

**Meeting Subject:** HHC Workgroup  
**Meeting Date:** 9/29/2020 10:00 AM  
**Location:** Zoom meeting  
**Link to Outlook Item:** [click here](#)

**Invitation Message**

Will update later with Zoom meeting details

**Participants**

-  [Cooper, Laura K](#) (Meeting Organizer)
-  [Mandirola, Scott G](#)
-  [Smith, Chris B](#)
-  [Brittain, Ross A](#) (Accepted in Outlook)
-  [Angie Rosser \(arosser@wvivers.org\)](#)
-  [Rebecca McPhail](#)
-  [Charles "Larry" Harris - Personal E-mail](#)
-  [Bird, Kerry L](#) (Accepted in Outlook)
-  [Jennie Henthorn](#) (Accepted in Outlook)
-  [Emery, Katheryn D](#)
-  [Maguire, Edward F](#)
-  [Wandling, Jason E](#) (Accepted in Outlook)
-  [Autumn Crowe](#) (Accepted in Outlook)
-  Terry Fletcher

<<092520 presentation for Sept HHC Workgroup.pdf>>

## Notes

Autumn

Thanks. Last time my question about whether we were going to get to the other criteria that was not included in the water quality standards I did not see that captured in minutes. Okay we make a note of that Kerry. I will make a note, but I do remember looking at that. I will go back and check that out I could do that right now.

Laura

So, did we talk about that question at the time?

Autumn

Very briefly

Laura

Well we will go into it. Into the work group plan in a few minutes. But as we said in the revised proposed language for the rule, our goal is to look at the remaining criteria that are in our rule. Not the additional not the additional criteria that EPA has that are not currently in our rule. That is probably the brief discussion we had before.

Ross out at eleven

Chris Smith and Jenni Henthorn presenting about Bioaccumulation Factor

## ***Laura's Slide Presentation***

### **Agenda - (on DEP website)**

Revisit HHC Workgroup Plan & outcomes

Review of last few meetings

Bioaccumulation Factors Presentations

- Chris Smith
- Jenni Henthorn

Discuss upcoming meeting with EPA

Plan next meeting

### **Workgroup Goals**

- Reasonable standards - approvable by WV Legislature & EPA
- Protective regulations - Protect West Virginians
- Learn - Broaden horizons, gain better understanding
- Consensus - agree on what to propose in 2021

Laura - Most of our time today is going to be spent talking about bioaccumulation factors particular presentations from Chris and Jenny and then we're going to talk about next month we are going to have EPA at our human health criteria workgroup meeting so we need to talk about that and think about what questions we want to ask them. I'm actually meeting with them on Thursday just briefly to tell them what we expect so hopefully we'll have an idea after today of what we expect and what we're asking of them for that meeting. Then we will plan the next meeting and be finished. You can find this agenda on our website a couple days in advance of the meeting each time.

I'm going to keep this slide about the same each time that we have this work group plan that we've put together, the first meeting we talked about we went around the room and talked about what our goals were and what we would hope to get out of this out of this workgroup I know this was not something that everybody you know was super excited to have, we have it now a set of goals and what we hope to achieve throughout this endeavor.

the first one is we want reasonable standards and I changed slightly the description of this one based on the comments on the discussion we had that Larry brought up last time. He brought up that this was not necessarily something that he would have wanted to see on the goals for our work group so I revised the this description to say that what we need is reasonable standards our approval able I was Virginia legislature as well as EPA.

It is important to talk about and to have that information here so that we know who exactly needs to approve of these once they're done and this is always a case of water quality standards as we talked about last time in West Virginia, whatever the Agency proposes goes all the way through the legislature and then it gets signed by the Governor, then after all of that it also has to go to EPA and by that I mean, it needs to get approved by them, If it doesn't get approved by EPA it's never effective that's just the way standards work and it West Virginia the way it works is also go through the legislature so if you think about that sometimes it can become a very narrow window of what is and what we can do because it has to go through those two bodies after we propose it. The next goal that we have for our group is to have protective regulations of course this is of paramount importance and protective regulations are those that are based on the most recent science which is also something that's worked straight into our quality standards, that's what they're there to do we don't have to think about whether they're sometimes standards gets tighter and sometimes they loosen but they are protective and they are based on the protectiveness to make sure that we meet the designated uses that we have in our state and they have a lot of latitude in setting their designated uses and how they're going to assess how they're going to use criterion there states you know what we talked about in the past West Virginia has it in our rule that we're going to protect human health criteria especially carcinogens to one in One million scenario and they are also based on a seventy year lifespan adult lifespan so we need to protective regulations, obviously and if we have regulations that are based on older standards you know we need to look at those and update them as we can. Our third goal for the workgroup is to learn people use the phrase broaden horizons or gain a better understanding I'd like to reflect a for a second here - is that working so far? Have we been learning? Can anybody chime in and mention anything that if you like we are either learning or we are we need to get some learning because we're not we're not doing that?

Larry said he thinks what we have learned so far are how complicated the standards are how many different factors you have to take into account. And I think we are going to learn more today as well and I like what changes you made in the first workgroup call thank you.

Laura -Thank you Larry I really appreciate that, yes they are very complicated and I hate that they're so complicated because it makes it so hard to talk about but that's what I love about this group is that we are doing this regularly we're meeting every month and we're building on that knowledge and doing a little review it too because it's all very complex and very new in many ways so thank you for trying to nurse anybody else want to mention anything about learning whether we are or aren't or should or shouldn't.

Angie - I have a comment related to that and also related to number one. Let me start with a thought on number one and reasonable standards and the tweak that was made I think - I talked about providing for jobs and this is now saying approvable by the legislature and EPA, I certainly have a pretty good understanding of the process. But I mean to see this is one of our goals or criteria that we are aiming to reach consensus around. We're going to have to learn some things one but you know I just want to recognize that when we say approvable by the legislature we're making some assumptions on what is approvable and not we don't have legislators here as part of this conversation, we don't even know what the makeup of our legislature will be - come February yet, so you know what I would encourage the group to do is definitely you know a reasonable standard let's put that in front of us. But not necessarily that it's approvable by the legislature because the way I see it is that we need to determine what's best and what's reasonable and then agency and the stakeholders make that case to the legislature you know it's up to us to educate them why they're reasonable why they should approve of them um so you know the way this is still worded makes gives it the feel of like the tail wagging the dog a little too much for me. I would rather I see us come up with a reasonable recommendation and educate legislators about why they should approve them. The second part - I've heard about reasonableness and jobs and the political nature of this this is concerns about cost to the regulated community and impacts on jobs and when it comes to learning and gaining better understanding that's a big blind spot for me we asked for more information as we've gone through the process and past rounds about what are the cost to industries of any proposal we would put forward and what are the impacts on jobs where there are you know if we take a certain approach will create jobs will create less jobs I mean that's a big black hole of information that we don't have it one thing I thought was interesting when I was looking at some of the Ohio work on their human health criteria get out a survey to I don't hundred fifty some facilities about costs because they have to do a cost analysis and they got no data back about any increase or burden on cost found that there would be no cost to the regulated community based on their updates so I would like us to think about how we can bring that kind of data into this conversation if it is something that were being charged to consider and the reasonableness and what is a provable and what are they I'm an economic impacts that inevitably come up in the legislative process I'd like to be more equipped with backgrounds in very specifics around this kind of questions and you know one thought I had is to invite someone who had submitted a comment about concerns about economic concerns and be able to hear from them and be able to ask more, some questions about details.

Laura - Thank you for bringing that up does anybody else want to comment on that like Amanda just popped in and kind of in the middle of that conversation but did you get enough. Did you hear enough about to have a comment?

Ed - I want to endorse what Angie just said both aspects of it because, I don't think we need to try to anticipate, hopefully coming to a consensus we telling the legislature what we think the legislature wants to hear I think we need to tell legislation what we think they need to hear. As a result in being cognizant of what they may anticipate as far as

reactions don't shy away from things that we think that it may take a little bit of a sales job that's one of the reasons were we getting together.

The same thing on the jobs I'm not sure how you incorporate that it is a strong proponent certainly on the legislative side and if we can do that going forward to somewhat take that account to get some specific background. It will make for a better product. My two cents.

Laura - Thanks I am so sorry Rebecca I called you Amanda a minute ago I saw those a's pop up and I couldn't see your name Rebecca, I was wondering if you had any comment on what Angie was saying?

Rebecca - well I will try to comment I did come in late I apologize I was running late on a parent teacher conference now so thanks for your patience! I know that one of the things that came up a couple of years ago there was a legislative bill that went through that could require the legislature to you request or that allowed the legislature to request economic impact statements on bills and rules that were submitted and I know that was something that was discussed not really on our end but maybe among legislators when this first circulated a couple of sessions ago they didn't really go any place so maybe that is something Angie that that we need to revisit I don't remember exactly what the provisions of that legislation required certainly we have talked with our members about having a better understanding of what the impact will be for them and Jenny can jump if she like I think one of the challenges that we have is just where we land on this each of our companies has a different permit with different components in it and we don't know until we know what it all shakes down to be but we do think that there's a lot of benefit in having a better understanding of those impacts on both sides.

Laura - I think that was a really good start on that and I've made some notes and I think that's a really good point to bring up that if we are talking about reasonable standards one of our goals we know it has to go through legislature one we need to make a case to them once we have a decision once we have you know criteria we've proposed and two we do need to consider the economic impact to some extent. Since that is always a concern. Okay so the fourth workgroup goal that we have is consensus this is one that I mentioned last time is important to us at DEP, we want to be able to propose what we agree upon. That will be a challenge for sure but that is important that we that we try to reach a consensus on whatever we want to propose to the secretary next year.

As I mentioned last time also our role was submitted to the secretary of state almost came up and legislative role making this week no last week this is only Tuesday- but it didn't so probably will be on for November. Well I guess I'm not meeting in October, but I heard November. So, this is the slide that I have for review. It's only one side but we're going to go over generally things about each of these of these bullets that we talked about in July and August.

## **Review**

### **July**

- Calculation changes in EPA 2015 recommended criteria
- WV Risk Factor for carcinogens: 1 in a million
- Went over factors of EPA's equation
- Other States – what neighboring states are doing on HHC

### **August**

- IRIS updates to toxics data after EPA's 2015 revision
- Went thru example EPA criteria document
- EPA's decision-making on drinking water intake and body weight numbers

### Bioaccumulation Factors

Chris -

So we've been discussing what equation inputs of change from the previous EPA calculations to their two thousand fifteen recommendations and we've discussed all these things and pretty great detail of the last being they switched by a concentration factors to bioaccumulation factors so let's take a closer look at what that is. What is bio concentration. EPA states that bio concentration factors reflect the propensity of an organism to accumulate chemicals in its tissues based only on exposure to the water in other words those factors that affect a fish that swims through a polluted pond.

And the factors that they are referring to here include the ability of the chemical to enter the body tissue of the fish from water and its level of tendency to want to stay in the fish tissue. So EPA states that bioaccumulation factors reflect the fish that spends its life in the pond including contaminants taken in and retain overtime from all sources of exposure from the water in which the fish lands to the surrounding sediment to everything the fish consumes the food chain.

So, like bio concentration, bioaccumulation also considers exposure of the fish to the pollutants in the water, but it also takes into account other exposure routes that this fish can be exposed to. So, here is an illustration of bioaccumulation. At the top part of this illustration we see the bio concentration process where the fish takes in the pollutant from the water but we also see in the lower part of this illustration the fish taking the pollutant in from the food chain which is Bioaccumulation. And to the right we see the processes by which the toxins can be lost from the fish and some of these processes can depend on the properties of the pollutant itself for instance biotransformation which is the alteration of the compound within the body of the fish. Okay here's another illustration of bioaccumulation to the food chain this is from the Michigan Fish advisory, I included this one to help illustrate the concept of trophic levels of aquatic organisms and trophic levels are the position that the organism occupies in the food chain or food web. Since different Aquatic organisms occupy different positions in the aquatic food chain that needs to be taken into account along with the bioaccumulation factor. As the trophic level increases so does the potential for consumption of food containing the pollutant because the fish in higher trophic levels are eating organisms from lower trophic levels that have consumed the pollutant.

So, let's take a look at how you can get a defined trophic levels and some examples of the types of organisms that occupy the trophic levels. Trophic level one contains primary consumers like Aquatic plants algae sign of cyanobacteria and sulfur bacteria. Although these primary consumers are part of the food chain that can contribute to bioaccumulation of pollutants and higher trophic levels, we can see these are not organisms that are typically consumed by humans.

In trophic level two we have the herbivores. And that does contain some organisms that are consumed by humans like clams' scallops' oysters which are mollusk. moving up to trophic level three we see species that eat Benthivores plankton and omnivores that eat both plants and other animals. And here we see some fish that humans consume like catfish and bluegill. An in trophic level four contains the top carnivores like bass pike walleye and trout which are obviously consumed by humans.

So, since the organisms consumed by humans are found in traffic levels two three and four these are the ones taken into account in consideration of the calculation of human health criteria. Okay this is I but this is the two thousand fifteen EPA Human Health Criteria calculation this is for carcinogens and non-carcinogens. And this is for category a because it includes both consumption of water and consumption of fish.

All right so let's we have discussed these equations in pretty great detail on the input, so they so let's just look at the part of the equation where of the bioaccumulation factor comes into play. So, in the two thousand two equation we see these seventeen points five grams a day that was the EPA recommended fish consumption rate at that time multiplied by a single bioconcentration factor. As the two thousand two methodology. So in two thousand fifteen we have the summation of the fish consumption rate multiplied by the bioaccumulation factor in each trophic level so we have the sum of trophic level two three and four and the fish consumption rate the total fish consumption rate is broken down. By each trophic level if you go to the next slide, we can see an example of how the map on this works. And I just used Aldrin as an example here. The first part of the denominator there the point zero zero seven six kilograms that is seven point six grams a day of organisms in trophic level two which have a defined bioaccumulation factor of eighteen thousand liters per kilogram, then you add on to that multiply the consumption of aquatic organisms from trophic level three by their bioaccumulation factor and the same with trophic level four so it is the sum of those three added together and that's the part of the equation. So, it is a good bit more complicated than the two thousand two equation which only use bioconcentration factor multiplied by a single consumption rate. So, these grams per day that is the overall total consumption rate divided into three by the types of organisms by the trophic level that the organisms occupy. EPA has four methods for deriving bioaccumulation factors, so we will take a quick look at each one of these. First is the B. A. F. method, the BAF method uses B. A. F. derive from data obtained from field studies field measured B. A. F. are normalized by adjusting for the water dissolved portions of the chemical and the lipid fraction of fish tissue for each species as well as the fraction of the total concentration of chemical and water that is freely dissolved.

EPA average multiple field BAF's using a geometric MEAN of the normalized BAF's by species trophic level EPA further average the BAF's across species to compute trophic level baseline BAF's. The national level B. A. F. adjust the trophic level baseline BAF's by national default values for lipid content dissolved in particulate organic carbon content and the in optimal water partition coefficient that is the KOW that we've previously mentioned.

KOW is the measure of the chemicals tendency to stay dissolved in water or to incorporate in the tissue of aquatic organisms. EPA chose to recommend the fiftieth percentile dissolved and particulate organic compound content for the national level default values. And then moving on to the B. S. A. F. method. This uses Bio sediment accumulation factors to estimate the BAF's. EPA did not use this approach in any of their calculations because of the two major compilations of these data have not been peer reviewed and that those sources of data our EPA's Bio sediment accumulation factors dataset version one point zero from two thousand fifteen and the US Army Corps of Engineers B. S. A. F. database also from two thousand fifteen so they didn't use any of that data because those had not been peer reviewed. Then the next method is the B. C. F. method and that that uses B. A. F. estimate from laboratory measured bio concentration factors with or without adjustment by food chain multiplier. Similar to field BAF's laboratory measured the BCF's are normalized with the lipid fraction and a fraction of the total concentration of the chemical and water that is freely dissolved and multiplied by the food chain multiplier where applicable.

Multiple values are average using a geometric MEAN across species and then across trophic levels to compute base line BAF's. the national level B. A. F. adjust the trophic line base level BAF by national default values for lipid content dissolved and particulate organic carbon content and the optional water partition coefficient KOW. EPA chose to recommend the fiftieth percentile dissolved in particular organic compound content for the national level default values.

And then moving on lastly the KOW method predicts the BAF's. based on the chemicals in optimal water partition coefficient. So once again the tendency of the chemical to want to stay in fish tissue versus wanting to stay in and water. And at this point I'll go and stop, and Jenny will discuss EPA's order priority for these methods and how EPA arrived at the BAF's. that they used in the recommended human health criteria calculations and before we move on to Jenny's presentation is anybody have any questions about anything.

Larry - I was sort of concerned with what the EPA said at the beginning about these organisms in a pond so I kept thinking about, we have our ponds but we also have lots of streams in which you're having episodic pollution where might go up for a while when somebody dumps something to. Go down how can you accurately measure how much is available for the fish and all the different situations in the world it just seems to me like if they're just thinking about putting an organism and laboratory on a fixed amount of water with a fixed concentration of the stuff that's one way to measure how does that relate to the real world.



\*\*\*\*\*Inaudible

Jennie

All right this first slide is just a different way of looking at the different factors that go into the calculations you'll remember is that we have a few other factors that stay consistent across the calculations we have the body weight we have that water consumption rate these are the main variables that go into the calculations for each of the criteria that we have human health criteria and I did something at the end I so we got cancer slip back the reference dose the relative source contribution and what we're talking about today or the bioaccumulation factors for trophic levels two three and four the last three columns the first number is the actual category A criterion which takes into account both drinking water and eating fish.

And I have and the next column which is category C. criteria those numbers just really take into account eating that fish and then the last one is drinking water so on that one and I took out the eating the fish component just to look at how much is the criterion is driven by drinking the water is just kind of a sensitivity analysis for the last two columns on a category C. criterion you'll see for the first one one one Trichloroethane for asking that the category A criterion is much closer to the drinking water number than it is the category C. eating fish number I'm sorry I'm sure you guys can hear my little dog you she's like you're talking to are you talking to me are you talking. Background check required here keeps up so on and drinking water number you will see that it's very close to the category A, my son just came to get the dog. Bailing me out. You'll see thirteen three thirty three is very close to that category A number so did drinking water resistance it route for that for that parameter the second one is the same way if you look at the category A criterion on this one is identical to the drinking water number so that means for this one eating fish doesn't really drive the criterion that is calculated for that perimeter that last one is one that is largely driven by eating fish so if you look at the drinking water number it is much higher than the eating the fish number so on this one the category A criterion is actually most sensitive to eating fish. Be aware that so that when we're thinking about Bioaccumulation factors it matters much more for some parameters than it does others it's not all equal sometimes drinking water makes more difference than eating fish does and vice versa so that's the purpose of this one

Chris went through this I'm not going to belabor it an Bioaccumulation factor in short is just a simple mathematical ratio is the ratio of the concentration of the chemical and to issue to its concentration in the surrounding water so it's mathematical there is a lot of different ways these numbers can be revised and sensitized. Through the processing back Chris was talking about Larry in response to what you said you can get fishing exposure through drinking water eating fish sediment when they do Bioaccumulation factor it's assumed that all of the exposure is from drinking the water which increases the conservatism of the Bioaccumulation factor because some of it may have actually come from other sources next slide. You've seen this before in prior communications with you this is the decision tree for which of the methods are preferred and allowed for different types of organic chemicals we have nonionic organic ionic organic and then the

inorganic or Organometallic compounds what we're talking about here are primarily nonionic or ionic organics we do have some Organometallics those tend to overlap with the ionic organics and when I think of those that's where I tend to put the organometallic compounds is an that ionic organic there are not a lot of other ionic organics that tends to be nonionic just you don't remember your high school chemistry, ionic verses Covalent bonds organic chemicals tend to form because they covalent bonds so were largely over on that nonionic organic chain of analysis and they go through it how hydrophobic is the chemical if it's moderately or Hydrophobic and then it goes into one decision tree and then the same if it's low and that's that same Optimal water partition coefficient that we've talked about generally the division is if it's greater than or equal to or less than four and then ask you divided into that you talk about how easily isn't metabolized if it's easily metabolized you're going to have different alternatives than if it is not easily metabolized by the fish and metabolized can the fish break it down into other things.

So if you look through the bottom boxes those procedures one through four you'll see that for some of the types of chemicals you only have one or two alternatives available for determining the EPA Bioaccumulation factor on others you have all four methods they're available for determining about regeneration actor the octanol water partition coefficient is only permissible if something has low metabolism and it's highly metabolized you are not supposed to use alternative. On all of these you'll see that the most preferable alternative always includes bioaccumulation factor data. And I'm not going to go through this at length Chris did a really nice job of taking care of this we have bioaccumulation factors that's the actual exposure in surface water by sediment accumulation factors we don't need to worry about those because EPA did not compile data and bioconcentration factors the same thing as a bioaccumulation factor but it's done on a fish in the lab instead of a fish in the field and an octanol water partition coefficient which is mathematical property or scientific property that we can use to do mathematical analysis next slide. First step of the process is to compile the research so you can determine what data we had do we had bioaccumulation factors do we have concentration factors or we can entirely have to rely on octanol water partition coefficients this is a screenshot of the EPA spreadsheet where they did their data compilation and the spreadsheet is available if you look in that lime green box we all just love lime green we are having a conversation at the beginning of the day today that's the link where you can actually go look at the spreadsheet and download it and fiddle with it when you have your own time I did not put this spreadsheet up because I was afraid it was going to make a presentation sluggish because it is large and it's ? to move through all the different columns and truncated it so we can get it on the screen. This is just the first ones on the list I didn't do any particular picking here the list is organized alphanumeric so it starts with that one is beginning with the number and then moves through and you'll see that what we have is first a chemical name we have two different entries for one one one track chloroethene. And it says that they were bioaccumulation factors that were reported in the study it lists this citation say you can go look at that study if you'd like to ask the citation for the authors that allows you to go do the search. The next group of columns are where the data is compiled from that study it is either going to be in the original text a log BAF or BCF or they convert it it's a converted BAF

or BCF where they've normalized data in a manner that Chris was talking about or how the raw numbers are turned into something that can be considered here whole body or other data they could have analyzed the whole fish for that bioconcentration so if it says whole body that means that they took the fish they ground up the entire fish and the numbers that are reported are based on the whole body analysis of the fish if it was the filet which is usually considered the edible portion of a fish especially that trophic level three and four fish it would say filet in this column we don't have any that say that here I'm not sure it is the actual temperature of the water that that was the end when it was captured total organic carbon that was another one of those factors that Chris was talking about is used in that way interpretation of the data wet weight these must be turned into a dry weight basis when we are talking about this so that reports the difference between the wet weight in the drive weight and then the lipid content is important for, That makes a difference for how this fish can concentrate if the fish has more fat in it that's where there's at compounds with higher octanol water partition coefficient which tend to accumulate the chemical isn't a fact that lipid content is important at.

Any questions on this one before we move forward because there's a whole lot of information here.

Laura - I have a question.

What do they do whenever they didn't have the data or I mean when they say not applicable do they mean they didn't have the data and what did they do in that case.

Jennie - Yeah it's not available and they make assumptions and some of them it's really hard to tell what assumptions they made this is not a live spread sheet it is literally just a compilation of data so this is where I think they made assumptions on lipid content for example they would assume that the numbers that were reported were down on a dry weight basis so they don't worry about not having the wet weight basis on the lipid content there actually going to do scientific research to see that particular type of fish what the general look at content of that fish would be.

Are there other questions on the side.

Autumn - Does this slide have the number that they used in the calculation?

Jennie - No one more and we will get there okay yeah good question

Laura - Autumn is paying a lot of attention thank you.

Jennie - It always helps to hear a question because it means you have not totally glazed over on me that is encouraging all right let us get on to the next slide. So Autumn this is the slide you are wanting to see this is where all of the information is being compiled you remember when at first we were really talking about octanol water partition coefficient because that's not something that is part of their scientific research that they were doing - that's more something that is published number now keep in mind there

are different octanol water partition coefficients for chemicals they're all different values they're reporting based on different chemical properties of the water so the very first column there beside the chemical name you'll see it says MEAN log octanol water coefficient they take all the Octanol water partition coefficients that they can find and they use the MEAN are generally the average of those values here and that's what's reported in that first column the BCF from the two thousand and three two thousand to two thousand three aquatic life criteria that is the number that was used in the denominator on the previous calculations that were done in two thousand two. And now this next group of columns are all the different EPA alternatives that they considered for selecting the national Bioaccumulation factors to use in the calculation so I'm just going to walk across the first one which is Acenaphthene there is no magic to it yet it's just the first one on the spreadsheet so you will see that the MEAN log octanol water partition coefficient is three point nine eight remember us talking about greater than or less than four that -Some of the alternatives are what are available for that it's not available and so on that one is less than four so we should only use alternatives that are available for an Octanol water partition coefficients for the hydrophobicity in that range there is the next number is the bioconcentration factor that was used in two thousand two it was two hundred and forty two and then the next the yellow are the different national bioaccumulation factors that would have been calculated from the Octanol water partition coefficient method so they take that three point nine eight and they do their magic math and they turn it into a national Bioaccumulation factors based on that method and that shows that for trophic level two it was a hundred and eighty national Bioaccumulation factor for trophic three on octanol waters two fifty and then to ninety for trophic level four. The next group has dash dash for Bioaccumulation factor method remember that's our preferred alternative there are no numbers that were available so EPA was not able to locate any Bioaccumulation factor data back or there was not in its database for Acenaphthene so it was not a available for method. Then bioconcentration factor method is based on the same thing as Bioaccumulation factor but it's on the lab studies instead of the field data you'll see for trophic level two it was at least three point five million five hundred and ten for trophic level three and three point five for trophic level four.

Now EPA has to select their alternative and you'll see that they have an alternate bio accumulation factor there of five ten that they looked at all their different alternatives and decided that the bioconcentration factor that made the most sense for them in this circumstance a look at that three point five million for trophic level two and three point five for trophic level four and thought those don't even come close to matching what we got with the Octanol water partition coefficient method those may not be reliable and it's pretty weird it's unusual to have a trophic level two bio accumulation factor it is higher than trophic level three or four that's kind of a sign that there may be something weird or wrong with that number so in this circumstance EPA evaluated all the data and said out of all of these numbers we feel the most comfortable using that five ten for trophic level three and you'll look across and it shows that they selected in the last number they selected that alternative B. C. F. of five ten for the national it's a higher number than using the Octanol water partition coefficient and so it would be considered more conservative the higher the number the bigger the denominator so the lower the

criterion so selecting that five ten over in the one eighty two fifty two ninety that they got with Octanol water partition coefficient is actually more conservative.

On the first one that's what was selected the next one I'm just going to go through actually let's look at Aldrin do you guys see that is the fourth one down same thing started with getting their mean Octanol water partition coefficient this one's greater than four which is in a different group thank you that is in a different group than a three point nine eight that we had for the Acenaphthene were greater than four the Octanol water partition coefficient method calculated numbers at eighteen thousand three hundred and ten thousand six hundred and fifty thousand look how much bigger those are then the prior numbers we had is that Octanol water partition coefficient goes up so do those log KOW method numbers. Then they had no data once again for Bioaccumulation factor method and then they did have some data for bioconcentration factor method they had thirty-eight thousand for the B. C. F. method. On this one they chose not to use an alternative BCF but instead if you look over the numbers they selected match the Octanol water partition coefficient so that is the group of selected at national BAF's that were used so the term national B. A. F. there is a little misleading you want to think that that means they used BAF method and that more often than not it doesn't those are just the national BAF that are used in the calculation not that it indicates that they used the BAF method to come up with. In this case they were log K. O. W. method.

Laura - In many cases they were. I am assuming that that falls in line with their decision tree. Because they didn't have B. A. F., they didn't really have all the data for BCF because they only have this one thirty-eight thousand so they went back to this is that correct.

Jennie- Yes generally on some of these days kind of violated their rules so you're not supposed to use Octanol water on certain, When the K. O. W. is less than four you are not supposed to use Octanol water but on some they did and the only thing you can say is that they felt more comfortable with those numbers for some other reason there's not a lot of documentation on how they moved through this decision tree on the last row but as a general rule of thumb. If they had it, I data that they felt more comfortable with for multiple trophic levels for BAF to BCF it appears that they tended to use those numbers but not always. It is hit and miss as you go across for a what they used and what they did not use it seems like more often than not they selected the more conservative choice of numbers.

Jennie - But not always

Laura - would they have needed to have BCF for trophic level two three and four to use that method?

Jennie – No, on many times what EPA does is adopt if it's a trophic level two fish that they are missing which is pretty common like the one that they tend to miss they will assume that he is the same as trophic level three so which is a conservative assumption because it tends to bioaccumulate more as you move up the food chain, so

a lot of times they will just adopt those numbers across based on various types of assumptions or they will do your calculations based on what they believe the lipid content of those different types of fish would be

Laura - I'm glancing at Benzo (a) Anthracene because it seems like the next one so it had K. O. W. here of course it has KOW for everything it did not have B. A. F. but it had two answers for BCF method and what they landed on was thirty nine hundred which is just above what they had for B. A. F. trophic level two so in this case it looks like they had two out of three trophic levels for B. C. F. method and they basically went with one of those is it more complex than that Jenny?

Jennie – it is not more complex than that and there's not a lot of documentation that is available that explain decisions in this spreadsheet. If you remember Laura showed you a spreadsheet that is more detailed analysis that goes through each chemical and there is a discussion in that document that sets forth the rationale for selecting their BAF's.

Laura - a lot of times it'll say something like we had a BCF method for trophic two and three and we decided to in this case I would say maybe they decided to go with trophic level two but for some reason something made a little bit higher but this is an example where they had some data here and they went with it rather than going back to K. O. W. whereas the example that Jenny was talking about with Aldrin they had one data for trophic level for B. C. F. and they did not go with it they went back to here an Jennie you are right they beyond this I mean this is a lot of details a lot of information but beyond this they don't give us a lot to say this is exactly why we did it they just say in those documents like what we went through last month they say this is what we did they don't necessarily say to this extent exactly why we did it but that they always tell us what they did.

Any questions before we move on?

Jennie - So please ignore the title on my screen I was going to go in to geek mode and I decided that I would not and I forgot to change my title on this screen so bad title has absolutely nothing to do with the content one of the things we wanted to do was go back through and a look at the studies that was that was a large part of the effort that we spent last summer is trying to look at the scientific studies and understand how these B. A. F. are put together and one of the things we found out pretty quickly is that EPA's data is very old nearly all of the studies that were used and there's tables that we just looked at were from nineteen ninety nine prior we don't have much data at all that was compiled in the last twenty years and I think that seems strange so we just did a preliminary search is it best just not an area where people are researching or is it more of a situation that the data just hadn't been compiled so we did a quick look we just picked a couple of organics. and we focused on polynuclear aromatic hydrocarbons because those tend to be done as a group and we found within a couple of days we identified more than seventy five studies that included B. A. F. data and largely field B. A. F. which is the preferred alternative that were done in the last twenty years and they

were not included in the EPA's analysis and we had some conversations with the EPA trying to understand that and what happened was this effort that they spent for putting together the twenty five criteria work was more largely based on assembling data or recalculating data using this bioconcentration switch to the bioaccumulation factors than it was in compiling a new database. In their database that was used was compiled from EPA's two thousand and two and was updated a little bit by a group of scientists in the early two thousand and there has not been a recent work to accumulate. compile bioaccumulation factor studies. Also keep in mind that we are going to talk about this more in just a minute some of the studies EPA cited were cited for only one chemical, but they do report Bioaccumulation factors for other chemicals.

Overall spread sheet you can go through and figure out which is the methods was used EPA had another little column there that helps with this you can sort it by the method that was used to calculate the criteria, so the most preferable method is bioaccumulation factors followed by bioconcentration factors followed by Octanol water partition coefficient. The vast majority of the bioaccumulation factors were based on Octanol water partition coefficient fifty nine of the ninety four EPA national recommended criteria used the Octanol water partition coefficient back six years bioconcentration eleven years battered bioaccumulation six are copied Benzo(a)pyrene so they did not do independent work on those they use the benzo a pyrene bioaccumulation factors rather than using chemical specific ones and then there are twelve that other alternative methods what that means is EPA took combination of methods they may have used Octanol water partition coefficient then they calculated separate trophic level Bioaccumulation factor based on something that they ran out of a bioaccumulation factor study instead of using the straight lipid content Octanol water partition or other variations all twelve of those had different iterations where EPA changed the methodology slightly from one of their recognized. The take home from this is the vast majority of these bioaccumulation factors are calculated from the least preferable method. Next slide. And this is just an example I wanted to show you remember a minute ago I said that not all of the data was extracted from the older studies this is this is a very old steady but a good amount of data was pulled from it for a bioconcentration factors and you'll see that there were multiple species that were tested. And Freitag I don't know if I'm saying his name right we're going to calling Freitag the lead author on it there was data reported for green algae golden eye and the fish is once again the golden eye and there were a couple of other species that were reported in the study but these are the two that were selected for using Bioaccumulation factor data and you'll see here for the fish we have two for a Dichlorophenol and all in vinyl chloride it was reported vinyl chloride is reported twice once as fish and once as goldeneye fish so you'll see some weird things in the spreadsheet you start digging through it don't let that throw you. It is simply because this spreadsheet does have some quirks to it, the data then that was extracted is in the next two columns you'll see the log BAF or the converted BAF its actually the converted BAF that was in the studies themselves. Look at the fish you will see the golden eye there two four dichlorophenol and then also down at the bottom for vinyl chloride.

This is the actual table out of that study where the data was reported and if you look down on the near the bottom right you'll see vinyl chloride there's that less than ten that we saw in the table the two, four Dichlorophenol is for that we had that was in the table that we just saw just a moment ago. Now all the others that I've highlighted in yellow are parameters for which we have national recommended criteria none of these numbers were included in the bioaccumulation factor database I don't know why I don't understand that but some of these are ones where EPA said that the only alternative that was available was Octanol water partition coefficient and this is the type of thing that we could do as a group this weekend look through some of this additional data just see if it makes sense to years and I include in our analysis the other thing that we can do is look at some of the more recent studies that have been done to see whether those numbers are important for setting Bioaccumulation factor there is a wealth of information out there is still available for consideration that's not within EPA spreadsheet and database.

Laura - Thank you so much Jenny and Chris for going through all that for us what questions do we have for Jenny and or Chris and I can go back and look at the slides as well. I think what you're saying on this last slide was interesting and I've made some notes about things that we want to ask EPA about and what you were saying on here seems to be that with highlighting that they use the study, was this stuff Freitag guy study? This is Freitag study yes, he examined all of these chemicals and they used some of them, but they didn't use these highlighted ones and I'm curious why they would do that.

Jennie - Yeah and honestly I'm just reading tea leaves I don't have any reason to think this other than just how this possibly could have worked my guess is that they had different scientists working on different compounds and Scientist A may have been responsible for researching DET and Scientist B may have been responsible for vinyl chloride and scientists bb found this study for vinyl chloride but he didn't necessarily call Scientist A and tell her Hey I got this study that found helpful to you.

Laura - Yeah that is possible

Jennie - it makes me think that if you go back a slide you'll note that the scientists cited this study's differently SO Freitag was cited several different ways in the secondary citation and also the species were referenced slightly different in some circumstances they were called green algae and others it just says algae and

Laura - maybe they were in the database is this way just a few different databases maybe they decided differently and then the databases might have actually been where they listed certain chemicals that that study was for and maybe in that database it wasn't listed for the other chemicals for whatever reason

Jennie - Exactly I think that is what happened



Laura - when I did talk to them last year it was really about a year ago that I talked to EPA on this just briefly it does seem to be that rather than looking in I mean they weren't necessarily opening the study to look at this table three what they did is go to the databases that were vetted and gleaned what information they could in those databases so I would imagine that whatever curiosities we see probably came from the differences in those databases. But again, we'll have them with us next month we can ask them these kinds of things.

Autumn - I have a question Jennie have you taken any of the BAF's that you found in your research and plug those into the calculation to see what it does to the criteria

Yes I have fiddled with it and that's that that's the fair way to put it I don't have anywhere I would be comfortable today making a recommendation I think we should use this over this, I have done that and they're already in a number of circumstances cases where it would make the numbers more conservative and others in cases where it would have made a number less conservative so I say that criterion higher or lower you know it is the number that it is it's a scientific calculation that number in some circumstances would be higher using just this Freitag study I in other circumstances it would be lower and it's not consistent you know it's just it's kind of all over the board and I think that's a great question because that to me is important I don't feel like, I feel like for these numbers to be right we have to do the work and we need to be looking at what actual bioaccumulation factor data exists in EPA's twenty fifteen work was more based on recalculating the numbers based on.

prior data compilations that it was based on what data is there that we can use to make these calculations That is a key question that will have for them next month do they plan to do that right now we want to know we realize that this recalculation twenty fifteen have a lot to do with changing the way that the calculation was done to update that but as far as incorporating the newest data that wasn't taken and so a question I would pose to them is when are we going to do that do they have a plan to

Scott - So this doesn't seem to be a pattern with either going to bring up or bring them down where they chose or didn't choose, I won't say completely random but it, there's no distinct pattern that you're seeing in would or would not have?

Jennie - I think it was just driven by data regional database compilation Scott said that step one is where I think. There wasn't a concerted effort to make sure all of the numbers were included there so what happened in step two is largely influenced by step one in and it's random it's entirely random if you look at the numbers that are available in other studies that could have been included I don't think that it was intentional I think it was more the scientific process step one assembling the studies is very difficult and it wasn't done consistently based on the available information prior to twenty years ago much less because this one to nineteen eighty five study this wasn't handled consistently prior to two thousand and I don't see any effort other than a few studies to look for things that were done in the past twenty years at all.

Larry - what you've done Jenny is made me want to go back and look at how many times these factors that are either Octanol water partition coefficient since that's the biggest one of the criteria that they're using agree with the bioaccumulation factors. I wonder about how scientific are the decisions when they choose one or the other you'd think that the if they chose Octanol water partition coefficient it would have to be consistent with something else to use that?

Laura - that's a really good point Larry that kind of is like another question that I wrote down that I want to ask of them like I want to explain that we have gone through the chemical documents that they have and they do a great job of telling us what they did which I like I said last month I think we're really lucky that we live in a place where EPA gives us so much information about what they did the decisions that they made and references that we can check on but when it gets down to the nitty gritty details of deciding between KOW and BCF like we see on the slide here how did how did they make that decision we don't necessarily have that so that's something that I'd like to ask them when they're here.

Larry -The other thing I was thinking about from the very beginning was the first goal that we had you make those changes, and I was thinking maybe better than reasonable to put science based but I am not know yet until I hear what EPA says about putting reasonable and the West Virginia legislature in the same sentence did not make any sense to me. That is a little humor. I think we all get that!

Laura - questions for Jennie?

Jennie - I would encourage you guys to go to that link that lays on the step one slide and download the spreadsheet like I said it's not live the numbers as they move across don't calculate it's not a live spreadsheet that actually does the math but it does give you a good stance and there are multiple tabs so it's at a big spreadsheet has it begins with a big work book it begins with the spreadsheet that basically is an overview of their method and then it goes through all of the different iterations that they did to prepare the calculations it's just that there are no live calculation numbers and at this more spending sometimes you. Get a sense of number one I am slamming them for saying compile the research there are still thousands of lines of studies that reported in the spreadsheet is just how much larger should that database be. I encourage you to look at it and spend some time with it and sort it and put your filters on and look at the data in ways that make sense to you because it's really hard to grasp until yet spend some time fiddling with it.

Laura - I mean if we have no more questions for getting on this I am tempted to mention a big overall question that this brings up to me that we don't need we won't answer today but when we look at all of this information that was put together and we think about what EPA did with it and what they have not, we don't know what we do know the question for us in the future is do we want to try, would we want to try to redo this for ourselves I mean is this anything that we could attempt as a little West Virginia to do for

ourselves or do we want to learn everything that we can about what they did to make our decision from there. I don't even need any anything else on that I just want to throw it out there that it's something to think about like this with each one of these things we really we want to think, here's what they did we understand what they did and after you talk to them next month will understand a little bit more about why they did what they what they've done on for any of these factors but we also need to think like if there's anything that we could attempt on our own.

If you go back to my first real slide there was a reason I did it and the analyst says there are only some of these parameters that are more sensitive to the Bioaccumulation factor so yes driving the calculation for certain Parameters not others. Since this one Category A criterion is primarily driven by eating the fish instead of drinking the water maybe this is a parameter where it would make sense for us to focus on looking in the Bioaccumulation factors where is we could not have to think about them so much for the one one one trichloroethane or the one one two two trichloroethane because the more sensitive exposure route is drinking the water. I just wanted to mention to the group there is some filtering we can do I do not know that that makes sense is just an idea.

Comments?

We have a few more minutes I think, and you close it earlier this year, so I have to hop out at eleven forty-five hopefully she still here. So where do you want your questions so I have this one slide in here this is my last flight before planning a meeting you know logistics of the meeting next time but we talked about this someone already I wanted to kind of work it in there because we are not going to have that much time at the end but we want to talk about so EPA is coming to our October meeting they will be here have folks from headquarters from the human and ecological criteria division and we will also have folks from headquarters that are in the standards of health protection division and that group is the ones that generally provide support on implementation of the human health methodology so their job is to provide states guidance and support on implementing these criteria so these are the right folks we are going to have in the room I will also have some folks from EPA region three just the ones that that we work with pretty typically, the water quality standards staff. So, we need to think about what we are going to want to ask them when they are here. We already have a few things with mentioned, I have a few examples that I wrote which are probably a lot similar to the ones that I just wrote down but what feedback do we have from you guys well we have a few more minutes. And we have several more minutes, but I think, and she only has a few more minutes about what we want to talk to you about when they are here in October.

Larry - you mentioned one of the questions already why they chose various factors will come in with a final amount, I'm trying to think back when I used to lecture on not toxicology but compounds that are carcinogenic that chemical industry on various types of industries come up with maybe ten thousand my number might not be right many thousands of new ones every year and I wonder how the EPA. we're going to talk about

ninety-four, are those ninety-four the ones that are used in this state or what are they doing with all these new ones that come out how do they regulate those?

Laura - Well it's complicated like as we're all aware they're working on criteria for like the P. Foss chemicals and we know there are a whole lot of those there are limits out there that are for that have come out in various ways but not human health criteria they haven't come up with that yet and so this is a complex thing and like just like with the benzo a pyrene the way that that that chemical information is used to decide to write criteria for six others sometimes they can group them like that but a lot of times especially at the federal level they get bogged down in worrying about every chemical isn't the same as every other one even if they seem the same you know if you have a **carboxyl** group here instead of right there it doesn't necessarily mean that it's going to react the same way inside your body.

Laura - I'm not really sure if we are articulated a question from that? Do you have a question I could write down that was along those lines Larry, I know you had mentioned that your second thing the question we're going to ask them why they make certain decisions so we'll definitely be asking that

Larry - the question would be how they can keep up with new chemicals that are being used every year by the very manufacturers?

Scott - EPA's approach on emerging pollutants is perhaps what he's what he's looking unfortunately P Foss as an example they're working on probably a group of twenty six to thirty something of them when there's likely thousands of them, I don't believe that they have a very good I'd be interested in their answer but I don't I don't think they have a very good way to address these type of things quickly. it's a long and tedious process that they go through and when you do it for each emerging pollutant it seems like it allows a long period of time of use to go by before work actually get something on the books for them you know I think that is reality Larry, unfortunately.

Laura - Before you have to go Angie it was your suggestion I think in the July meeting that we invite EPA to a meetings to talk to them do you have any thoughts on what kinds of things we want to talk to them about.

Angie - I was just trying to review, we sent a list of questions the EPA about a year ago September twenty nineteen we thought we were going to be able to talk with them but they did not agree to meet and sent their responses in writing

Laura - Do I have those? I do not know if I have those responses did you send them to us.

I have spoken with them too but if you have a set of questions you ask them, and they responded to.

Angie - We can share this I mean a lot of the questions are things that came out today. The seventy-five BAF studies why were they not considered, why was the KOW used so much. I mean they are like one sentence answers.

Laura - Okay well I would recommend that you keep those with you and remind you know we may go get a better more detailed answer

Angie -yeah, I think more of a conversation is what I'm looking for it just to understand some of what Larry was bringing up how does the process work what is the timeline. I am like this is their job this is not little state DEP's job. And I just sense of like a resource going into it and what we can expect from them.

Laura - I do have written down that I want to talk to them about their use of the KOW method for so many of these and how they feel about having had to use that method which was the least preferable I think in all parts of that decision tree I think KOW was the least preferable and it ended up getting used the most which we understand but I'm curious as to how they feel about that like this that you know does that are they going to revise that also like are you going to revise and get try to get more data goes along the same lines.

Laura - Their answer to that question was EPA followed the decision framework described in the two thousand methodology an EPA technical support document volume two.

Laura – we have all educated ourselves so much over these three meetings that we're going to be a challenging group to talk with because we know that we know that they use the method as proposed in the decision tree about what we want to know is how do they feel about having had to do it that way in so many cases. Or have you decided to do it that way

Scott - Follow their own decision tree

Jennie – yeah right

Laura -did you follow it.

Scott - Well that is it they use the KOW. when it was not the first choice when some of the first choices were available why did they do that. They do not articulate very well it does not seem that they are articulate very well; why they've done.

Laura -Are there any questions that are along any different lines that I haven't really we're kind of talking about the ones that don't come up to me but I'm not if somebody has a different perspective or different thought maybe something that we haven't thought of yet we want to talk to them about it.

Jennie - one of the questions that I hadn't been able to answer what I was looking at their data on their decision tree there is that question on whether the metabolism for

chemical is low or high and I haven't been able to figure out where they did that classification it maybe I'm just overlooking it and like to know where they recorded that and what's the basis for that determination was.

That's a great question that kind of reminds me of Larry's question when he brought up how did they know you know how exactly these fish or Organisms accumulate these chemicals and some of that would have to go into their how they meant metabolized and yeah I don't I don't see either where they decided whether was lower high.

Jennie - Yeah

Larry - I was interested in that one word in the early slide's depuration or something like that which is purification never heard that word before but that's what we're talking about right here is whether it's metabolized and not stored or not.

Laura -I think that was one of Chris's slides maybe EPA's quote on what bioaccumulation is

Larry -I've never heard that word before

Laura -I remember that one too it kind of it seems like the opposite of a word that I was familiar with

Larry – It is

Email questions that you would like to talk to you about.

Next meeting - October twenty eighth which is a Wednesday at the end of October. at ten AM



