's published. As a matter of fact, the Department of Agriculture has a book that we use. One of their members published it in 1980. It's kind of a -- it's kind of a go-to book for a lot of people who are involved in designing land application systems and that's what we used.

Q. Mr. Flippin, I'm showing you what has been marked as Petitioner's Hearing Exhibit 23.

(Document marked as Petitioner's Exhibit No. 23 for identification.)

BY MS. WEYHING:

Q. What is this document?

A. This document is the design and operation of farm irrigation systems published by -- it's edited by M.E. Jensen and it is part of the American Society of Agricultural Engineers.

Q. Okay. Is this the publication that you just testified about?

A. Yes.

Q. Now, it's not the full publication, right?

A. Right.

Q. What is this?

A. This is a copy of a table that we use, Table 5.1, which is called the Salt Tolerance of Agricultural Crops as a Function of Sole Saturation Extract Salinity. And so this is the table we use for judging the viability of whether or not the effluent could be applied diluted or undiluted of the Henry's effluent on these crops.

Q. Okay. And that table is at Page's 158 through 160?

A. Yes.

Q. Is this a true and accurate copy of

the table?

A. It is.

Q. So using this table, what did you conclude about spray irrigating corn or soybean with Emerald's wastewater?

A. It's a -- it's a nonstarter on the undiluted effluent.

Q. Why is it a nonstarter?

A. The -- if you take the -- if -- the way you do it is you take the EC concentration of the effluent, which is 15.5.

Q. Mr. Flippin, I want to interrupt you really quickly. What does EC mean?

A. Sorry. Electroconductivity.

Q. Okay. Continue.

A. So what we did is we looked at the threshold concentrations and we then looked at the saltiness of the effluent and what you do is you take the saltiness of the effluent, subtract the threshold concentration and that's how much extra salty it is and then you multiply that by the decrease in yield that you get for extra -- for each extra mS/cm and then you calculate what would be your decrease in yield if you applied the

undiluted water, undiluted effluent, and what we found for corn and soybeans is that -- is that the decrease in yield is more than negative 100%. In other words, it would never grow.

If you were to land apply the effluent on undiluted -- if you were to land apply the undiluted effluent on corn and soybeans, it would never grow. It would be barren ground. You would be looking out on acres and acres of just barren ground.

Q. Looking at the table, what were your conclusions about Bermuda grass?

A. You could land apply undiluted effluent on Bermuda grass, but what you'd find is you'd get a 55% decrease in yield if you did that. So you can either provide about twice as many acres and get the full crop yield or you can apply it undiluted and provide twice as many acres and that number was about 270 acres if it were diluted and it would be about 600 acres if it were -- if it were undiluted.

Q. Okay.

MS. WEYHING: Hearing Officer --

BY THE WITNESS:

A. There is a problem with the undiluted version, though.

BY MS. WEYHING:

Q. I do want to get there, Mr. Flippin.

MS. WEYHING: First, Hearing Officer Webb, I'd like to move Exhibit 23 into evidence.

MR. GRADELESS: No objection.

HEARING OFFICER WEBB: Exhibit 23 is admitted.

BY MS. WEYHING:

Q. Okay. First, Mr. Flippin, undiluted, does the amount of crops over which the wastewater is applied matter at all for your spray irrigation analysis?

A. No.

Q. Why not?

A. The -- what matters is the concentration of salt surrounding the root zone and so if you apply the undiluted effluent during a period of non-rainfall, particularly if that lack of rainfall lasts, like, let's say two weeks, the root zone sits in that saline effluent electroconductivity, which then would basically

kill the plant. It's that much higher than its threshold.

Q. Okay. But what you're telling us is based on a standard amount of water per acre per day, right?

A. It is based on -- if you don't apply it -- if you don't dilute it, no amount of water could you apply during a period of non-rainfall without killing the plant because it would -- the root zone can't help it. It would sit in the undiluted effluent.

Q. Okay. But suppose hypothetically that we decrease the amount of water per acre per day. So, for example, by taking the same amount of water as before, but applying it to 10 times more acres, would that make a difference to your analysis?

A. Not on corn and soybeans at all, you'd still kill them.

Q. What about for Bermuda grass?

A. You can. You can apply Bermuda grass over -- or hay over twice as many acres undiluted as you do over half as many acres diluted.

Q. Okay. How much river water would we need in order to dilute Emerald's wastewater to successfully irrigate corn or soybean?

A. About -- for corn, it's about 14 gallons of river water per gallon of effluent. For soybeans, it's about 2.4 gallons of river water per gallon of effluent.

Q. And how does that compare with Bermuda grass?

A. Bermuda grass or hay is 1.4 gallons of river water per gallon of effluent.

Q. For the corn and soybean, once you've diluted the wastewater that much, is there any agronomic benefit left?

A. Very, very, very little because what you've done is the whole purpose of applying this to the crop was to get nitrogen uptake and those crops do need nitrogen to produce a yield and so when you dilute the water that far, you're having to come back in behind and add fertilizer to make up for the lack of nitrogen you didn't provide with the effluent.

Q. Okay. Now, you previously testified that we would need 270 acres of Bermuda grass if

the wastewater was diluted --

A. Right.

Q. -- but that we would need 600 if it was undiluted, are there any problems with trying to spray irrigate 600 acres of Bermuda grass?

A. Yes, there are several. One of which is if we spray irrigated 600 acres instead of 270, half of the nitrogen uptake that's needed for the Bermuda grass to have its yield has to come from fertilizer and so you would be still providing half the nitrogen uptake through fertilizer addition.

The second thing is the State of Illinois is not a cattle farming state and so trying to -- trying to find a market for your 600 acres of Bermuda grass would be difficult at best if you could even find somebody to take it.

Q. Would there be any additional costs associated with the 600 acres?

A. Yes, much more extensive system. To put it in perspective, 640 acres is a square mile. So we're talking about a square mile of irrigation area and that's a very expensive endeavor.

Q. Why is it an expensive endeavor?

A. To run the pipes, pivots and all of that from the Henry plant to, first of all, finding a farmer who would take it, finding a farmer who is willing to not grow a more profitable crop, to grow a less profitable crop and to still have to provide half the nitrogen needed to fertilizing and running the pipes, pumps and irrigation pivots over a square mile of area, this isn't -- it's an expensive undertaking.

Q. Now, there's been a lot of testimony about tertiary nitrification. In simple terms, what is tertiary nitrification?

A. Tertiary nitrification truthfully means nitrification downstream of a secondary treatment system which is activated sludge typically in a secondary clarifier. So the appropriate use of the word tertiary nitrification means nitrification that happens after the secondary clarifier.

Unfortunately, in these proceedings, those two terms, tertiary nitrification and single stage nitrification, have been mixed and that's a tragedy that that happened because it horribly miscommunicates nitrification.

Tertiary nitrification is a step increase in unit cost for ammonia removal because the only reason it's there is to remove ammonia, tertiary nitrification.

Single stage nitrification is very inexpensive because it -- the same BOD removal, suspended solids removal, all of that is happening within the confines that the nitrification is happening. So the unit cost of single stage nitrification is way less than tertiary nitrification. So we can't ever describe those as being equal. They are absolutely not equal at all.

Q. Okay. Is treating just the water coming out of the PVC tank, in other words, primarily Mexichem's wastewater, tertiary nitrification?

A. No.

Q. Why not?

A. It's single stage nitrification which is, again, one of the most economical means of providing nitrification. It is the most economical means because the PVC tank has BOD in it, suspended solids in it. It also needs to be

primary clarified because of the degree of suspended solids. So if you were to try to treat PVC wastewater by itself, you'd have to essentially replicate the types of treatment that are already being provided in the Emerald facility.

Q. Would you have to build a separate treatment train?

A. You would.

Q. So this treatment of the PVC tank which you said is not tertiary nitrification, how would you characterize that?

A. I would characterize it as single stage nitrification and, if I might add, treating the PVC wastewater separately is a bad idea.

Q. Okay. Why?

A. It's a really bad idea because right now the Emerald facility needs to remove -- to get nitrification in their existing tanks, they have to -- and they're making strides on it reducing MBT in their effluent. If they don't have the fourfold dilution provided by the Mexichem wastewater, they would have to reduce the MBT four times lower.

Q. Have you ever evaluated treating the PVC tank wastewater separately?

A. Yes, I have.

Q. When was that evaluation?

A. I did it in the -- prior to 2004 because we -- that was in our 2004 report.

Q. By itself, would that alternative achieve compliance with applicable limits?

A. Not at all.

Q. What was your conclusion about the technical feasibility and economic reasonableness of that alternative in 2004?

A. It was not economically reasonable.

Q. Why wasn't it economically reasonable?

A. Because, again, you have to totally replicate the treatment process that you already have in place. So you have a whole other parallel treatment system and then all you did by doing that was remove the nitrification load from the -- from the Mexichem wastewater. You still have the nitrogen load from the Emerald wastewater which, if you will, would still be left even in worse shape because you're no longer blending the two.

It would be left in worse shape and even more prone to being unable to nitrify.

So you'd be discharging the ammonia that can't be nitrified from the Emerald facility with, granted, much less ammonia coming out of the PVC -- the Mexichem side, but it would still, when combined, not meet the standards.

Q. Why didn't you reevaluate this alternative in 2019?

A. It was economically unreasonable nor could it attain the standards.

Q. In your opinion, is there any reason to study this again?

A. No.

Q. Why isn't there a reason to study it again?

A. Again, it's a bad idea and the reason it's a bad idea is that the Mexichem wastewater actually helps dilute the more difficult Emerald wastewater. So why would anyone build a separate treatment train and avoid that advantage?

Q. What about this idea of rehabbing the existing biotreaters in order to take water

from the secondary clarifier and route it over those, is that tertiary nitrification?

A. That would be tertiary nitrification.

Q. What are your thoughts about that proposal?

A. The economics of that is something one would have to look at. I have already costed what tertiary nitrification looks like in the confines of an RBC unit. Whether or not you can do it less expensively through the rehabbed biotreaters with media and pumping and piping systems, also updating the aeration equipment, I'm not sure if you would find any benefit -- economic benefit there, but it would certainly have to be considered.

Q. Why wouldn't there be an economic benefit? I mean, shouldn't it be cheaper to use the existing biotreaters rather than to build a new system like you have in your report?

A. Not necessarily because the media cost -- the random packing that you would need to put in the biotreaters to get the tertiary nitrification is very expensive. Second of all,

these biotreaters definitely would need to be pumped, too. You'd have to pump the effluent from the secondary clarifier up there, distribute it, bring it back, you'd still need the same alkalinity addition system that the RBC system needed.

You would still need -- you would need steam addition most likely to the biotreater option because when you start doing tertiary nitrification in aboveground tanks in Illinois in the winter, they're going to cool significantly. Unlike the RBC which doesn't need to be heated, this very well could need to be heated and that also makes the cost go up.

Q. There has also been a lot of testimony about baffles, this idea that we modify Emerald's existing biotreaters with a baffle so that each one has a side A and a side B, do you recall that testimony?

A. I do.

Q. Are you familiar with using baffles in a wastewater treatment system?

A. I am.

Q. In simple terms, what is a baffle?

A. A baffle is intended -- typically, the way one uses the expression baffle is to redirect flow. It's -- it's a partial wall or to redirect flow is how it's typically used. That's not how it was used in this description, in the testimony.

Q. Are there different kinds of baffle systems?

A. There are. There are typically -- the baffles that one thinks of are just separately partial partitioning walls in which the liquid level on one side of the baffle is automatically the liquid level on the other side because the two are hydraulically connected and what you typically do with a baffle is you partition a tank into two different zones where you're distinctly doing something different in each zone.

I've used them myself in Chesterfield County, Virginia to accomplish denitrification on one side of the baffle and nitrification on the other side of the baffle and those are baffles that you -- are basically flow-thru baffles that just partition zones.

Q. Okay. So back on January 15th as

you were hearing Mr. Liska's testimony, the baffles -- about the baffle's in realtime, did you understand what he was talking about?

A. I did not.

Q. Why not?

A. It was confusing to me in the testimony at the time. Were we talking about a partial wall in which the two sides were hydraulically connected or were we not?

Q. Do you have a better understanding of what that proposal was now?

A. I do.

Q. Okay. So now that you understand the concept, in your opinion, would a baffle system that allows water to flow from side A to side B work at the Henry plant?

A. It would not in the -- in the context of activated sludge as they practice it today because, quite candidly, whatever is inhibiting the bacteria on side A or -- is still inhibiting the bacteria on side B. So it doesn't really offer an advantage to have this hydraulically connected baffle system.

Q. Okay. So if we distinguish between

the hydraulically connected baffle and a watertight wall, would a watertight wall between side A and side B to the tank allow Henry plant to achieve nitrification?

A. As it was suggested, if side B were used for tertiary nitrification and side A were used for conventional activated sludge, in concept, that could work. There is only a couple of problems with it.

Q. What are those problems?

A. Those tanks were never meant to have a high -- a partitioning wall between them. They weren't built for that. The exterior wall is not meant to take the stress of an interior wall being attached to that exterior wall, particularly the biotreaters, the older ones, the three smaller ones. They have steel floors.

So putting the baffle in, you'd be having to -- you'd be having to connect the floor to the baffle through welds. You'd have to connect the side through welds and any movement in the baffle wall would -- would put movement on the floor and movement on the exterior wall, which would then lend the tank, in the worst case, to a

collapse.

Q. Would there be any loss of capacity as a result of installing a baffle in one of these tanks?

A. There -- the capacity you would lose is -- the good news is you'd have one tank split into two. The bad news is you might cause failure of the tank, but the other bad news is that the -- you no longer -- you have given up, if you will, the ability to use that tank for the single purpose whether it be tertiary nitrification or whether it be activated sludge treatment.

Q. Okay. Would there be any issues with the flow in the tank as a result of the baffle?

A. It would because, again, let's pretend that you did put the baffle in and let's pretend you tried to take great care to keep stress off that inner baffle to keep the tank from collapsing. Yes, there are level sensors that you could try to keep the level the same in both tanks, but if the level sensor fails and you get significant difference in level on each side of the baffle, you'll put such pressure on it that

you literally could collapse the tank.

The second thing is if you're making all this effort to keep the level the same on both sides of the baffle, you can't take one side down and leave the other side up. The whole tank has to come down and come up at the same rate. So it doesn't really offer you the flexibility that -- that was alluded to yesterday because they don't behave as two separate tanks anymore because the level has to be kept the same.

You can't just lower one or take one out of service or repurpose one and not repurpose the other. They have to work together which kind of defeats the purpose of segregating them.

Q. Well, what if the baffle isn't right down the middle of the circular tank, does that change?

A. It does not. It's the same predicament. It's the same predicament of tension being placed on the wall -- the floor and the wall created by a baffle the tank was never designed to have.

Q. Are these problems something that a

licensed professional engineer would recognize?

A. Certainly would recognize the need to look at it.

Q. Okay. Have you ever heard of an industrial wastewater treatment plant partitioning a circular tank with a watertight wall to maintain these two watertight zones?

A. Not only have I not heard of that in my 35 years of practicing, I reached out to two of my -- my peers who are both in our construction side of the business and asked one of them with four years of experience has he ever heard of it. His answer was no and the other one with 15 years of experience has he ever heard of it. His answer was no. They both thought the risk would be so great in doing it that very few would choose to go down that path.

Q. Looking at these two tertiary nitrification ideas, either the biotreaters or the baffle, would bringing the biotreaters back online or the baffles increase the salt load of Henry plant's wastewater to the Illinois River?

A. Tertiary nitrification unquestionably is going to increase the salt load

on the Illinois River. Hands down it's going to and the reason it's going to is for every pound of ammonia you remove you need 7.14 pounds of alkalinity. So you have to add alkalinity to get the tertiary nitrification to proceed all the way and when you add alkalinity you can't help it. You're adding salt. Typically it's sodium hydroxide, it can be magnesium hydroxide, but either of those adds salt.

Q. Okay. Now, you just stated that the tertiary nitrification proposal you evaluated is an RBC --

A. Yes.

Q. -- what is that?

A. It's a rotating biological contactor, which imagine -- you've seen rotisserie chickens --

Q. I have.

A. -- in the grocery store. So imagine a circular media that is attached to the center bar of the rotisserie. So it literally is rotating through the water and the bugs grow on it as it's rotating through the water and when it comes up out of the water, they get oxygenated.

When it goes back in the water, they pick up some more food and they just -- it's essentially a rotisserie media column.

Q. Why did you select that as the form of tertiary nitrification?

A. It's been around for ages. It is sound, it's proven, it's -- honestly, it doesn't command much of a markup because it's been around so long. As a matter of fact -- so, honestly, it's an economical way -- one of the more economical ways of trying to do tertiary nitrification.

The other reason is it -- because the residence time in it is short, it has a small footprint. That's the other advantage and they're short on real estate at the Emerald facility. Because of its short residence time, you don't get a chance for wastewater cooling. So you don't have to heat the wastewater like you would if you were to put it in an aboveground tank and aerate it for a while.

Q. Okay. So out of all of these three proposals we've talked about, which is the best idea?

A. Tertiary nitrification. In an ideal world, the Henry plant would be able to reliably do single stage nitrification, which means is the most economical. Without that, tertiary nitrification whether it be practiced in a tank or an RBC, it all boils down to economy and what is economically reasonable and we did not conclude -- we concluded that tertiary nitrification just has a high unit cost, much more than single stage and it is -- it is very difficult from -- from a cost perspective, from an economical reasonableness perspective.

Q. And I understand that that's in your report, correct?

A. Right.

Q. But I want to know out of the RBC or the baffles or the biotreaters, which of those three is the best idea for tertiary nitrification?

A. The one that -- the one that is the easiest to come to is the one that is most demonstrated, which is the one that we calculated which is RBC's.

Q. Why are the RBC's a better idea than rehabbing the biotreaters and bringing them back

online as part of tertiary nitrification?

A. Two things. One is if you do -- if you do bring those back online as tertiary nitrification, you would have to have -- you just got rid of some tanks that are about to be shortly needed for the taking the north biotreater out of service. So you'd have to build additional tankage. I know yesterday it was talked about renting those types of things, but typically the rental aeration basins are about 21,000 gallons a piece, that those are aerated frac tanks and you can bring these in like a tractor trailer and set those up.

In Emerald's case, you'd need about 70 of them. So imagine parking 70 tractor trailers in -- around the wastewater treatment plant and trying to distribute flow amongst 70 units. That would be incredible, incredibly difficult at best. So finding rentals for 1.4 million gallons is -- is very difficult at best, if even plausible.

And so we would have to provide some tankage to allow -- if we confiscated the three biotreaters for tertiary nitrification, we

would have to provide tankage to allow the north one to be taken out of service for -- for repair and inspection.

Q. Why are the RBC's a better idea than the concept of a watertight wall where it's been described as a baffle?

A. Well, we really can't do a watertight wall in those three existing biotreaters unless someone was willing to take on extreme risk of failure.

Q. Mr. Flippin, have you worked with a system that uses hydrogen peroxide at an oil refinery before?

A. I have.

Q. What was your experience?

A. It was actually quite similar to what was testified yesterday about. At the Tesoro refinery in California, we did the design for the treatment plant upgrade there to remove ammonia and BOD and what we found was that we also needed to oxidize the sulfides ahead of this treatment to promote better sludge settling.

So we recommended hydrogen peroxide addition for sulfide removal upstream of

the Tesoro wastewater treatment facility and the good news about hydrogen peroxide it's very selective for oxidation of sulfides. If you add hydrogen peroxide to water that has sulfides in it and other things in it, it's typically the sulfide would get oxidized first. So it's great for selective treatment of sulfides.

Q. I'm looking at State's Exhibit 20.

A. Yes.

Q. I believe you have a copy of that in front of you. If you can pull it out for me, please.

A. Yes.

Q. What is your understanding of what this permit is for?

A. It says in the second paragraph, "To construct a hydrogen peroxide tank and injection system to treat tank TK 588 to supplement the benzene recovery unit before discharging to the Joliet Refinery Wastewater Treatment Plant for treatment."

Q. How do sulfides enter the equation there?

A. They -- it appears from listening to

testimony yesterday that the purpose in this system was to -- was to oxide the sulfides, which, by the way, is different than organelle sulfur, which is what we really have at the Emerald plant, not sulfides.

Q. Let me back you up. Is sulfide the same thing as MBT?

A. No.

Q. Okay. How are they different?

A. First of all, MBT is not only -- is -- not only is it not a sulfide, it can't become a sulfide.

Q. Why not?

A. Because it's an organelle sulfur and sulfide is an inorganic constituent, it has no organic associated with it and sulfide carries a double negative charge. So it is essentially an ion in the water readily oxidizable by something like peroxide. On the other hand, MBT is organelle sulfur. Sulfur itself has a -- has a zero charge. It's -- it's bound in the organic compound.

Q. Okay. The subject of this permit is ExxonMobil Oil Corporation, correct?

A. Yes.

Q. From a technical, scientific standpoint, is the use of hydrogen peroxide by Exxon in any way useful in evaluating hydrogen peroxide at the Henry plant?

A. No.

Q. Why?

A. Two totally different uses. One is a highly selective use for oxidizing sulfides, which, again, I've done that. The other one is implying that MBT is a sulfide and it's not. It's also implying that they're not -- that it can be selectively used at Emerald and peroxide addition at Emerald doesn't have the ability to be selective because at Emerald the wastewater is surrounded by high concentration of COD, chemical oxygen demand, and peroxide is a chemical oxidant.

So chemical oxygen demand plus oxidant -- you consume peroxide satisfying chemical oxygen demand and so if when you have a wastewater with high COD concentrations coming out of the PVC tank, their number is like 4,000. Coming out of the sub-streams upstream of the PVC tank they have been measured as high as 16,000.

So there's a lot of peroxide that would go to meeting chemical oxygen demand at the same time you're trying to use it to -- to oxide MBT.

Q. Okay. Mr. Flippin, you can go ahead and set that exhibit aside. I want to move on to questions about granular activated carbon treatment.

Did you study that alternative?

A. We did.

Q. Is the carbon in GAC selective in removing MBT?

A. It is not. As a matter of fact, MBT has a low affinity for carbon, meaning -- what I mean by that is something that has a high affinity for carbon you might be able to remove 0.3 pounds of it per pound of carbon, something that has a high affinity. Something that has a low affinity, I mean you're down to less than 0.03 pounds of pollutant removed per pound of carbon. Things that just have a really low affinity like MBT.

Q. Okay. Knowing that, how did you evaluate granular activated carbon at the Henry plant?

A. We tried to go to where we would find the highest concentration of MBT and the least concentration of competing COD and the only place that you can gather all of the MBT in one spot today at the Henry plant -- or actually two locations, the PC tank and the C-18 tank, that's the only place you can gather it today and we took those two streams as far as we could get upstream and put them through carbon and the reason we did it, again, is we were trying to avoid the competing COD that you would have gotten from Mexichem downstream.

Q. Okay. So there's been testimony during this hearing about applying GAC at different points throughout the Henry plant process, why didn't you evaluate granulated activated carbon at the primary clarifier?

A. The primary clarifier, if you will, removes -- can remove particulate COD. That's the good news about it. So whatever particulate COD you remove doesn't compete for the carbon. The difficulty is you've got a lot of soluble COD coming from Mexichem, not just particulate COD.

So, yes, you offset the carbon

usage by getting rid of particulate COD, but you don't offset the soluble COD present. So, again, our goal was to push the carbon back up into the process to where we had the least competing reactions besides that of absorption of MBT.

Q. In your opinion, is there any utility in evaluating GAC at the primary clarifier?

A. No.

Q. What about the flocculation, why didn't you evaluate it there?

A. The flocculation is actually a mixed stream before the primary clarifier. So it would be a little self-defeating. If you were going to look at carbon at all downstream of the PVC tank and the PC tank, it is true that you would either look at it -- if you wanted to do single stage nitrification, you'd look at it after the primary clarifier.

If you wanted to look at -- but it wouldn't make sense to look at it in the flocculation chamber because it's a mixed waste there, you haven't given it the benefit of being settled yet. So if there's any benefit of

settling, then you want to accomplish that first before you look at GAC.

Q. Okay. Well, why didn't you evaluate GAC at the secondary clarifier?

A. We could have. However, we had already demonstrated -- the whole purpose in the GAC was to see if we can get single stage nitrification to occur and if we put the carbon downstream of the secondary clarifier, we would have already been past the single stage, if you will.

Q. In your opinion, is there any utility in evaluating GAC and flocculation or secondary clarifier?

A. No.

Q. Are there any other points in the Henry plant wastewater treatment process where, in your opinion, it would make sense to evaluate GAC?

A. We evaluated it at the most economical place we could find and so to answer your question, no, I can't see a benefit of evaluating it elsewhere.

Q. An example was provided yesterday during testimony about groundwater remediation and

use of GAC in a groundwater remediation system.

Is that useful in evaluating use of GAC at Henry plant?

A. It's not and the reason it's not -- it's not coincidental that in groundwater remediation the people often use granular activated carbon because groundwater is relatively clean excluding the contaminant -- the trace contaminants that are often in it.

So, there, it doesn't matter that GAC isn't selective because so what. There is not much else competing and so -- but that's not true at the Henry plant. There is so much -- so many other things competing that it makes that comparison honestly moot.

Q. Okay. Mr. Flippin, in your expert report, which is Petitioner's Hearing Exhibit 12, you compare the cost of the treatment alternatives that you evaluated to costs per pound, information that was provided by the National Association of Clean Water Agencies, which you've already testified is NACWA.

Do you agree with Mr. Liska's testimony that the treatment technologies you

evaluated should have been compared to data based on absolute cost?

A. Absolutely not.

Q. Why do you say absolutely not?

A. It -- it has no meaning. No, meaning can it be assigned to any number -- to any cost unless you know what you're accomplishing for that cost and the only way you know what you're accomplishing for that cost is to put it in terms of what you're doing with that cost and in our case we are removing ammonia.

It would be absolutely silly to not consider unit cost. Not only would it not -- not only would it be silly, it would be just -- it doesn't have any rationale. It -- I can't see anyone gaining any benefit at all from looking at capital cost versus ammonia removal comparisons. I can't see that.

Q. Okay. Can you give us an example then of why considering total cost doesn't work?

A. Sure. Last time I testified, I said that Bush Brothers spent essentially $56 million and part of their project was ammonia removal. Well, someone could have mistakenly thought that

$56 million was primarily spent removing ammonia. It absolutely wasn't. A very small fraction of that had anything to do with ammonia removal.

As a matter of fact, the load there, COD load, is about 15 times higher than that of the Emerald plant and the ammonia load is not the large -- was not the driver in that project. The COD load was and the water reuse component was.

And so for someone to have tried to think that $56 million was associated with ammonia removal would have been horribly misled, horribly misled and led to a wrongful conclusion. The only way, again, that anyone can make sense out of cost when it comes to ammonia removal is to express them in terms of what those costs are accomplishing, which is pounds per -- dollars per pound of ammonia removed.

Q. Okay. So, in your opinion, does it make sense to compare the total cost of treatment technologies at plants that address two to three pollutants at a time to Emerald?

A. Absolutely not.

Q. Okay. In Lacon, there was testimony

about seven municipal projects for reducing ammonia, do you recall that testimony?

A. I do.

Q. The Geneva project in 2000 had a total cost of $5.4 million, do you recall that testimony?

A. I recall describing Geneva.

Q. Take my word for it then $5.4 million. Is $5.4 million a helpful metric to use in comparing the cost of treatment alternatives at Henry plant?

A. Absolutely not.

Q. Why isn't that helpful?

A. Again, that money was spent to accomplish several things besides ammonia removal and it was never parsed out what fraction of that cost was spent on ammonia removal.

Q. Okay. But let's say hypothetically that I was somehow able to figure out what portion of the Geneva project reduces ammonia and of that $5.4 million the portion that reduces ammonia is actually $750,000.

Is $750,000 a helpful number to use in comparing the Henry plant?

A. Absolutely not. Because we don't know how many pounds of ammonia were being removed per day for that $750,000. If we could get that in a unit cost, it would be helpful.

Q. Okay. What if out of that $750,000 I told you that $300,000 specifically removed ammonia as opposed to other pollutants such as BOD or TSS, is $300,000 useful to use in evaluating alternatives?

A. No.

Q. Why is that still not helpful?

A. I still don't know the unit cost.

Q. We've talked at length about a scenario where at $50 per day technology could reduce one pound of a pollutant, right?

A. Right.

Q. In all the times that you've evaluated treatment alternatives, have you ever been looking at a $1 -- or a one pound per day reduction?

A. No, I've -- I've -- I've converted everything into dollars per pound, but there were way more pounds per day than one.

Q. In evaluating alternatives for

Emerald, what was the daily ammonia reduction achieved for most of your alternatives?

A. Approximately, 330 pounds per day.

Q. Are you able to convert that into a cost per day number?

A. We were and did.

Q. What did you find?

A. We found that on our operating cost basis, which really doesn't paint the entire picture, present worth paints a better -- a more realistic picture, but on an operating cost basis we needed -- it was anywhere between -- the lowest number was around $6.30 a pound if tertiary nitrification were reliable, just for the operating cost.

If -- the next closest one was about -- was nearly double that and then on the -- on the present worth cost, which includes the capital that you had to fund to accomplish it, those numbers were closer to $10 and $12 per pound.

Q. Okay. So, in your opinion, is cost per day a useful metric?

A. It's not.

Q. And, in your opinion, as an expert and licensed professional engineer, is cost per pound the most useful metric?

A. Yes.

Q. Now, in Lacon, on January 14th, you heard the testimony of Mr. Koch, correct?

A. I did.

Q. And he testified about Whole Effluent Toxicity test results of Emerald, do you recall his testimony that one of the factors that would contribute to the toxicity of Emerald's effluent is conductivity?

A. Yes.

Q. Do you agree with Mr. Koch?

A. I do.

Q. What is conductivity?

A. Conductivity is -- kind of goes back to what we just talked about moments ago. When it comes to land application, it is -- the conductivity is an indirect measurement of -- or -- it's a measurement of saltiness of water essentially.

Q. So is it related to the salt content of the effluent?

A. It is.

Q. So in looking at the various treatment alternatives that you evaluated both in 2018 and 2019, what impact would those alternatives have on the conductivity of Emerald's effluent?

A. All of them, including the one that has river water treatment ahead of irrigation, all of them add salt to the effluent.

Q. And if all of them add salt, would that increase the conductivity of the effluent?

A. It would and correspondingly it can't help it. It's also going to increase the aquatic toxicity of that effluent.

Q. I see. So is that a factor, this increase in aquatic toxicity, that you would use in addressing technological feasibility or economic reasonableness?

A. I would.

Q. Now, Mr. Koch also testified that the Agency doesn't set toxicity limits for the area inside a zone of initial dilution, or ZID, do you recall that testimony?

A. I do.

Q. Do you agree with him there?

A. I do, and honestly the reason they don't include the area inside of a ZID is the U.S. EPA criteria for the velocity inside of a ZID is greater than 10 feet per second, which is a very fast walk. So imagine a little -- the little organisms that are used in the toxicity tests are newborns.

As a matter of fact, the little water fleas you can probably put four of them on the tip of an eraser, pencil eraser, and the fish, the little fathead minnows, you can probably put two on the tip of an eraser. Imagine these little critters trying to hang out in an area where the velocity is 10 feet per second. They can't stay there very long. So there is no reason to be concerned about the toxicity within the ZID because they can't stay there.

Q. Are you aware of any state agency that sets toxicity limits within a ZID?

A. No.

Q. And is that because of what you just testified about --

A. Yes.

Q. -- that the fleas and the minnows aren't able to hang out in the ZID for a substantial period of time?

A. Yes.

Q. Now, in Lacon, did you hear Mr. Gradeless' opening statement that the best available treatment economically available, or BAT, means best as in superlative?

A. I did hear that.

Q. Do agree with that?

A. No.

Q. Why don't you agree?

A. It doesn't really matter in this case whether I agree. EPA doesn't agree. The -- there is best degree of treatment for each industrial category and for Henry they are providing over and above the best degree of treatment for their industrial category and the reason I say that is the best degree of treatment for their industrial category is activated sludge treatment and the way you know that they're getting best degree of treatment they reliably comply. I have never heard anyone accuse them of being out of compliance with the OCPSF standards.

Q. Okay. Mr. Flippin, let me back you up just a little bit.

A. Okay.

Q. Who establishes what is BAT?

A. U.S. EPA.

Q. And how do they establish that?

A. They -- they look at what industries are practicing to meet the BAT regulations and determine from that what is -- among that peer group, what is the best degree of treatment that this peer group is providing that meets the regulation.

Q. Is BAT the superlative absolute best treatment available?

A. If -- if that term is meant to ask, does the effluent taste like Sprite when you're finished with it? No. If it -- if it's meant to answer the question, is it meeting all the categorical limits and requirements in a -- in a good manner? The answer is, yes, they are definitely providing best degree of treatment.

Q. Okay. Does the Illinois Environmental Protection Agency establish what is BAT for any treatment category?

A. No.

Q. That's the U.S. EPA?

A. That's the U.S. EPA.

Q. Now, in the adjusted standard 13.2, as part of its opinion at Page 55 the Board wrote that the regulations further provide that BDT, or best degree of treatment, must be consistent with technological feasibility, economic reasonableness and sound engineering judgment.

In your opinion, is the Henry plant's wastewater treatment plant designed with sound engineering judgment?

A. It is.

Q. Why?

A. It -- again, outside of ammonia, which we've been talking exclusively about, its difficulties at this plant from -- from a categorical compliance level it clearly meets categorical compliance. It clearly produces effluent BOD and TSS concentrations in par or better than many of its peers and so I -- from all other measurements, it is providing best degree of treatment.

Q. And, in your opinion, is Emerald

plant still providing the best degree of treatment in January and February 2020?

A. Yes.

Q. Why?

A. The same unit processes are engaged that they have always been engaged. Again, BAT defines activated sludge treatment as best available treatment and it also -- at the Henry plant not only do they provide that, they also provide tertiary filtration over and above BAT.

Q. Okay. Mr. Flippin, can you explain what the impact of having greater MBT-related production at Henry plant would be on the wastewater treatment system?

A. Yes, the -- one of the things that was confusing yesterday in the testimony was the whole comment about concentration, the impact on effluent concentration of greater production. That was -- that was confusion that was held.

Q. What was that confusion? What was confusing?

A. The confusion was that it implied that with every batch that Emerald made they discharged the same concentration and the same

volume of water and, therefore, whether they made 1 batch or 10 batches it wouldn't affect concentration, but what that neglected was Emerald's -- Emerald's wastewater stream is not the only stream.

As a matter of fact, it's the smallest flow contributor of the two entities, Mexichem and Emerald. As a matter of fact, Mexichem's flow is about 80% of the flow and that stays relatively stable and then of the 20% of the flow that's the Emerald flow not all of it is MBT product-related.

So imagine as you're making more and more batches, each batch releases so many pounds and if you make twice as many batches and put that twice as many batches in the same base flow you get twice the concentration.

Q. So if I'm understanding you correctly, if there is greater MBT-related production, then you would expect the concentration of MBT in the primary clarifier to increase, right?

A. That's exactly right.

Q. And what would the impact of that be

on NH3 and the ultimate effluent?

A. It would -- it would be a higher -- it would, first of all, prevent single stage nitrification if the MBT were high enough and that results in a high effluent ammonia, but MBT is not the only thing that is discharged when a batch is made.

Also, Total Kjeldahl Nitrogen is discharged and TKN, when going through the existing treatment plant, becomes ammonia. So, quite frankly, the more batches you make going into a steady base load flow, which is 80% of the flow, ends up being higher effluent ammonia concentrations based on how many batches you make.

So the greater number of batches, the higher the effluent ammonia concentration because you're putting more pounds in the same base flow. That's very important because we've been talking about does Emerald need an elevated effluent ammonia concentration for a daily maximum element? Hands down they do. Without that, you hamstring them on production.

Q. Mr. Flippin, that was my last question.

So tell us why Henry plant still needs a higher concentration limit?

A. If you don't -- if you don't provide that, you basically are limiting the number of batches a day that they can make.

Q. Okay.

MS. WEYHING: No further questions.

HEARING OFFICER WEBB: Thank you. Mr. Gradeless?

MR. GRADELESS: Just a few and we won't go on for hours.

S U R R E B U T T A L E X A M I N A T I O N

BY MR. GRADELESS:

Q. Mr. Flippin, you just mentioned about a higher limit was needed by the petitioner, the Henry facility, do you remember testifying about that? Just the last question.

A. Just then.

Q. Okay. You were actually offered to calculate what those limits might be in your scope of work document, right?

A. Yes.

Q. And you didn't calculate those for this case?

A. That's right.

Q. Okay. Now, I remember last time we talked about the cost of your final report if you remember that and that report was the October report, the cost for the October report was $45,300, does that sound about right to you?

A. That was the estimated cost of what it would be at the time of the proposal.

Q. Okay. And you've done -- you've actually provided two reports, there was one report before the October report as well, is that right?

A. That was in 2018.

Q. It was the April 2018?

A. Right.

Q. Okay. And then I know last time you talked about the $18,400 set aside for the depositions and to appear at the hearing, do you recall that?

A. Yes.

Q. Okay. Do you know if you have hit that $18,400 set aside to date?

A. I believe we have.

Q. And have you had -- has there been

more authorized since the Lacon hearing?

A. No.

Q. So right now as you sit here today, we are at the $18,400 as far as you know?

A. As far as -- as far as I know, we have not yet -- that is the only authorization we have.

Q. So it's -- the authorization stayed the same --

A. Right.

Q. -- between Lacon and Springfield?

A. Yes.

Q. Now, we heard a lot in the last three days about internal process improvements specifically with respect to products that are made at the petitioner's facility.

Have you been asked to evaluate how to remove the MBT in the BBTS process?

A. Have not.

Q. Have you been asked to evaluate ways to reduce the MBT in the MBDS process?

A. Have not.

Q. Have you been asked to -- for ways to reduce the MBT in the OBTS process?

A. Have not.

Q. Have you been asked or consulted or requested your services to look at reducing the MBT in the 50% MBT process?

A. Have not.

Q. And do you disagree with the statement that MBT is known to be oxidized by hydrogen peroxide alone?

A. Which document?

Q. I'm just looking -- I'm reading from an exhibit that has been entered into evidence. It is a scientific journal. State's Exhibit 19.

A. Thank you.

Q. I don't know if you have that.

A. Good. Thanks.

Q. Right on top. I'm looking at Page 2 and it cites a study, but it's entitled Optimum Hydrogen Peroxide to Substrate Ratio and the first sentence of that -- I'm just asking if you agree or disagree.

It says that the MBT is known to be oxidized by hydrogen peroxide alone.

A. I do agree that in this -- in this study where MBT is in tap water and they've added

peroxide, I have no doubt that the peroxide oxidized the MBT.

Q. Okay. I guess you haven't been asked to look at oxidizing the MBT with hydrogen peroxide at the Henry facility?

A. Have not.

Q. Would you agree or if you know -- would you agree or if you know I guess is the question, whether or not Illinois Pollution Control Board technology limits can sometimes be more stringent than the federal categorical standards?

A. Would you -- would you rephrase that question, please?

Q. I can. I can try. Are you aware or not whether or not the technology limits from the State of Illinois can be sometimes more stringent than the federal standards?

A. I have not encountered that.

Q. Does that mean you don't know?

A. I don't know.

Q. Okay. You also testified a lot about field application, I think, testifying that -- correct me if I'm wrong that if you

applied this to corn and soybeans, it would be a wasteland?

A. It wouldn't grow.

Q. It wouldn't grow at all?

A. Right, if you -- if you didn't get rainfall often enough to keep it diluted.

Q. And you base that on the nature of the effluent at the Henry plant?

A. Yes.

Q. I'll ask Darrin. We also talked about the NACWA cost per day, pounds per day, and assume for the sake of argument that I fully agree with your analysis, which it doesn't matter if I agree or not, what would be the cost in pounds per day for ammonia that would be economically unreasonable?

A. That's a great question.

Q. Thank you.

A. I haven't settled on a number myself.

Q. So the five pounds per day that was at the highest end, and I think I remember and I'm not trying to trick you, but the highest end, could that, in your opinion, possibly be

economically reasonable?

A. We were suspicious of the $5 per pound because it was so far above the median just like we were suspicious of the low dollars per pound because we thought there might be some outlying points that -- so I don't know how representative the $5 actually is.

Q. Has it been your experience that the members of NACWA would spend money to build treatment facilities that were economically unreasonable?

A. I wouldn't suspect they would do that.

Q. Okay. Why would you not suspect that?

A. Those clean water agencies are serving customers, they're serving the environmental needs, they're meeting compliance and so they would -- they would build what is needed to be in compliance and for them thankfully single stage nitrification is typically their -- what they do.

MR. GRADELESS: I don't think I have anything further.

HEARING OFFICER WEBB: Ms. Weyhing?
MS. WEYHING: Nothing further.
HEARING OFFICER WEBB: Okay. Thank you.
MR. RAO: Carol, I have --
HEARING OFFICER WEBB: I'm sorry. Second time I've done that.
MR. RAO: Just one.
HEARING OFFICER WEBB: Sorry about that.
MR. RAO: Mr. Flippin, you testified about the best available treatment technology, is that BAT --
THE WITNESS: Yes.
MR. RAO: -- you refer to? And you mentioned that according to the U.S. EPA's categorical standards activated sludge is bad for --
THE WITNESS: OCPSF.
MR. RAO: Yeah, for the Henry plant. So when U.S. EPA makes these determinations about BAT, does it consider what contaminants are being treated?
THE WITNESS: It does, and as a

matter of fact they have a list of the regulated compounds they are focused on.

MR. RAO: And, in this case, is activated sludge considered bad for ammonia-nitrogen also in addition to BOD and solids --

THE WITNESS: The OCPSF doesn't regulate ammonia.

MR. RAO: Okay. So when you say Henry plant has the best available treatment technology --

THE WITNESS: For the -- sorry.

MR. RAO: -- it does not apply to ammonia-nitrogen?

THE WITNESS: It does not. That best available treatment technology applies to the compounds regulated under OCPSF, which ammonia is not.

MR. RAO: Okay. So -- but Henry plant is regulated for ammonia-nitrogen, isn't it?

THE WITNESS: Yes, but not by U.S. EPA.

MR. RAO: Right. So Mr. Gradeless mentioned, and I'll ask you about state -- the

state having standards which may be more stringent than -- may have standards that the feds don't have.

So we had an ammonia-nitrogen effluent standard here, would it be reasonable for us to consider U.S. EPA's determination of what BAT is -- does not consider ammonia-nitrogen in this case?

THE WITNESS: Their determination of BAT, again, is based on regulations that do not include ammonia.

MR. RAO: Okay. Thank you.

HEARING OFFICER WEBB: Okay.

MR. DIMOND: I do have one little follow up on that, if I may.

HEARING OFFICER WEBB: Sure.

F U R T H E R E X A M I N A T I O N

BY MR. DIMOND:

Q. As you understand it, Mr. Flippin, why do the U.S. EPA categorical treatment standards for the OCPSF category not explicitly consider ammonia as a regulated pollutant?

A. Ammonia removal is not required in all -- in all locations of the -- of the OCPSF

industries and so they -- many OCPSF plants, if you will, either are not required to remove ammonia even though they may and so these standards only focused on what these -- what this peer group has in common and that's the need to meet these regulated compound limits.

Q. Would the categorical treatment standards for the OCPSF category, would those, for many plants, achieve reductions of ammonia as a collateral effect of the treatment that is required?

A. Yes. As a matter of fact, the operating conditions needed to meet the OCPSF limits would typically cause single stage nitrification to occur and so most of these OCPSF regulated facilities that are operating activated sludge systems, which is their BAT, are operating at conditions that promote and accomplish single stage nitrification.

MR. DIMOND: That's all.

MR. RAO: Mr. Flippin, just for the record, do we have an expansion of OCPSF in the record what it means, the category that you're talking about?

THE WITNESS: Organic chemicals, plastics and synthetic fibers. Thank you.

MR. RAO: Do you know if refineries are under the same category?

THE WITNESS: They're under a different industrial category.

MR. RAO: Thanks.

HEARING OFFICER WEBB: Any follow up from anybody else? Okay. Thank you, Mr. Flippin.

THE WITNESS: Thank you.

HEARING OFFICER WEBB: Should we take a five-minute break between witnesses?

MR. DIMOND: If you would like.

HEARING OFFICER WEBB: Yes, let's do that.

(Whereupon, a break was taken after which the following proceedings were had.)

HEARING OFFICER WEBB: We'll go back on the record. Ms. Weyhing, please call your next witness.

MS. WEYHING: Actually, I'll turn it over to Tom.

HEARING OFFICER WEBB: I can't win today.

MR. DIMOND: Emerald calls Mr. Galen Hatchcock.

HEARING OFFICER WEBB: Mr. Hatchcock, please have a seat up here. I'll remind you that you're still under oath.

R E B U T T A L E X A M I N A T I O N

BY MR. DIMOND:

Q. Mr. Hathcock, good morning.

A. Good morning.

Q. Does Emerald have a stated set of core values that govern its operation and conduct?

A. We do.

Q. Okay. Can you explain for the Board what those are?

A. Yes. In the operations side of the business, we are asked to operate our facilities in a safe and environmentally complaint manner, to continuously work towards improvement of quality and mechanical reliability and ultimately to treat our employees with humanity and to -- as an overall guide to do the right thing.

Q. What is -- what steps have you been

taking at the plant with regard to continuous improvement? And first I want to talk about, you know, unrelated to ammonia, the ammonia issue.

A. We are doing a number of things. In general, not focusing on ammonia, we're working on continuous improvements in other processes for quality improvement, thru-put improvement, waste reduction. We are working on mechanical reliability and up time of equipment because, of course, reliable equipment is also safer, generates less waste and is there when we need it.

Q. And with, you know -- more directly with regard to ammonia, in general terms, can you describe what continuous improvement steps are -- have been taken, say, in the last 6 to 12 months and are being, you know, considered going forward?

A. Very good. If you limit to the last six months, we have focused on MBT reduction because of the evidence we see with reduced ammonia discharges from the plant that reduced MBT has had a direct effect. So we have been focusing on controlling that to a greater extent and we have been focusing on the process changes that would allow us to consistently and reliably

maintain low levels of MBT.

Q. Did Emerald and the Henry plant employees willfully fail to identify means of reducing MBT in the waste streams?

A. No.

Q. When does the current adjusted standard expire?

A. April 16th.

Q. Has Emerald taken any steps to prepare for the expiration of the adjusted standard if the Board does not act in this proceeding before the expiration date?

A. We are. We are working towards identifying what can run and what cannot run to maintain the standard limits.

Q. When you say what can run and what cannot run, what do you mean by that?

A. I mean, which production processes. We will have to curtail production.

Q. And when you talk about production process, you're talking about products?

A. Yes.

Q. You're talking -- so are you talking about MBT-related products?

A. Yes.

Q. Okay. Continue.

A. To that point, we are considering what can -- to the question of what can run, what can't run, are we not going to produce certain product lines and that will have financial impact on us. So, hence, we're working on improvements. Nevertheless, this is a big problem.

Q. So if we -- if we go very far beyond April 16th, will the plant have to take extra steps to maintain compliance with its permit?

A. If we cannot continue to improve upon our MBT, therefore, ammonia results, we may not run parts of the plant.

Q. And those would be the parts of the plant that produce MBT-related products?

A. Yes, which is 70% to 75% of all production.

Q. Based on what you currently know about how the plant currently operates, can the plant produce MBT-related products and comply with the 6 mg/L daily maximum and the 3 mg/L monthly average limits?

A. Not at this time.

Q. On a long -- on a long-term basis, can this plant be financially viable without producing MBT-related product?

A. With the current product mix, no.

MR. DIMOND: That's all we have.

MR. GRADELESS: Quick today.

MR. DIMOND: Yes.

MR. GRADELESS: It's nice.

S U R R E B U T T A L E X A M I N A T I O N

BY MR. GRADELESS:

Q. Okay. Mr. Hathcock, there was an exhibit entered into evidence, it's State's Exhibit No. 18, and it's the deposition of Mark Winters and I have -- I'm going to read a little bit of it and ask you questions about it.

A. Very good.

Q. If you know or don't know --

A. Very good.

Q. -- let me know.

This is on Page 33 of Mr. Winters' deposition and Mr. Winters' is the utilities foreman --

A. Yes.

Q. -- at your plant, right?

A. Right.

Q. Okay. Now, Mr. Winters testified that during the course of this month -- and this deposition was taken in December of 2019 -- 2019. I think it was just before your deposition.

A. Mm-hmm. Yes.

Q. Okay. "During the course of this month, we have been actually doing some recipe changes and tests with one of our processes that we didn't expect to be a big MBT contributor because of how little it runs, but despite its smaller flow rate compared to others in the waste stream and how little it runs, it turned out to be a much bigger offender than we had thought. So we identified it and we're working on recipe changes right now to see what we can make better."

Okay. That was his -- do you know which process that Mr. Winters was talking about?

A. I suspect he is talking about the OBTS, which is a cousin to the MBDS. Those two are low volume products. We have -- again, back to -- prior to Mr. Winters' testimony as we just stated, about six months ago we really changed the

direction of our studies to focus on MBT specifically. Not in wastewater, that's too late. We're looking at individual streams coming off the processes and looking at opportunities to improve them and one of the streams we measured the concentration and the flow rate, found there was more than we were anticipating of MBT leaving that process.

Q. And that process was in the OBTS process?

A. Yes.

Q. And what was the cousin? I just didn't hear you. You said there was a cousin.

A. Cousin. MBDS.

Q. Gotcha. Okay. So the MBDS process and the OBTS process is one of your lower volumes?

A. Yes.

Q. Is it the lowest?

A. No.

Q. Okay. Let's -- let's go through them.

A. Mm-hmm.

Q. BBTS?

A. Yes.

Q. I'm sorry. Let me back up. There is four products that have the MBT in it, right?

A. Yes.

Q. So we're going to rank these one to four.

A. Very good.

Q. And if you know percentages, great.

A. Mm-hmm.

Q. All right. The BBTS process, how much in that process or product -- let me scratch that.

Production levels, I'm talking about production levels, compared to the other three --

A. Yes.

Q. -- how does that rank?

A. Historically, BBTS -- as we discussed also yesterday, BBTS had a high for that select product last year at over 11 million pounds, or close to 11 million pounds in the year. OBTS last year was probably 1 to 1.5. So definitely BBTS is the large component.

This year we have seen a dramatic reduction in the BBTS volume and the OBTS

is actually remaining fairly steady. So it has changed dramatically in the last six months to eight months, but yet BBTS is still the largest consumer.

Q. Okay. So your OBTS is the lowest production product?

A. I would rank them as BBTS.

Q. As the highest?

A. Highest.

Q. Thank you.

A. BBTS, OBTS, the -- right now the 50% and then the MBDS and yet product mixes change, customers change. So that does fluctuate.

Q. Yeah. Okay. So the -- and what percentage of your products are produced, I guess, with the BBTS?

A. What percentage is that of the total?

Q. Yes.

A. This year being a somewhat abnormal year if you take 2018, that would have been approximately a third -- more than a third of all total production.

Q. Just talking about MBT products,

right?

A. That's BBTS specifically. If you consider all products MBT and it's -- the products made with MBT, that's 70%, 75% of all production.

Q. Right. I'm just talking about the four MBT products --

A. Right.

Q. -- and what percentage of that -- of those products account for your production levels.

A. Okay.

Q. So BBTS, do you have an idea of the percentage in the BBTS?

A. Again, 2018, BBTS was close to 11 million pounds on 32 million pounds total produced.

Q. And did you say that was about a third of the --

A. About a third of the total, yes.

MR. DIMOND: Hearing Officer Webb, if I can just interject. I don't want to consider this transcript to be confidential, but we are going to be -- as the Board requested, we are going to be producing this data. We will consider it confidential. So I'd just sort of like to

advise the witness not to talk about specific poundages. I think we can talk about percentages. I think if we start talking about specific poundages, that starts to get into information that the company considers confidential.

THE WITNESS: Very good.

MR. GRADELESS: I have no objection. That makes sense. Percentages. It's easier for me, too.

THE WITNESS: Okay.

BY MR. GRADELESS:

Q. Your second highest production level was the OBTS?

A. Yes.

Q. And that was -- what percentage would you ascribe to that?

A. 6% to 8%.

Q. 6% to 8%. And I won't hold you to the math, but what about the MBDS?

A. 2%.

Q. 2%. Okay. And then the 50% MBT is everything else?

A. Depending on the year, between 2% and 5%.

Q. Now, I want to know which is the -- produces the most MBT, sort of the biggest offender, so to speak?

A. Okay.

Q. Which product is that?

A. Historically --

MR. DIMOND: I'm going to object. It's vague as to whether you're asking about the greatest amount of MBT in absolute terms or the largest amount of MBT in concentration terms. The answers could be different.

BY MR. GRADELESS:

Q. If they're different, please describe them.

A. Which are you looking for?

HEARING OFFICER WEBB: Would you repeat it?

BY MR. GRADELESS:

Q. Both.

HEARING OFFICER WEBB: Okay.

BY THE WITNESS:

A. The BBTS process, because of the sheer volume, has always been believed to be the largest contributor and that's why it's been the

focus of our historical efforts over the last few years to try to improve that process to reduce any effluent and control that process in an approved manner. As we did make improvements in the BBTS, we then shifted focus to the others.

BY MR. GRADELESS:

Q. Which was the -- which product did you shift focus to first?

A. OBTS.

Q. And that product had more higher concentrations of MBT than you anticipated?

A. Higher than we anticipated.

Q. And have you looked at the MBDS?

A. Yes.

Q. As well as the 50%?

A. Yes.

Q. So you know those values?

A. We have data. We are surveying the effluent from those streams.

Q. Okay. And what was the process improvement that you applied to the BBTS to reduce the MBT?

A. There were many.

Q. Okay. Let's discuss them.

A. Okay. If you can, how far back do you wish to go?

Q. Well, since you've looked at reducing it the last -- in the last year and a half, I think you said --

A. Okay. In the last year and a half, starting with hiring a process engineer for controls, which beefed up the staff to allow the bandwidth to work on these types of projects, we have made a number of changes to the controls of the system.

So we can simply run it reliably and consistently once we change subtle changes in the process, we have improved procedures, filtration, we have changed the reaction temperature and we have changed the particle size to facilitate better filtration as well.

Q. And isn't it true that you basically -- what you've testified about today is that you just need more time to implement those process changes?

A. We have already implemented many changes in the BBTS process. We are not done working on the other three.

Q. So you need time to work on the other three to implement similar --

A. We do.

Q. -- process changes, is that right?

A. Yes, that is true.

Q. So would you benefit from a compliance schedule?

MR. DIMOND: Objection. Foundation.

HEARING OFFICER WEBB: With respect to?

MR. DIMOND: I'm not sure the witness understands what a compliance schedule is.

BY MR. GRADELESS:

Q. Galen, do you know what a compliance schedule is?

A. I understand what a compliance schedule is.

Q. Okay. Would that help you in -- with respect to production?

A. Not necessarily.

Q. Why do you say that?

A. I say that because we are working towards our own process improvements and we are -- until we actually determine what will be the best

corrective action to take, I really have a hard time setting a schedule.

Q. Okay. But it's possible? Would you agree it's possible that a compliance schedule could help?

MR. DIMOND: Objection. Calls for speculation.

MR. GRADELESS: It's either yes or no if it's possible.

HEARING OFFICER WEBB: Overruled.

BY THE WITNESS:

A. I would disagree frankly. We are pursuing our own improvements, we are making changes, we are investigating.

BY MR. GRADELESS:

Q. Okay. So despite not knowing what you need to do, you're not sure one way or another whether a compliance schedule is necessary to help you?

A. Because it's an R&D effort right now. We are basically going into a place where we haven't been before and we are discovering things and we are making changes and that includes process improvements that are underway as we speak

and some small capital investments.

Q. Okay. What about a compliance schedule that contemplated the R&D processes that you have mentioned?

A. In my opinion, it's a bit like determining an R&D schedule for work that hasn't been done yet. I'm sorry. I don't support that.

Q. All right. Have you submitted plans for these process improvements to the Agency?

A. Not yet.

Q. Do you plan to?

A. We can.

Q. Okay.

A. We are actually having conversation this week internally about our plan for just that.

Q. Okay. The continuous process improvement team, I guess as it's been called throughout some of the hearing and some of the depositions, does that -- do you know what I'm talking about when I say that?

A. Yes.

Q. Okay. And the members of that team include -- can you just tell us who the members of that team include?

A. Locally, that would be myself, Mark Winters, I have two separate process engineers who are involved depending on the process and we have support from Chris Wrobel.

Q. Have you met with the continuous process team since the deposition in December?

A. Yes.

Q. And when was that?

A. I don't have a calendar. It happens, frankly, multiple times a week that we discuss ongoing data collection and change in direction and thoughts on how to improve the process. It's continual.

Q. Okay. Have you discussed the alternatives, I guess, mentioned in the adjusted standard?

A. The adjusted standard is what -- the proposals from the EPA is what Mr. Flippin has looked at. We are focused on the internal changes that we can make locally, which apparently would have had -- as the evidence indicates, have had the biggest impact. So we're looking at reduction at the source.

Q. Okay. So you're not -- you're not

considering any of Mr. Flippin's alternatives at this time?

A. I do consider those. I think in my opinion it -- the changes that we can make internally will be far more cost-effective. Instead of spending the $10 million to $12 million that could be required for an end of pipe solution, if we spend much, much smaller funds simply to control the processes in such a way that MBT doesn't go to wastewater at all and reduce it. I don't know that we can achieve zero, but our goal is to reduce it as much as possible.

Q. Okay. Have you run those cost estimates?

A. We're still developing the projects.

Q. You've been here both days in Lacon I believe I saw you and both days here in Springfield, right?

A. Yes.

Q. And you heard the testimony of potentially using hydrogen peroxide?

A. Yes.

Q. Has that alternative been discussed?

A. Yes, it has.

Q. And is that something that you're willing to look into further?

A. We are looking into it. We are actually capturing data and trying to assess what could be the performance of the peroxide or oxidation process and that has to do with as has already been testified peroxide is not selective to MBT and our waste streams have many compounds in them. So we are evaluating whether that would be effective or not and no matter what was done in another site, we don't yet know how well it would work for us specifically in our waste streams.

Q. You haven't ran a test or anything, right?

A. We have conducted one test that I wouldn't qualify as much as a test as much as a contractor came in and did some very quick jar testing with us and got some not entirely reliable results and did not -- it very much was just an initial trial to see how it goes and before we come in for more developed tests, we have to really develop a sampling plan along with a game plan for that project.

Q. Okay. So it's not off the table is

what --

A. No. No, not at all.

MR. GRADELESS: I have nothing further. Thank you.

MR. DIMOND: No further questions.

HEARING OFFICER WEBB: Mr. Rao?

MR. RAO: No.

HEARING OFFICER WEBB: Thank you, sir.

Would the petitioner like to call another witness?

MR. DIMOND: Yes, Hearing Officer Webb. We call Mr. Chris Wrobel.

HEARING OFFICER WEBB: Mr. Wrobel, have a seat up here.

Would the court reporter please swear in the witness.

WHEREUPON:

CHRISTOPHER WROBEL

called as a witness herein, having been first duly sworn, deposeth and saith as follows:

D I R E C T E X A M I N A T I O N

BY MR. DIMOND:

Q. Good morning, Mr. Wrobel. How are

you this morning?

A. Great. Thank you.

Q. Can you please state your full name for the record.

A. Christopher Wrobel.

Q. And you might want to spell it for the court reporter.

A. W-R-O-B-E-L.

Q. By whom are you employed?

A. Emerald Kalama Chemical.

Q. And is Emerald Kalama Chemical a sister company of Emerald Polymer Additives?

A. Yes.

Q. How long have you been employed by Emerald Kalama?

A. Fifteen years. A little more than that.

Q. What is your present position?

A. Essentially, I am the corporate HSE manager.

Q. Okay. By HSE, what do you mean by that?

A. Health, safety and environmental.

Q. How long have you held that

position?

A. Since May of 2016.

Q. What position did you hold prior to that?

A. Prior to that, I was the environmental, health, safety and security manager for the Kalama -- the Emerald Kalama Chemical facility in Kalama, Washington.

Q. What -- roughly, what time period did you hold that position?

A. November of 2004 until May of 2016.

Q. Okay. Were you -- at some point during there, were you considered to be a senior environmental engineer?

A. Yes. Actually, I was. That was when I was first hired. So that would have been the first couple of years. That was November 2000- -- 2004 to June 2006. I forgot about that.

Q. Could you describe for us your education after high school?

A. Yes, I went to Ursinus College in Pennsylvania and I received a Bachelor of Science in Chemistry and then after working for a while I went back to school and received a Ph.D. in

chemistry from the University of Montana.

Q. In your current position as the corporate HSE manager for Emerald -- or for Emerald Kalama, do you have any responsibilities related to the Henry plant?

A. Yes, I do.

Q. Can you describe for us what those are?

A. Well, my responsibilities to all the plants are to provide overall health, safety and environmental support and specifically as -- as certain projects come up that require somebody with my education, experience and technical background, I typically get pulled into those things such as the Henry ammonia in the wastewater issue.

Q. Do you have any role with regard to continuous improvement projects?

A. I do, especially in the realm of the environmental performance of our sites.

Q. And are you currently a member of the continuous improvement team for the Henry plant that is working on -- is working on ammonia discharge-related issues?

A. Yes, I am.

Q. Do you -- right now, I guess it's February of 2020, do you have any other duties that you are helping perform with regard to the Henry plant?

A. Yes, I'm actually -- I have -- since the Henry plant is currently without a health, safety, environmental manager, I also help with some of those bigger ticket items that -- that -- that person would normally do.

Q. And is the Henry plant looking to hire a new HSE manager onsite?

A. I believe so.

Q. Okay. So describe for us, if you can, some of the things that you've worked on in the last 12 to 18 months to attempt to address the ammonia discharge from the Henry plant?

A. Well, whenever you start any project, the first thing you have to do is characterize the nature of the problem and so initially when I got -- became part of the continuous improvement team, I noticed there was just a lack of data about what was going into the wastewater treatment system, where it came from

and really just trying to understand that misbalance of things.

So that was essentially what we started to do was to look at the balance between ammonia and Total Kjeldahl Nitrogen (TKN) and understand where everything came from, understand the loading to the system, try to figure out Mexichem's contribution, our contribution and then we also expanded to looking at MBT from the various process streams and --

Q. I'm sorry. I didn't mean to stop you. Keep going.

A. No. Just all of that is in an effort really to, you know, paint the picture and understand truly what we need to focus on as far as where we can get the most bang for the buck, if you understand.

Q. You've been present for all the days of hearings in the proceeding, right?

A. Yes.

Q. You know, there's been a lot of discussion about possibly treating the PVC tank stream separately for ammonia, do you recall hearing that?

A. Yes.

Q. You know, that seems like such a simple idea, is it really that simple to implement?

A. No.

Q. Tell us what some of the complications are in terms of implementing a treatment scenario like that.

A. Well, to do that, you would essentially be creating a totally separate activated sludge wastewater treatment system. So as Mr. Flippin testified, there are obviously a lot of negative reasons why you wouldn't want to do that, but from an operation standpoint you would be essentially having two wastewater treatment plants on one site.

So you would have to double -- you'd be doubling everything. You'd have to double the staff needed to operate it. Currently, you're talking about -- I think the operators to run the current wastewater system are taking about 32 samples a day of various parameters such as COD, TSS, looking at the flocculent and coagulant additions, pH, et cetera to operate the existing

system.

Well, you would have to do all of those same things in order to operate another system and I don't know what the benefit to that would be.

Q. So how many people are -- are -- how many wastewater treatment plant operator employees does the Henry plant currently have?

A. Four.

Q. And how do they work in shifts?

A. They're 12-hour shifts.

Q. How many people work in a 12-hour shift?

A. One person a shift and they rotate.

Q. So you have 24-hour, 7 day a week coverage for that position?

A. Yes.

Q. So you've currently got four people operating the current wastewater treatment plant.

If there was a separate wastewater treatment plant for just the PVC tank waste stream, what would you anticipate you would need in terms of extra employees?

A. I would think you would need double

that. So you would need eight.

Q. Now, you talked about the number of samples that get collected, where are most of those samples analyzed?

A. The 30, 32 are analyzed by the wastewater treatment operators and then there is another six or so per day analyzed by the quality assurance laboratory.

Q. And that's a quality assurance laboratory that is staffed by Emerald employees?

A. That is correct.

Q. Are there additional samples that go off to a third-party contractor lab?

A. Yes, there are. Those samples for compliance with an NPDES permit and some analyses that we can't do in-house are sent to an outside laboratory.

Q. Now, you've got a PhD in chemistry. Based on that and what you know about the Henry wastewater treatment stream as it is currently configured, are there benefits to mixing the wastewater stream from the Emerald production processes with the waste stream from the Mexichem production processes?

A. Yes.

Q. What are those?

A. Exactly as Mr. Flippin testified. The -- the Mexichem wastewater stream is a stable stream. So its flow doesn't change very much and that is very beneficial not only -- I won't speak to what Mr. Flippin said, but from a standpoint of treating the wastewater itself because the Henry plant is batch in general and production rises and falls, nutrient loading to the wastewater treatment plant would be very challenged if those streams were separated.

The Mexichem wastewater being so consistent allows the biomass in the digester to stay alive because it's essentially feeding those -- those organisms regardless of what the production levels at the -- the Emerald site do. So it's a very positive thing to have a nice steady wastewater stream.

Q. So in the first part of your response there, you use the phrase Henry plant and we've used that phrase a lot here and sometimes we use it to mean just the Emerald side of the plant, sometimes we use it to mean the entire plant.

In the first part of that response when you used the phrase Henry plant, did you really mean the Emerald side of it?

A. Yes.

Q. Now, there's also been a lot of testimony about the possibility of Emerald Polymer's running its reaction processes and/or reducing or possibly eliminating MBT from their wastewater.

As a general matter on a manufacturing plant scale, can chemical reactions be run to completion to eliminate all waste streams?

A. No, they cannot.

Q. Okay. And explain to us why.

A. Well, since we all know BBTS, I'll just use that as an example. So when you run a reaction in a closed system, there are very few chemical reactions that go to completion and so the laws of thermodynamics tell us whether the product can be made and whether it's stable, but kinetics and equilibrium tell us how fast we can make that product and -- and -- and whether it's economically feasible to do so.

So to make BBTS, the product, we have to react the MBT with tertiary Butylamine and I'm going to simplify this because I'm not going to go into all the different mechanisms. There's a lot of other mechanisms in here, but essentially the rate of that reaction is equal to some constant times the concentrations of the reactants and when you first start the process you don't have any products.

You only have reactants and the -- the rate of the reaction changes with the concentration of the reactants and so you start -- you add your reactants together and as these molecules collide given the proper orientation and energy, you make a product and as you make your products, the concentration of your products increases.

And so in the closed system, you eventually reach an equilibrium point and the equilibrium can be described as the equilibrium constant equal to the concentration of your products over the concentration of your reactants. And so at equilibrium, the forward reaction and the reverse reaction are equal and so if you have

equilibrium constant of -- of 100 no matter what you do you -- you -- you can never change that equilibrium constant. Therefore, for instance, if you were to disturb that equilibrium by adding more of a reactant -- you think of it as the denominator of the fraction.

So you would increase that concentration of reactant, you would have to increase the concentration of the product in order to keep the equilibrium constant, the same, and that is what chemistry -- that is what happens in chemistry in a closed system.

But you can't ever have a zero concentration in the bottom of -- of your denominator. It doesn't work. So there is -- there is no such -- there is no -- there is no way to take a chemical reaction and drive it to completion in a closed system. It just doesn't happen.

Q. Would it be in any chemical company's self-interest to operate a reaction process to eliminate all the waste?

A. Yes, it would. That would be a perfect world if all of your reactants formed

product and there were no waste streams and no other products formed, if everything was pure product, well, that would be the ideal situation. If it can be done, it would be in a chemical manufacturer's interest to do so.

Q. Yet figuratively, we have tons of regulations that apply to chemical company waste streams, right?

A. That is correct.

Q. What does that tell you about the ability to get to zero waste in these reactions?

A. The laws of science prevent that.

Q. As someone with a Ph.D. in chemistry, is it credible for anyone to suggest that plant scale reactions can be made 100% efficient with no waste generation?

A. That -- that cannot be done.

Q. Now, you know, specifically as to the Henry plant and the use of MBT, are you aware of any information that suggests that manufacturing processes for BBTS, OBTS, MBTS -- MBDS and other MBT-related products can be controlled in a way to eliminate all MBT from the waste stream?

A. They cannot -- that cannot happen that way, no.

Q. Is it possible to reduce the amount of MBT in the waste stream?

A. That is possible.

Q. Okay. When you're taking steps to try to reduce the MBT in the waste stream, when does the process become the hardest?

A. Well, the process becomes the hardest as you get the lower and lower concentrations of MBT and -- and really the way to understand that is, you know, things have to have a driving force in -- in science, say, like defusion.

Well, it's fast when you have a big concentration gradient and it slows down as there is a slower concentration gradient. So no matter what you do, same thing with concentrations, the chemicals and the reactions I just said, right, more -- higher concentration, faster the reaction. As you get lower and lower, you just have diminishing returns. It's harder and harder to eliminate that last little bit of whatever you're trying to eliminate.

Q. There has also been a lot of talk about the testimony in Mr. Winters' deposition, you've heard that, right?

A. Yes.

Q. Have you gone back and read Mr. Winters' deposition yourself?

A. Yes.

Q. And, in particular, did you read the portions of his deposition where he described some testing about oxygenating MBT with hydrogen peroxide?

A. Yes.

Q. Did you subsequently talk to Mr. Winters about what information he relied upon for that testimony?

A. Yes.

Q. Have you looked into that information and any other information that Emerald has on using hydrogen peroxide to oxygenate MBT?

A. Yes, I have.

Q. As a chemist, do you agree with Mr. Winters' description that the hydrogen peroxide pulls MBT out of the wastewater?

A. No, I would not describe it like

that.

Q. How would you describe it?

A. Well, hydrogen peroxide will react with MBT. Hydrogen peroxide will react with a great many chemical and it does so as both an oxidizer and a reducer. So depending upon the pH of the solution that it is in, it would either -- if it's acidic, it would -- it would be an oxidizer and if it were a basic solution, it would be a reducer.

Q. Now, since you've talked to Mr. Winters' about this testing, can you -- can you describe the test that was done that he was talking about?

A. Unfortunately, the -- I can describe it, but it's -- it's not really a very sound test.

Q. Describe it for us and then we'll talk about it.

A. So this was really done by a chemical supplier that was trying to sell Emerald a proprietary catalyst and there was no clear objective for the testing other than to try -- well, I don't even know what the objective was. There was no method written down to follow. There

was only one duplicate sample done and so the results are not very reliable.

In fact, if I remember correctly, there was -- in one instance, the treated sample that they provided had a higher MBT concentration than the untreated and the duplicates also -- the one duplicate that they did, the MBT concentrations were not within one -- the amount of error that would one expect.

Q. So this -- this salesman who attempted to do this test, did that person record the volumes of the samples that were analyzed?

A. No, they didn't record the volumes of the samples in all cases. They also treated some with acid and some they did not and they did not record the volumes of acid treated, of volumes -- of acid used.

Q. Were there other details of sample preparation that you would have expected to find, but did not find?

A. Yes. I mean, if you're going to do an analysis of sample to try to prove a concept, you first have to have a clear objective and identify what streams you're going to test, you

have to identify the method you're going to use, you have to record the volume of sample that you used, the pH of the sample that you used, whether you adjusted the pH.

All of these things would have to be thought out ahead of time so that when you go to do the test you would be assured that you wouldn't have missed something and then you have reliable data with which you can go forth and make a good decision.

Q. As a chemist and somebody who has a lot of experience working at a chemical -- in a chemical industry environment, what conclusions can you draw from this trial test that was done?

A. I -- I can draw no conclusions from this particular test. The data is absolutely inconclusive.

Q. So stepping back a bit from this particular test that was done, more generally, what would you expect from the use of hydrogen peroxide in a catalyst to oxygenate the MBT?

A. I would expect hydrogen peroxide to react with MBT. I would expect hydrogen peroxide to react with any -- just about any organic

molecule present in the wastewater stream.

Q. So in Emerald's wastewater stream, are there organic constituents other than MBT?

A. Yes, MBT would be a small fraction of the total number of organic chemicals that are present.

Q. So MBT is a small fraction.

Is the hydrogen peroxide going to be selective and try to react with the MBT first?

A. No, the hydrogen peroxide is essentially going to react with whatever molecule it collides with at the right orientation. So if -- if there is 5,000 parts per million of organic chemicals in the water and 100 parts per million of MBT, then it's 50 times more likely that the hydrogen peroxide will collide with another molecule. That's just the nature of chemistry.

Q. Okay. You know, again, as a chemist, would you expect hydrogen peroxide combined with some catalyst to oxygenate all of the MBT that is in Emerald's waste stream?

A. Provided you gave it a tremendous

amount of hydrogen peroxide I suppose that would be possible.

Q. And you'd have to give it -- why would you have to give it a tremendous amount of hydrogen peroxide?

A. Well, as I said, you have to have enough molecules to essentially react with every molecule in -- that it would encounter and get to the point where it would, you know, oxidize the MBT as well and that would be very hard to do.

Q. Now, Mr. Hathcock testified to some degree about, you know, the project plan that the company is working on for its processes to try to reduce MBT.

As you understand what has been -- what is being worked on as part of that continuous improvement project, do you think that process -- that that process has a better chance of reducing the MBT that gets to the waste stream in a cost-effective manner compared to using a hydrogen peroxide treatment?

A. I do.

Q. Why?

A. Because the approach that we're

taking is -- is to try to identify and eliminate the -- the -- or reduce the amount of MBT going to wastewater from each process and we don't really know yet how we're going to get there, but we're going to use the scientific method and facts in order to make strides towards that goal.

So when you're looking at the -- trying to reduce MBT, the closer you are to the process and if you can do it in the process, then that would be a much more effective way to do it than downstream somewhere else.

Q. The types of things that Emerald is considering as part of its continuous project improvement, are those ideas more selective in removing MBT than hydrogen peroxide treatment would be?

A. Yes, that -- that's one of the goals is to be selective toward removing MBT.

Q. In Mr. Winters' deposition, he was asked if hydrogen peroxide could be added into the biotreater, what do you think of that idea?

A. Well, I don't recommend that. Again, the concentration of hydrogen peroxide that you need in order to have any effect on the

organic molecules in the digester would likely damage the microorganisms. There is only so much hydrogen peroxide that an organism can metabolize. We all have -- we all produce hydrogen peroxide. It's part of the respiratory process because we breathe oxygen and -- and we have enzymes to catalyze its destruction, but like anything else too much of it is toxic. So if you try to have a high enough concentration of peroxide in the digester to destroy the organics, you would also be destroying the organisms that are doing the work.

Q. Yesterday, the Agency introduced into evidence and asked some questions about an article Soybean Peroxidase-Catalyzed Removal of an Aromatic Thiol, 2-Mercaptobenzothiazole, From Water, which I think you have in front of you and I think it's been marked as Agency Exhibit 19.

A. Mm-hmm, yes.

Q. Did you have a chance to read that article yesterday evening?

A. Yes.

Q. Just describe for us initially what the test was or describe to us what this article

is reporting on and what tests were run that are the underlying basis of the article?

A. So the scientists made a solution of Mercaptobenzothiazole in -- in regular lab water, reagent grade water, to a concentration of 167 parts per million and then they added various concentrations of soybean peroxidase, which is an enzyme found that can be extracted from soybeans and at various pH's they tested the ability of the enzyme to help catalyze the reaction of hydrogen peroxide with the MBT.

Q. Okay. Now, the -- the, quote, trial or test that was done by the salesman on the Emerald plant effluent, they -- that used a catalyst, too, right?

A. Yes.

Q. What -- do you know what that catalyst was?

A. No, the salesman said it was proprietary. So I don't really know what it is.

Q. But the two things that are somewhat similar in that both tests used hydrogen peroxide and some form of catalyst, right?

A. Yes, the enzyme is -- is -- can be

considered a catalyst, it would be slightly more selective, but not 100%. So it's the same enzyme and this paper was used to catalyze both the hydrogen peroxide reaction with phenol and amines as well as MBT, but yes.

Q. Okay. The tests that was done as part of this article, did it have the sorts of controls and data gathering that you described were missing from the trial that was done by the salesman at the Emerald plant?

A. Oh, yes, this is a very good scientific paper.

Q. Are there differences between the test that was done for purposes of this paper and how the use of the soybean-based catalyst and hydrogen peroxide might work on the Henry plant effluent and here I -- well -- or let me -- let me rephrase this.

Are there differences between the tests that were run as part of this study that's described in the article and how a hydrogen peroxide/catalyst-based oxidation process might be used in connection with wastewater generated on the Emerald side of the Henry plant?

A. Well, there are many differences and things that would need to be considered. The study was done as a proof of concept that this is possible, but, you know, what they're doing is they're essentially doing a radical preliminarization of the MBT in a very controlled solution.

So they're -- they're forming the MBT radical and then as they continue to form these radicals, they dimerize and once they dimerize, then essentially you have a double MBT molecule connected by the sulfur atom and then they become heavy enough to fall out of solution and then they're using a micro filtration at about 0.2 microns to filter the solution, remove it from the -- from their -- remove the MBT from the filtrate.

And that's all great. There is nothing wrong with that. That's a proof of concept and that's what a scientific paper is supposed to do. The next step would be to try to apply it into a real world situation and so in this case because you're -- we have such a -- a much more complicated matrix where you find the

MBT. As I mentioned, there are so many chemicals in there that can cause a lot of different problems.

One, the test they did with -- the vendor did is most likely just using the oxygen in the -- liberated from the hydrogen peroxide to oxidize the MBT. I'm not sure if it preliminarized it as they did in this paper, but regardless the difference is the matrix of the wastewater treatment system. It's much more complicated because the matrix here is not complicated at all. They made a solution of MBT.

Q. So let me just stop you for a second there, Mr. Wrobel.

When you say the matrix, are you talking about the water that the MBT is in?

A. Yes, so the matrix is the solution and all the surrounding components that make up the solution that your substrate is in. So in this case, we're concerned about MBT and in the -- in this paper, there is nothing in there but MBT and if they added polyethylene glycol or whatever minor amount of concentrations of other things.

Q. Did they use tap water --

A. Yes.

Q. -- as a solution?

A. Yes, they -- they used lab water, tap water.

Q. So --

A. Actually, better than tap water.

Q. The wastewater that comes out of the Henry plant reaction processes, is that tap water?

A. Most definitely not.

Q. What sorts of other things are in that matrix?

A. Well, it's composed of everything that would come out of the process. So essentially all of the amines that would be washed from the process, a lot of other organic chemicals, some -- the salts and things used to regulate the pH, the flocculent and the coagulant used to -- at primary clarifier all these things are going to be in some concentration in the solution. That's the matrix.

Q. And the effluent that comes out of the Henry reaction processes, is that going to have a different chemical oxygen demand than the tap water that was used in the test for this

paper?

A. Well, it would be hugely different. I mean, many, many orders of magnitude because there would be little oxygen demand from 167 parts per million MBT in this laboratory paper compared to the many thousands of COD -- mg/L COD present in the wastewater.

Q. So in the test that was run that underlies this paper that we're talking about, did the -- did the people doing the test, did they have to be concerned about the combination of the hydrogen and peroxide and the catalyst being selective for removing MBT?

A. No, that's the only chemical present for it to react with.

Q. Do you have to be concerned about the combination of the hydrogen peroxide and the catalyst not being selective if you use that on the Henry plant effluent?

A. Yes.

Q. You -- I think you mentioned the kind of filtration that was used as part of this test.

Can you compare that kind of

filtration to the kind of filtration that is possible on a plant scale that might be used at the Henry plant?

A. Well, 0.2 microns is a pretty small filter. It would be something you would use to filter drinking water. It would filter out bacterium. It would probably not be the way you would -- you would perform it at a chemical manufacturing scale.

Q. Do you use a 0.2 micron filter at the Emerald Henry plant?

A. You wouldn't use it in a wastewater treatment system.

Q. The enzyme that is used here as a catalyst in the testing that was done for this paper, might there be problems in terms of how it would perform either in a pretreatment step within the Henry -- within the Emerald portion of the plant or in the wastewater treatment system itself?

A. Yes. So enzymes all have a specific temperature range, pH, many things can affect them. In this case, the pH change is actually pretty reasonable. The temperature, of course, is

important. If you're -- if your enzyme gets too hot, then you denature the proteins and the enzyme doesn't function anymore. So temperature is something to consider. Typically around 160 degrees is usually where that occurs. But it's different for every enzyme.

And then also as I mentioned before the matrix all the different ions present in the wastewater already and all the other organic chemicals could have an effect on the enzyme as well. They could either render it ineffective or certainly reduce its effectiveness.

Q. As between the project plan that the company is working on as part of its continuous improvement project and testing out the soybean catalyst/hydrogen peroxide oxidation approach, in your opinion as a chemist, which of those two has a better chance of being successful on a cost-effective basis?

A. Definitely the process improvements.

Q. And why?

A. Again, it's just selectivity. It's looking at the process and trying to make changes that are specific to MBT and, again, hydrogen

peroxide, in either case, whether you have a catalyst or an enzyme, it's still not specific and you have so many other things to consider.

Q. Does Emerald have a health, safety and environmental security policy?

A. Yes.

Q. Tell us what the primary principles of that policy are.

A. We want to be a responsible corporate citizen. We want to do the right thing. We want to always strive to continuously improve on our environmental performance so that we minimize our environmental impact. We know it's important to train our employees so that they understand the impacts on their actions on the environment.

We want to maintain open dialogue with the communities and the regulators that work with us and we want to protect the environment and the community where we operate. That -- that is our -- those are our objectives paraphrased.

Q. So the company is working on this continuous improvement project.

Are there any elements of the continuous improvement project that are looking at end of the pipe treatments?

A. No. Because continuous improvement that -- that doesn't really fall under the definition of continuous improvement. We're looking more at the process side of things.

Q. There has been a lot of testimony in this proceeding about different forms of end of the pipe solutions.

What environmental concerns would you have about implementing any of those end of the pipe solutions?

A. So every one of those solutions that has an environmental impact, none of them are just get rid of the ammonia and everything is great. Every single one of them has a worse side effect and so that's one of the reasons I got in to do what I do is -- is I want to make it better by improving the process before we have to implement something at the end of the pipe that will either increase greenhouse gases or increase the salinity and the toxicity of the effluent or produce other side streams of chemicals that we have to dispose

of again. And so, in my opinion, those are not really -- those aren't really good ways to go.

Q. Has the company asked Mr. Flippin to have any input to the continuous process improvement team or, you know, the process steps that you are considering?

A. Well, Mr. Flippin is certainly very accomplished and knows a lot about a lot of things, but that is not his area of expertise. So we would not -- we would not ask Mr. Flippin to help us with the process improvement.

Q. And have you, to date, asked him to help in any significant manner with that process?

A. No.

MR. DIMOND: Okay. That's all we have.

C R O S S E X A M I N A T I O N

BY MR. GRADELESS:

Q. Mr. Wrobel, nice to see you again.

A. Thank you.

Q. Why are you recommending that there be no sunset provision?

A. Why am I recommending that there is no sunset provision?

Q. Why is the petitioner in this case recommending there be no sunset provision for the adjusted standard?

A. I don't really know the answer to that question.

Q. Okay.

A. That's not my area of expertise.

Q. I hear a lot about we're trying to make it better, we're trying to improve our internal processes, we have plans where we're doing projects, we're considering projects and yet in the adjusted standard case you've recommended that the adjusted standard be put in place forever.

A. Is that a question?

Q. If you know that, do you know that?

A. Well, I will say that whether or not the adjusted standard is granted in perpetuity will not change the company's responsibility or desire to meet the standards. That's not going to change. We are committed to continuous improvement and my area is continuous improvement in environmental performance.

Q. And your desire you would only seek

to meet the standards as they have been adjusted, right, the higher standards?

A. No, that's not what I'm saying.

Q. So your goal is to always look for the 3/6 standard?

A. My goal would be, yes.

Q. That's your goal, is it not the goal of Emerald Performance Materials?

A. It is the goal of Emerald Performance Materials.

Q. Okay. You would agree that you only need to get the MBT low enough to achieve nitrification?

A. So far the evidence that I've seen, although it is still not -- I would not say I'm 100% sure of that, but that is what the data seems to support.

Q. So you would agree that to get the MBT low enough to achieve nitrification would, therefore, be your goal?

A. That is certainly one of my goals.

Q. And it's not necessarily to remove all the MBT?

A. Well, that's correct. If you can

get it low enough and you can nitrify it, that would be great.

Q. Now, you're -- you live or you're from Washington state, right?

A. I live in Portland, Oregon.

Q. Portland, Oregon. But you work for Kalama Chemical in Washington state?

A. Emerald Kalama Chemical's corporate office is in Vancouver, Washington and we also have a plant in Kalama, Washington about 40 miles apart.

Q. So you've traveled here to both Lacon and Springfield to testify, right?

A. Yes.

Q. And how many times have you traveled to Illinois with respect to the Henry plant?

A. Well, I come out here about once a month.

Q. And is that for the continuous process team that has been assembled?

A. Sometimes. A lot of times we discuss things via phone.

Q. When you travel to Henry, Illinois, that's to discuss the continuous process

improvement team, right?

A. It's one of the duties I have to do, yes.

Q. Okay. But that's the only time you travel to Henry, Illinois, right?

A. I don't understand.

Q. The only time you've traveled to the Henry plant in Henry, Illinois was in the context of your duties as an employee, right, is that correct?

A. Yeah. Yes.

Q. And those duties relate to your role on the process improvement team?

A. I also have other responsibilities as well. So I come to Henry for other reasons as well.

Q. Now, you report to Ed Gotch, is that correct?

A. Yes.

Q. Ed Gotch is the CEO of Emerald Kalama Chemical?

A. That's correct.

Q. In Kalama, Washington. And I'm -- not a trick question, but Ed Gotch's role with

respect to Emerald Performance Materials, are you aware of that?

A. So -- my understanding -- so Ed Gotch is the CEO of Emerald Kalama Chemical and on the Board of Directors for Emerald Performance Materials.

Q. Now, you didn't -- you became involved in the continuous process improvement team for the first time in the spring of 2019, is that right?

A. I think it was 2018.

Q. I think you're right. Spring of 2018, right?

A. Yeah, I think so.

Q. And was that because the Henry plant no longer had a health, safety and environmental manager employed?

A. No, that wasn't the reason. I don't think they did at that time either. Oh, no, I think they did actually when I first started looking at that. This was really -- that part was really just to start looking at what data did we want to collect in order to try to understand this ammonia issue.

Q. Okay. And that was in the spring 2018?

A. Yes.

Q. And you arrived on the scene in Henry?

A. Yes.

Q. And you said -- I think you said you were surprised at how little data that they had?

A. Consistent data, yes.

Q. Okay. What about that data surprised you?

A. Well, just that I would expect a lot more data going down consecutive days and a lot more -- if you -- well, if you want to characterize the wastewater treatment system, you just need to sample more points and we didn't have that information.

Q. Okay. And now you're looking to do that, right?

A. Now, we're looking to do that.

Q. Were you required to sample at more points or is this sort of an internal corporate decision?

A. Just my decision, corporate

decision.

Q. And when you are making -- in the context of making a decision, I guess, I'm just trying to get the process up the corporate chain here to make sure I understand it correctly.

Basically, you and Mr. Hathcock would have to agree to some kind of potential solution for this case to bring it up to the next level, is that right? Is that fair to say that's how it would work?

A. Yes -- yes, I mean, that's generally how it'd work.

Q. And then you would -- guys would bring that decision to Jan Eland?

A. Jan.

Q. Jan Eland. Sorry.

A. Yeah, so Galen reports to Jan. Jan is the vice president of manufacturing.

Q. And you guys would report to Jan about any sort of treatment or alternatives that should be implemented at the Henry plant --

A. Yes.

Q. -- generally? Jan is in the Netherlands?

A. Correct.

Q. And is it your understanding then Jan from the Netherlands would take that recommendation and could potentially forward that to senior management?

A. Well, Jan is a vice president. He is a senior manager and if Galen and I supported something and we convinced Jan of it, then he would support it and that's how it would work.

Q. And that's essentially to spend money to implement any kind of treatment, right?

A. Yeah, there is an approval process to get capital funds released to do any capital project.

Q. And do you know the capital -- or the authority that Mr. Hathcock has with respect to capital improvement projects, the spending authority?

A. I don't know his spending limit.

Q. Do you have a spending limit, I guess?

A. My spending limit is fairly low. It's like $10,000 or $15,000.

Q. Okay.

A. I'm not going to fix your problem for that.

Q. Gotcha. So you have to take it up to get a higher spending approval --

A. Correct.

Q. -- right?

A. Correct.

Q. And do you know who Jan -- Jan, who is he employed by?

A. Jan is employed by Emerald Kalama Chemical.

Q. And is it your understanding that Emerald Performance Materials owns Emerald Kalama Chemical?

A. Yes, they do.

MR. GRADELESS: I don't think I have anything further. Will we get done before lunch?

MR. DIMOND: I have no further questions.

HEARING OFFICER WEBB: Thank you, Mr. Wrobel. Anything further?

MR. DIMOND: We have no more witnesses. We would like to make a brief closing statement, but we would like to take a brief break

before then.

HEARING OFFICER WEBB: Okay. Let me just ask is the Agency going to have anything before closing statements that you'd like to present or address?

MR. GRADELESS: Nothing to present or address --

HEARING OFFICER WEBB: Okay.

MR. GRADELESS: -- at this time.

HEARING OFFICER WEBB: All right. Then let's take a break.

(Whereupon, a break was taken after which the following proceedings were had.)

HEARING OFFICER WEBB: We'll go back on the record and we are ready to proceed with closing arguments. Would the petitioner like to make a closing argument?

MR. DIMOND: Yes. Thank you, Hearing Officer Webb.

In making a closing argument, I am painfully aware that we still have a post-hearing brief and reply to post-hearing brief. So I am not going to even try to address

every issue that has been raised in these proceedings or to address anything in any significant detail, but I do think that we aught to go back and look what the Section 28.1 factors are for granting an adjusted standard.

I'll do them in a little bit different order than they are -- than they are described in the statute, but that's because I think some of them are more important than others. So I want to start with impact on the environment. All the testimony that the Board has heard through this proceeding is that the ammonia in Emerald's discharge has no negative impact on the environment.

The water quality standard testing shows that outside the mixing zone we're at background. The Whole Effluent Toxicity testing shows outside the ZID there is no impact. Inside the ZID, there is no state in the nation that sets standards, and for good reason, as Mr. Houston Flippin explained. All the treatment alternatives have bad side effects. I think no one in the State of Illinois is more cognizant than the Board the difficulty of meeting the water

quality standards for chlorides and the Board has been involved in multiple proceedings dealing with that issue.

All the treatment alternatives are going to have a negative impact on the amount of chlorides and the amount of salt that goes into the Illinois River and as the witnesses have testified the salt is a permanent addition to the river that will not break down. In contrast, the ammonia does break down and is at background levels at the edge of the mixing zone.

So that, to me, is just a huge factor. There is no environmental impact with the adjusted standard that currently exists and there is no evidence that suggests that there is an environmental impact from the adjusted standard that currently exists.

Another factor that is laid out in the statute is consistency with federal law. There has been no dispute about that here. The Agency admitted in their recommendation that it -- that the adjusted standard would not involve any inconsistency with federal law. The Board has found that twice and no one has identified any new

federal law since AS 13-2 that would create an inconsistency with federal law.

Another factor, I think it's maybe -- it might even be the first factor that is listed in 28.1 is that the Board needs to find there is a substantially different factor that applies to the individual or company that is applying for the adjusted standard. The Board has already twice found that there is a significantly different factor for the Henry plant that was not considered in adopting the general rule. It seems impossible to me that the Board could go back on that finding now. There is absolutely no doubt that in 1974, I think it was 1974, when 304.122(b) was adopted that the circumstances of the Henry plant were not considered by the Board.

The Board has, as I've said before, twice found that to be the case and I don't see how the Board could change that historical finding. The Agency has sometimes tried to suggest that that's not the case anymore because we have a significant amount of data now that shows that for a substantial period of time there has been no MBT in the effluent after the

secondary clarifier, but that doesn't undercut the Board's prior findings that there is a substantially different factor because even as Mr. Liska admitted yesterday to look at what the level of MBT is at the secondary clarifier ignores what the difference is.

The difference is that at most other industrial plants and at -- and at -- and at all municipal plants, they do not have MBT in the primary clarifier and that's why all those plants can achieve ammonia reduction with single stage nitrification.

Even as to the examples of ExxonMobil and Citgo while they do have nitrification inhibitors they are not MBT and the nitrification inhibition potential of the inhibitors at an oil refinery are not the same as the nitrification inhibition potential of MBT. So even -- even ExxonMobil and Citgo are not comparable to the Henry plant.

And, furthermore, even if they were, and they're not, but even if they were, it doesn't change the fact that in 1974 or '75 when 304.122(b) was adopted, the Board did not consider

the circumstances of those two oil refineries and it did not consider the particular circumstances of the Henry plant as with regards to the ability to meet the ammonia limits that were set in 304.122(b). That is essentially a historical fact that cannot be changed.

So I think the Board can -- can do nothing -- I think it is, in essence, bound by its prior determinations that there is a substantially different factor. I don't see how that can change.

So that brings us down to the last factor that is listed in 28.1, which says, "Does the significantly different factor justify an adjusted standard?" And the Board has always looked at that in terms of a couple of factors. Are there alternatives for control that are both technically feasible and economically reasonable?

Emerald and its predecessors have always acknowledged that there are treatment alternatives that are technically feasible. I might wish as a lawyer coming to this proceeding for the first time at a -- at a -- at a testimonial level where we are putting on

witnesses I might wish that hadn't been conceded before, but we've said it so many times that there's no point in disputing it. We've never contested that there are some treatment alternatives that can be end of the pipe solutions that are -- that are technically feasible. They will work.

But that doesn't answer the economic reasonableness question and that is a separate prong of the Board's analysis of whether or not the significantly different factor justifies an adjusted standard. So -- so the Agency or anybody else saying there are technically feasible alternatives, okay, we admit it. But that doesn't answer the question of whether an adjusted standard is justified. You also have to look at economic reasonableness.

Now, on economic reasonableness a few things that I'd like to point out. We have consistently maintained during this proceeding that you judge economic reasonableness on the basis that is set forth in the statute. That is that you look -- you do a cost benefit analysis and you compare the cost of reducing pollution

versus how much pollution reduction you're getting.

During Mr. Hathcock's testimony this morning, he talked about what the impact would be on the company if -- if the adjusted standard was not acted upon before April 16th and what the long-term impact of not extending an adjusted standard would be. I don't want that to be mistaken for a change in our position on economic reasonableness. It is not.

But I did think it was important that the Board understand that there are real consequences for this plant if the adjusted standard is not acted upon before April 16th. We have, I think, by filing our petition more than a year in advance of April 16th, 2020, and by our conduct in this proceeding have sought to diligently see that the Board has time to act before April 16th and are hopeful that it will still be able to do so.

Further, on economic reasonableness, Mr. Flippin's analysis shows that the costs of end of the pipe controls are still not economically reasonable. Are there things

that can be done essentially as a pretreatment step before we get into the wastewater treatment system that can be done to reduce the level of MBT that may ultimately help us be able to lower the amount of ammonia in the -- in the effluent?

Maybe. The company is working on that. We don't know the results of that yet and some of those things may be economically reasonable, but until the work is done, until the work is planned and the investigations are done and the results are known, it's premature for the Board to think that those solutions are going to work.

The Agency has done little to rebut the evidence that we have put forward that the end of the pipe solutions are not economically reasonable. The Agency has set forth a number of different treatment alternatives and every time they come up with one we evaluate it and every time we evaluate it is found lacking. The baffles are found -- the baffle idea was imprecisely described on the record in a way that was very, very difficult to understand during verbal testimony. I certainly did not understand it.

Mr. Flippin didn't understand it.

Once we got the transcript and read it, we started to understand what we thought the concept was. It was immediately obvious what the dangers of that were and throwing out an alternative that is not well-thought through, that has not been costed out is not evidence that the Board should be considering in evaluating alternatives.

It's -- you know, the testimony is in the record now. That is why we had to spend so much time rebutting it, but a half thought through process, a half thought through alternative wasn't even half thought. An alternative that is no more than a brainstorming idea with no costs attached to it, with no valuation of whether -- what the physical dangers would be of doing that is not a credible alternative.

So all of the -- all the real evidence on economic reasonableness shows that there is not yet identified an economically reasonable alternative that will achieve the 6 mg/L daily maximum or the 3 mg/L monthly average

and it's the summation of all that evidence that has caused the company to believe that it is appropriate for the Agency -- or for the Board, I'm sorry, for the Board to grant an adjusted standard in this proceeding.

Before I -- there is -- I want to talk a little bit about what conditions might be appropriate on an adjusted standard, but before I do that I just want to talk a little bit about some of the Agency's themes.

The Agency said there are new facts. I agree. There are some new facts. I think there are fewer than the Agency thinks. The Agency thinks that the lack of MBT at the end of the secondary clarifier is a big new fact. Well, if the lack of MBT at the end of the secondary clarifier was such a big, new fact, Mr. Flippin would not have evaluated tertiary nitrification in 2004.

In 2004, I think there were concerns, and this is stated in the record of AS 02-5, there were concerns that MBT could not reliably be removed at the end of the secondary clarifier and that was one of the reasons why

tertiary nitrification was not considered by Mr. Flippin to be economically reasonable and was considered potentially not to be technically feasible in 2004. The Board ended up agreeing with that conclusion and that's why it -- that's one of the reasons that it granted the adjusted standard in AS 02-5.

So I think that there are fewer new facts than the Agency really thinks and the impact of them is less than I think the Agency portrays as well. The -- it is true that we have a lot of data showing a lack of MBT after the secondary clarifier, but the data also shows that there are sometimes spikes and that can't be ignored by the Board.

Another theme that the Agency had is that Emerald was willfully failing to reduce MBT in its waste stream. That just seems to me to be incredible. If that was the case, why did Emerald undertake the project it undertook in the fall 2018 and early 2019 to improve the BBTS process? If that was the case, under no compulsion from anybody to do anything, why in the fall of 2019 were further modifications made to

the BBTS process? Sure. We were looking at the expiration of the current adjusted standard, but to suggest that there was a willfulness on behalf of the company to look for alternatives to reduce MBT is, I think, just a wholly unsupported assertion.

Another theme the Agency had is combining treatment alternatives. Some of this is just fantastical. The idea that you would invest in a spray irrigation system and one of their -- one of their ideas that was thrown out was the idea that you would invest in the spray irrigation system and build it all out, you would operate it for, I don't know, 6 to 12 months so that you could do the repairs on one of the biotreaters and then I guess you would just turn it off and never have to use it again because at that point the biotreaters would be set up to do tertiary nitrification has no relationship to reality.

What you're doing from an economic standpoint is you're building two systems. You're incurring two sets of cost. Neither system by itself is economically reasonable and yet the combination that the Agency

suggests is doing both of them and then turning one of them off.

The combinations idea, particularly as unspecific as it is as the Agency has used it, sort of is saying, well, they need to evaluate all sorts of alternatives and the combinations of alternatives. That is not a credible assertion and it has been made in such general terms that it lacks all credibility.

The Agency threw out a number of different alternatives that they said we should handle. I'm going to leave most of our rebuttal on this to our post-hearing briefing. We will discuss each of those alternatives in detail and what the problems are with them. For now, I think it's enough for me to say that for each one of those alternatives we were able to show that either they physically can't be built, that they would have other negative impacts on the environment, that they would not be economically reasonable and in the case of the watertight sealed wall that it would involve significant physical dangers that could cause really catastrophic events at this plant. I'll just

leave it -- we'll address the details of each of the alternatives as we understand them in our post-hearing brief, but the Agency's, quote, alternatives are not really alternatives.

And the final theme that the Agency has is on best degree of treatment. The best degree of treatment is defined in the Board regulations and if memory serves me correctly, it is -- it is defined as treatment that is technically feasible, economically reasonable and employs sound engineering judgment.

So, in essence, the best degree of treatment determination is not much different. The only real different element of it is the sound engineering judgment element of it which Mr. Flippin has asked and the other two components of it are really the same components that have to be considered in determining -- for the Board determining whether or not the significantly different factor justifies an adjusted standard.

Now, there has been a lot of talk -- there's been a lot of testimony about the Henry plant meeting the OCPSF categorical standard set by U.S. EPA. I don't think there is really

any dispute that that is the case. It is not Emerald's position that necessarily meeting that standard means that we've met the best degree of treatment standard under the Board's regs.

We certainly think that it's a factor to be considered by the Board, but we wouldn't say that the two -- we wouldn't say that the two determinations are the same thing. We do think, though, that we have shown that for ammonia control Emerald is employing the best degree of treatment for its plant.

Yes, there are technically feasible alternatives, but best degree of treatment as it is defined by the Board, not as it is discussed -- has been discussed by some on behalf of the Agency nowhere in the definition of best degree of treatment does it say that it is superlative best.

In fact, the use of the term economically reasonable in the Board's definition of best degree of treatment immediately implies that it doesn't have to be the superlative best and any suggestion to the contrary simply has, I think, no basis in the law.

If that was the -- if that was the law, then essentially economic reasonableness would fall out of the definition of best degree of treatment and best degree of treatment would simply be what is technically feasible. That's not what the Board's definition of best degree of treatment says. And so the idea the best degree of treatment means best/superlative, you must employ the absolute best in all cases, simply cannot be true.

So now a few final thoughts on what we think are appropriate conditions for the adjusted standard in the belief that the Board should grant it based on the evidence in the record. There are -- there are, of course, multiple -- we -- we proposed ourself in our filing on December 30th a list of adjusted standard conditions, and I'm not going to touch on all of them. I'd really like to touch on three of them; the concentration limits, the load limits and the issue of an expiration date for the adjusted standard.

As to the concentration limits, we believe based on the data that we have got over

a five or six-year period it's summarized in Petitioner's Hearing Exhibit 14 that maintaining the concentration limits at daily maximum of 140 and monthly average of 110 is appropriate. We said that in our petition, we said it on December 30th and I'm telling you that now. We think that, in part, because the more recent data that we have that seems to show that maybe at low production levels of the MBT-related products we can achieve single stage nitrification there is just not enough data to use that as a reliable basis for changing the concentration limits.

Some testimony indicated that concentration limits could be lower because if you only look at data -- there was a little bit of vagueness, but if you only look at data from the last five years or maybe from all of 2014 to date, which as the proceeding has gone along would now be six years of data, that, well, they haven't hit 140. They haven't hit 110. That's true. We haven't. We have been in compliance with the 140 and 110 limits, but there have been some months where we've been pretty doggone close. We had a month at 130. We had a month, I believe, at 120

and this is on the daily maximum and we've had several months where we were between 100 and 110 on the daily maximum.

Memory does not serve me correctly as to where we've been on the load limits, but I do believe that there are several months where on the load limits our monthly average has been close to or above 100. That's not far from 110 and the production data that we will later this week or maybe early next be providing to the Board in response to Mr. Rao's question unequivocally shows that the plant is not producing at full production; not in 2018, not in 2017, not in 2016, certainly not in 2019. So on the limits, we think that the data well-justifies maintaining the daily maximum of 140 and the monthly average of 110 on a concentration basis.

As to the load limits, it is, I think, almost conclusive to note that 304.122(b) says nothing about load limits, nothing about load limits. So, in essence, we sort of -- I'm not sure that there are -- you know, almost isn't a request for an adjusted standard there, but the Board put limits the last time on it. We have

looked at the data and all the DMR data and we do believe that we can reliably -- based on the last six years of DMR data, that we can reliably reduce those load limits by 25% and still comply with the 25% lower limit. That's why we proposed it on December 30th.

We think that -- to the extent the Board is looking for some step that shows that we are trying to do something better for the environment we think that's a significant step, but it is still important to note that 304.122(b) does not put a load limit on anybody. It doesn't put a load limit on us. It doesn't put a load limit on the Stickney plant that is operated by the MWRD. It doesn't put a load limit on ExxonMobil. It doesn't put a load limit on Citgo or any of the other facilities that are subject to 304.122(b) regulation.

Now, as to the time limit as to an expiration date condition in the adjusted standard in our petition, and on December 30th, we did not propose such a limitation. We didn't propose it because we think the evidence justifies an adjusted standard without a time limit. We

still think that based on the evidence at the end of the hearing, but we are not naive. We are pragmatic.

We know that the Board has not issued an adjusted standard or a site specific rule, at least not I think in the water arena, that does not have an expiration date on it for probably 15 or 20 years. We will not be shocked. If the Board decides to grant an adjusted standard, Emerald will not be shocked if it has an expiration date on it. Whether we think the evidence justifies that or not, we will not be shocked by this.

So just because we have not proposed a limit, doesn't mean that we are ready to operate under an adjusted standard if it has such an expiration date on it. We do think if the Board does that that there are some things that aught to be considered. We think that the Board should consider having an adequate time for the work that Emerald is currently doing to see what the results of that are. We shouldn't be made to come back in such a short time period that, you know, we're all doing this in another six months

or another year. That, I don't think makes sense even from the Board's standpoint.

But if the Board wants to put an expiration date on the adjusted standard of five years or four years, some adequate period of time, as I said, we're not going to be shocked by that and we will do the best we can and we will come back at the end of whatever that period of time is and we will see where we are. I don't know where we will be in four years or five years. We may be in a position where the process improvements that we are currently working on suggests that the plant can consistently meet a concentration limit that is significantly below 140. We may be able to meet a monthly average concentration that is significantly below 110.

Whether or not it's below 6 and 3, I don't know, but it may be significantly below 140 and 110 and if that's what the data shows at that point in time, and if there is an expiration on this adjusted standard, we will come back before the Board and we will present our evidence again and we will address that issue at that point in time.

The other thing that we will suggest, and we will provide specific language on this in our post-hearing brief, is that if the Board does adopt an expiration date for a new adjusted standard that it be worded in such a way that it operates much like the expiration date of an NPDES permit. In simple terms, what the expiration date on an NPDES permit says is it specifies a hard expiration date.

So if it's issued on April 1st of 2020, an NPDES permit typically lasts five years, the expiration date is April 1st of 2025, but there's a clause in the standard conditions that basically says, and I may get the time period on this wrong because my memory isn't perfect, especially now after so many years in the world, but I think it says something on the nature of if the entity applies for a renewal at least six months in advance of the expiration date, then the existing permit continues in effect until the Agency acts on the application for the new permit.

So if the application is filed on June 15th of 2024, that's more than six -- actually, it wouldn't be June 15th. I guess April

would be -- I'm all mixed up here. I think it would be sometime in September if I've done my -- my time calculation. So if the renewal application was filed September 15th of 2024, if the Agency doesn't act on that permit until June of 2025 after the expiration date, that permit continues in effect until the Agency acts on the new application.

We do think that if the Board is going to adopt a time limit on the adjusted standard that language of that nature would be appropriate and would eliminate some of the uncertainty that we are now dealing with of having a fixed date of expiration of the adjusted standard. But I do want to go back to the first point that I made with regard to the time limit. We are pragmatic. We are not naive about this and while we don't think the -- we don't think the evidence or -- I'm sorry.

While we do think the evidence supports the issuance of a permanent adjusted standard, as I said, if the Board agrees with us and decides to grant an adjusted standard based on the evidence in the record as we think they

should, we're not going to be shocked if you put a time limit on it.

So if you do, that's fine, we'll deal with it and perhaps that will give us a chance to all meet again at some happy time in the future. Thank you.

HEARING OFFICER WEBB: Thank you. Would the Agency like to make a closing argument?

MS. ZEIVEL: Yes. I think I'll be doing it today. Like Mr. Dimond, the Agency will be summarizing our position in our post-hearing briefs. So I hope to not belabor too many points today, but I think we just want to highlight some of the important points that we think came out through the testimony presented, things that we would like the Board to remember and consider.

We are here because Emerald Polymer has submitted the petition to the Board requesting that its adjusted standard, which is 46 times the regulatory effluent limit for ammonia, stay in effect without sunset as Mr. Dimond reminded us because it claims that every treatment alternative has been evaluated and that despite changing technologies and costs as Mr. Flippin

testified meeting the regulatory limit or even incrementally reducing its ammonia is too expensive and will forever be economically unreasonable.

However, as it sits today and as admitted testimony has shown and as Mr. Dimond just spoke to there are a number of treatment alternatives which can achieve both partial and full scale compliance with the ammonia effluent limit that are both technically achievable and in the Agency's position economically reasonable.

In fact, Mr. Flippin, the petitioner's consultant, has evaluated over a dozen technically feasible alternatives, none of which the petitioner has sufficiently shown through its guesstimates characterized by the AACE cost estimate document admitted as State's Exhibit 16 are economically unreasonable.

As I said, we just want to point out some crucial parts of witness testimony that we have heard throughout the proceeding starting with Mr. Hathcock, the plant site director.

Mr. Hathcock stated that they are just now realizing how much MBT is in their

process waste streams. Mr. Hathcock further admitted that the plant's ammonia levels have dramatically dropped towards the end of 2019 and that he suspects nitrification may be happening, but that he was surprised at this achievement and they haven't yet figured out how this was achieved or how its happening.

After 20 years of the petitioner claiming to so closely evaluate its internal processes, specifically looking at MBT, ammonia and how nitrification can occur, it's hard for the Agency to understand how any part of these processes are still a surprise or a mystery to the petitioner. It's also hard to understand why these MBT product processes are just now being evaluated with some of the MBT processes never having been evaluated to date including MBTS as we heard from Mr. Hathcock and in his testimony it appears that despite their claimed desire to reduce MBT in the process as opposed to installing any of the end of pipe alternatives that we have been discussing here they would like to do that because those process changes don't cost the company anything to implement.

The petitioner has only made changes to BBTS, one of the four MBT containing processes. Why the petitioner's efforts remain focused on what Mr. Hathcock termed financially effective MBT reductions while admitting that there is no MBT in the final effluent after the secondary clarifier since at least 2016 which means that the final effluent can be treated for ammonia just like any other ammonia-containing effluent is the real mystery to the Agency.

We admitted the deposition of Mr. Winters who is the utilities foreman in charge of the wastewater treatment system. His deposition echoed Mr. Hathcock's surprise at the drop in ammonia because of the legacy of Mr. Flippin's reports stating that there is no way to nitrify, but Mr. Winters' testimony, which we encourage the Board to go back and read as it's been admitted in its entirety, states that based on current evidence nitrification is possible and is not just suspected, but is, in fact, occurring in the operational biotreater.

Mr. Flippin's evaluations have served as the petitioner's basis for claiming all

their treatments evaluated are economically unreasonable due to the presence of MBT in the waste stream. However, the data shows Mr. Flippin himself has now admitted, and Mr. Dimond referenced, that there is no MBT in the effluent past the secondary clarifier, tertiary nitrification is possible and that his Class 5 evaluations really are the least accurate of all evaluations under the AAC cost estimates available.

If the Board finds that these unit costs are really the appropriate marker for economic reasonableness, it's clear that the petitioner will never install end of pipe treatment while they continue to rely on these Class 5 guesstimates because he testified that the unit cost will only increase from here. Construction costs will only continue to increase. So as long as unit cost is continued to be relied upon as the marker for economic reasonableness and those unit costs will only continue to rise over the next number of years, we can pretty much guarantee that we will never see an end of pipe treatment installed. So should the look at MBT

internal processes not be successful, this reliance on unit cost will mean that the state will never see the petitioner attempting to install treatment sufficient to meet the ammonia effluent limit.

For the Agency's witnesses, we had Mr. Bingenheimer. There was a lot of questions as to the purpose of his testimony. He testified that the Agency requires at least a Class 3 cost estimate to be able to properly and sufficiently evaluate the economic feasibility of an improvement project. Additionally, Mr. Flippin stated that the present value over 10 years is the appropriate yardstick for economic reasonableness, but Mr. Bingenheimer's testimony highlighted how POTW's are financing projects over 20 and 30 years -- 20 and 30-year loan periods and that they, therefore, have to evaluate the economic reasonableness of paying for treatment over that much lengthier time period using a much more detailed analysis than what petitioner has brought to the Board in this proceeding.

The Agency also admitted the deposition of Edward Gotch who Mr. Wrobel stated

today sits on the Board of Emerald Performance Materials and also serves as the CEO of Emerald Kalama Chemical which is one of the four entities, along with Emerald Polymer, that are managed by Emerald Performance Materials. If you look at the deposition which, again, we encourage the Board to do despite the fact that Mr. Gotch was not with us for this proceeding, his testimony explains how cash generated by the four entities is sent to Emerald Performance Materials where it is then pooled and distributed to pay the expenses of those same entities.

Mr. Gotch explains how these pooled assets are considered and available to finance capital improvement projects at any of the four co-managed facilities. These two pieces of testimony together bring us to encourage and ask the Board to not allow this industrial facility to consider economic reasonableness over a timeframe a half to one-third shorter than municipal facilities which have much less financial resources available to them, but they nevertheless have to comply with the applicable limits, including those for ammonia.

Hopefully, that brings the relevancy of Mr. Bingenheimer's testimony and the Agency's position as to what the appropriate benchmarks are to determine economic reasonableness, 20 to 30-year loan periods with a much more detailed cost estimate to sufficiently bring a compelling argument to the Board and sufficient argument to the Board regarding economic reasonableness of actually installing some of these treatments.

Mr. Hathcock's testimony touched on Mexichem's contribution of wastewater. I'm referring to Mexichem despite the name changes, but for ease of the consistency in the record, Mexichem's contribution of wastewater containing ammonia to petitioner's effluent. And this point is expanded upon in the deposition of Amy Harding who is the corporate comptroller for Emerald Performance Materials. Ms. Harding, in her testimony -- again, we encourage the Board to look at it as she did not join us today, but it's been admitted into evidence. Ms. Harding explains that Mexichem paid the petitioner $1.8 million in 2018 to take its wastewater containing ammonia in order

to benefit the petitioner's adjusted standard from ammonia.

Mr. Hathcock characterized the petitioner's relationship with Mexichem as zero sum, but the reality is that both companies benefit from the petitioner's adjusted standard in this case. Mexichem gets to discharge its wastewater without the cost of treating it for ammonia and in exchange the petitioner gets to use Mexichem's electricity and steam for its own purposes. If it was truly zero sum as Mr. Hathcock has represented, then the petitioner could or would just shut off Mexichem's stream at no cost to the petitioner and instantly reduce its ammonia discharge.

So the petitioner has this adjusted standard for ammonia. Mexichem is allowed to contribute its ammonia to petitioner's waste stream and then pays the petitioner millions of dollars for its ability to do so while the petitioner's adjusted standard doesn't require any pretreatment of Mexichem's ammonia contribution as long as the petitioner's final effluent remains 46.6 times above the regulatory limit and the

petitioner receives critical services in exchange for this.

Despite petitioner's representations today and throughout the proceeding about their being no environmental impact, I encourage the Board to remember Brian Koch's testimony which highlights the extreme toxicity of petitioner's discharge. I think that toxicity may have been spoken about today speaking to the barren land application field should it relieve -- if soil were to receive this discharge, it would kill everything in it.

If the water receives this discharge, he explained that at the highest dilution rate of 6.25% effluent everything was killed and that in order to derive the LC50 value Mr. Koch has to create two new brackets to work with the toxicity of this effluent. The petitioner can only continue to discharge this highly toxic effluent if it can meet its burden of proving that it is using best available technology and new facts that have come out during this proceeding and through more intensive discovery than previously done has shown that the petitioner

has not, in fact, met that burden.

So in response to Mr. Dimond's closing, the Agency takes extreme issue with his representation that this effluent has zero environmental impact and we encourage the Board to look very closely at those assertions. Conversely, as opposed to the petitioner who has the burden of showing that it is using best available technology, the Agency is not a party to this matter and the Agency has no burden at all. The regulations just require the Agency to make recommendations on the petition to help inform the Board of its decision.

Nevertheless, the Agency takes such issue with the petitioner's inability and failure to make incremental improvements in its discharges of ammonia that the Agency has expended innumerable hours of its very limited resources to show the insufficiency of the petitioner's arguments. Specifically, that petitioner's analysis of technically feasible alternatives is severely lacking, both in their ability to implement site-specific or even partial alternatives and the economic reasonableness of

doing so.

The goal -- let's see. It is clear that the petitioner is not, and will not be, motivated to comply with the regulatory limit while its adjusted standard remains at its current limit. The previous adjusted standard was 140 and 110 yet all of these years later petitioner comes into the Board and says we still need 140 and 110. The goal should always be to comply with the applicable limits. And other facilities that have been granted an adjusted standard for this 304.122(b) standard for ammonia have achieved this compliance through incremental reductions over time, yet the petitioner maintains that it should forever and ever be allowed to discharge at 140 and 110.

It claims that its MBT is this magic dust that transforms it and its facility into this unicorn of industry, but new facts and not just new facts, but a better understanding specifically on the Agency's side and hopefully to everybody involved of the petitioner's processes obviously sounds from our testimony we've heard from petitioner's witnesses, that they're still

gaining a better understanding of their own processes, which as I said, is surprising to us because they have been studying it for 20 years and we're just trying to catch up and really try to understand so that we can better inform and provide a different perspective to the Board.

With that being said, we do believe that we now, the Agency, have a better understanding of petitioner's processes and it shows what we all know to be true that unicorns don't exist. Throughout the proceeding, the Agency has presented treatment alternatives for full and partial waste stream. Petitioner has presented full and partial treatment alternatives both before and after the petitioner mixes its waste stream with that of Mexichem.

In fact, all six alternatives evaluated in Mr. Flippin's October 2019 report would provide ammonia removal or at least reduction, yet this company, which has an enormous cash hub available to it through its parent who pays all of its other bills, contends that the cost of any one of these, even partial incremental improvement to its ammonia reduction, is just too

expensive compared to the benefit of treating its effluent, which is highly toxic within the mixing zone that it is only allowed if it can show that it is meeting best available technology.

So based on all the evidence presented during this proceeding, the Agency continues to maintain its position that the petitioner has failed to meet its burden and that it is using best available technology and the Agency continues to believe that the adjusted standard should be denied. That was the primary recommendation that the Agency submitted in response to the petition. It continues after all the testimony we've heard today. We have consulted with the technical expertise on our side of things. We maintain the position that the adjusted standard should be denied.

That being said, we did note Mr. Rao's question about whether the Agency would like to revise its recommendations. So we will be reviewing those recommendations and we will be responding with revised recommendations in our post-hearing briefs.

HEARING OFFICER WEBB: Okay.

MR. RAO: Thank you.

HEARING OFFICER WEBB: Thank you very much. Let me just make some final announcements and we will all get out of here.

Today's transcript will be available by February 11th and will be posted on the Board's website. The public comment deadline is February 21st, 2020. Public comment must be filed in accordance with Section 101.628 of the Board's procedural rule. The parties have agreed that the deadline for filing post-hearing briefs is March 11th, 2020, and response briefs are due by March 25th, 2020.

The parties are also reminded to review 35 Ill. Adm. Code 101.627 of the recently adopted procedural rule requiring the electronic filing of exhibits post-hearing.

At this time, I will conclude the proceedings. We stand adjourned and I thank you, all, for your participation.

MR. DIMOND: Thank you.

MR. GRADELESS: Thank you.

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

I, Steven Brickey, Certified Shorthand Reporter, do hereby certify that I reported in shorthand the proceedings had at the trial aforesaid, and that the foregoing is a true, complete and correct transcript of the proceedings of said trial as appears from my stenographic notes so taken and transcribed under my personal direction.

Witness my official signature in and for Cook County, Illinois, on this _____ day of _____, A.D., 2020.

_____

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