

Meeting Date: 8/26/2020 10:00 AM

Location: Zoom meeting

Invitation Message

Sending this out again to make sure it is getting to everyone—

Hey Human Health Criteria Workgroup,

Since Thursday was a problem for some folks, let us try for having the August Workgroup meeting on Wednesday the 26th. Please accept the meeting invitation if you are able to attend, and EPAC members feel free to forward this meeting invite to one other person who you would like to represent either with you or in your stead at the meeting.

Thanks again for agreeing to participate on this workgroup, and more details regarding the next meeting will be coming soon.

This meeting will take place via Zoom. Here are the Zoom meeting details:

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Meeting ID: 817 3517 7183

Passcode: 991293

Dial by your location

646 558 8656

Participants

-  [Cooper, Laura K](#) (Meeting Organizer)
-  [Mandirola, Scott G](#) (Accepted in Outlook)
-  [Smith, Chris B](#)
-  [Brittain, Ross A](#) (Accepted in Outlook)
-  [Ted Hapney](#) (Accepted in Outlook)
-  [Rebecca McPhail](#) (Accepted in Outlook)
-  [Charles "Larry" Harris - Personal E-mail](#)
-  [Bird, Kerry L](#) (Accepted in Outlook)
-  [Jennie Henthorn](#) (Accepted in Outlook)
-  [Maguire, Edward F](#) (Accepted in Outlook)
-  [Wandling, Jason E](#) (Accepted in Outlook)
-  [Autumn Crowe](#) (Accepted in Outlook)
-  [Evan Hansen](#) (Accepted in Outlook)

Notes

Zoom Instructions

Introductions

Presentation

Agenda

- Revisit HHC Workgroup Plan & outcomes
- Discuss Ohio EPA's proposed HHC
- Discuss spreadsheet comparison of WV's criteria, WVMA & WVRC recommendations and EPA recommended criteria
- Review EPA criterion document with discussion
- Plan next meeting

Workgroup Plan

- Reasonable standards – provide for jobs and finding a happy medium
- Protective regulations – protect West Virginians
- Learn – broaden horizons gain better understanding
- Consensus – agree on what to propose in 2021

Larry Harris commented that it always catches him off guard when economics and jobs come up with the discussion of environmental protection, so it is not the first standard for me. I would not put it on my list whereas two, three and four are very important

Laura responded Good point! The way that it's set up in West Virginia every time we make a change to Water quality standards we go through the legislature, there's no other path other than through this legislative body so we have to be able to have regulations that will pass through, otherwise they won't ever make it through. We must take that into consideration because it's part of the process, it is the way the process is set up.

Laura referred to notes - to the language that we have put into the rule, that's still a proposed rule to establish this workgroup and we basically have said that we will research and review remaining numeric Human Health Criteria to make a recommendation of the secretary for proposal in twenty twenty-one- to go to the twenty twenty two legislative session so basically, I wouldn't call it our mission statement but it is the words that will be in the rule should that pass without being changed and that's basically why we're here with this workgroup.

Questions?

Chris discussed what he learned about Ohio EPA; due to extensive contact he's had with water quality standards person.

Ohio has completed their public input process and they are right now in the final stages of adopting the revisions. They are awaiting approval from their attorney general's office and the U. S. EPA; they expect those within the next three or four months. So, I put together a spreadsheet comparing Ohio's proposed criteria EPA's recommended criteria this is for all ninety-four EPA recommended criteria.

They are proposing to adopt thirty three of those completely as is as recommended by EPA highlighted in light green, the ones highlighted in pink they are adopting new standards for revisions to the standards as well, but less stringent than what is recommended by EPA that

being said, of the thirty seven - twenty-seven are carcinogens which they use a one and one hundred thousand risk factor for, whereas West Virginia uses one in one million.

In EPA's recommended criteria they use one in one million, but EPA does allow states to use different risk criteria in their calculations, for instance, Virginia uses one in a hundred thousand. So, twenty seven of these thirty-seven that they are proposed are less stringent use the one in one hundred thousand risk factors instead of one in one million. The other ten I am not sure why those are less stringent they vary by different factors. I am reaching out Ohio again to ask what their equation inputs were for those because I am not seeing why the difference for instance here is an example on Toxaphene. EPA's recommended criteria is point zero zero seven micrograms per liter, but they propose point zero zero two eight. I am not sure what equation inputs they use that are different I am still trying to find out. The person who is in the water quality standards position in Ohio is new and she is trying to do some research to figure out why the difference on the other ten. And for eight of the standards Ohio is proposing to adopt a more stringent standard than EPA it is the ones dark green. I am not sure what their equation inputs were, why those are different from the others and I am still trying to figure out. There are sixteen of these that they have not proposed any type a revision, of the sixteen two of their current standards are the same as EPA's current recommendations, eight are less stringent than EPA's current recommendations and six are more stringent than the EPA's current. There are a couple in here where they do not have a standard all. That would fall under the eight less stringent as well. For those sixteen compounds they are not proposing any kind of change.

Laura asked if he found anything out from her about their process, like where they are in their process and what else they need to do?

Chris responded saying, they have gone through the public comment period, right now they are only awaiting approval from their state attorney general's office and US EPA, which they said they hope to have both of those within the next three months.

Laura commented that they propose the criteria, they put them out to public comment they have done that and then they need their AG to (as)sign it? Chris said, Yes, Laura continued - So, they do not go through their legislation to make those changes.

Chris responded -No their process is a little bit different and their proposed standard – ours is on the secretary of state's website they are proposed standards is on -their rules are published on the registrar of Ohio's website so that is where you can go and see the rules that are proposed and where they are in the process. Current revisions are found there.

Evan Hansen asked what designated use is this for and how does that compare to either Category A or C?

Chris responded these are Category A standards, I did not put the category C on here. These are also only from the Ohio River because they have standards for different water bodies within the state.

Laura asks if Ohio does not apply their Category A criteria statewide, Correct?

Chris responded that she is correct but that it would apply to the Ohio River and that is what these provisions are specifically for. I only put the Category A standard on here because they are more stringent than Category C standards, so they would be the driving factor.

Laura stated for all, that for the most part, when we are talking about criteria, showing criteria, we are going to be talking about Category A, they are always more stringent for human health criteria. When we are talking about aquatic life though that can be different but in human health criteria. The category A or exposure to water and exposure to consuming fish criteria is always going to be more stringent. Trying to keep it simple and only talk about those.

Ted Hapney ask do we share in the regulating of the Ohio River as well.

Laura responded, Yes- in our criteria table we have variations for some criteria based on Ohio River standards.

Ted Hapney said the reason he was asking, he thought West Virginia owned the Ohio River over to the banks of the Ohio side.

Laura responded, when talking about property it does work that way over to the bank of the Ohio side. Everybody is responsible for what they are putting in the river no matter what state they are from. ORSANCO (Ohio River Valley Water Sanitation Commission) helps to manage that, but all states have their standards for what they are putting into the Ohio River.

Scott Mandirola added from an NPDES (National Pollutant Discharge Elimination System) perspective, the agreement we have with Ohio my understanding is, they regulate any industries that are on Ohio soil discharging into the Ohio river on their side, we regulate any industries on our side that are discharging into the Ohio River. You are correct, my understanding is similar, West Virginia does own the Ohio river but that is the way the NPDES permitting is handled. It is similar to the Potomac, Maryland owns the Potomac, that borders West Virginia but we discharge to the Potomac, a number of industries discharge into the Potomac, we permit anything on WV soil and they take care of everything on their side. Now that does not mean that we have an opportunity to comment on permits from the Ohio side if we do not believe that they are putting discharge limits in that are adequate, the same as ORSANCO.

Ted Hapney commented that he remembers the old court decision saying that West Virginia and lawsuits own over to the banks of Ohio, I was just wondering if they had to go by more stringent rule, based upon the Ohio side versus West Virginia side or how that actually works.

Scott continued - It is more of an agreement between the states that we both handle our own permitting on our own sides of the river and we do have an opportunity to review those permits to make sure we believe they are protective as does ORSANCO but we allow them to be the permitting agency.

Larry Harris said that Ted brings up an interesting point -it would seem to me that in both the border rivers we should have the same standards to protect the water on both sides. It makes sense is there any effort to do that?

Scott answers it is one of the concepts behind ORSANCO and their water quality standard to regulate equally across the whole nine hundred fifty odd miles of the Ohio River. They have recommended standards that they believe, I say, ORSANCO- is made up of the member states, so the representatives from those member states are the ones that vote on putting those standards in place. As with any states unfortunately, I used to be much more optimistic that Maryland and West Virginia could agree on all of the standards for discharges into the Potomac, but having dealt with ORSANCO and a number of other jurisdictions and the political winds that may change those jurisdictions, states just don't always agree on everything. I believe West Virginia is doing it correctly, well they believe theirs is doing it correctly as well. So, you know how

it is Larry- in an ideal world that would be all right I agree. Honestly, I do not think they are that far off, realistically there is a few things that are different here and there but, overall, they are all deemed to be protected by EPA, clean water act oversight as being protective of the use and I think we can say we have equivalent use protections; I would not say that they amount to NPDES permits that look exactly the same. EPA has deemed that they are protective of the uses.

Laura - next slide - what we can agree upon -get close to a consensus -so we propose twenty four criteria already based on them being virtually the same between EPA's recommended criteria and what the manufacturers submitted to us last year. We would like to look at the remaining criteria and see what else we can agree upon.

The spreadsheet already looks a little bit different than what I sent you on Friday. But I did put a box around the twelve that I had highlighted before, these are the twelve that I wanted to look at next. The reason I have chosen those twelve is because when I looked at them. The blue color indicates that the Rivers Coalition are cool with them because they become more stringent because EPA's suggested criteria becomes more stringent than what we currently have, they are marked in blue. The green is marked because manufacturers association suggested, is either equal to or higher than, I mean ETA is either equal to or higher than what the manufacturer's suggested and then red is the opposite of that. That is what the colors mean. I have selected these twelve because of the differences between what manufacturers association suggested and what EPA is recommending were small differences and because the rivers coalition would be happy with all twelve of these changes because they become more stringent. However the reason that I changed the coloration on these twelve is because of something I wasn't aware of before but we had discussion with Ross earlier this week and he said that with Benzo a pyrene, the IRIS database recommends a new cancer slope factor for that and Chris and I did not know that. We went to the IRIS database and looked at that, Benzo a pyrene is a chemical for which several other similar chemicals are based upon, as far as their cancer slope factor and that has been revised, the Iris database which is the accepted database that EPA has that shows what cancer slope factors are and other information has revised the cancer slope factor for benzo a pyrene which has an effect on several others I have marked those in in the light gray.

Chris put this together yesterday and the ones he marked in pink have a revised cancer slope factor in the current IRIS database. Benzo a pyrene is the first one and he's determined that the update happened in two thousand seventeen so EPA was not privy to this new IRIS update at that time because they suggested that their criteria in twenty fifteen and I don't know if EPA is going to revise them anytime soon. In the meantime, the current IRIS database changed and now the cancer slope factor for Benzo a pyrene is one. As opposed to what it had been or what it is in EPA recommended criteria now which is seven point three. This changes Benzo a pyrene by a factor of about seven and then it will also change to some extent the others that are based upon Benzo a pyrene, there are five or six other chemicals that are derived from what they know about Benzo a pyrene because they focus the research on that. The E column, according to the IRIS database, this is based on the study from two thousand one, by this person whose name is spelled KROESE and Byland and Kulp nineteen ninety-eight so while these aren't recent studies, they are the ones that have informed the database to come up with the cancer slope factor of one. So that's new information.

Scott asked, we know what it was in fifteen, we know what the current is, do we know what it was prior to fifteen, in the previous recommended criteria?

Laura - not necessarily, but the Manufacturers Association's suggestions to us last year were based upon the previous information. I believe that they would not have been much different because they currently are not much different than what EPA recommends

Jennie added they only used the twenty fifteen BCF's at that time, the prior version to the twenty fifteen – we used the 2015 CSF's we did not evaluate the older cancer slope factors.

Laura -West Virginia's current is point zero three eight. I do not know, Scott if cancer slope factor was much different previously in two thousand fifteen. Do you know anything about that Chris?

Ross added I don't think it, from my standpoint I don't think it has changed in quite a while IRIS used these things on a regular basis that's why it was that long gap two thousand one updated in two thousand seventeen - So it has probably been that way for twenty plus years.

Laura This is something we should take into consideration. We should take it heavily into consideration because I don't think anyone disagrees with the IRIS database is the place to look for this kind of information, there might be newer information but the IRIS database that was updated in twenty seventeen says the cancer slope factor is now one, then it is. We should take that into consideration when we recommend criteria to revise next year. That is why these criteria change somewhat and I wanted to rethink about those and just because of the actual difference between these seem small does not mean that is the best criteria we can agree on. There is a whole host of criteria down here that may not be something that we may disagree about.

Chris found the previous calculation of the standard; Seven point three was the slope factor.

Laura reiterated, seven point three before, seven point three in twenty fifteen and now it is one. There are some revisions to others from the IRIS database that are not related to Benzo a pyrene and we have those shown as well. Basically, this list of what we are going to look at and what we are going to think about, more a spreadsheet than a list and it will evolve as we as we move forward. We will be able to get closer to really looking at what it is that we that we can agree upon we will continue to share this spreadsheet with you and we will incorporate that other information in here too so that when you look at it you can see everything that you need to see to think about that. But in further discussions on it's not like a big part of the discussion today but in the future we're going to we'll look more closely at how we how we analyze each of these to figure out what we can propose next year.

Autumn asked if we have plugged in the new cancer slope factor, the one, into the equation to see what it does to the criteria? Laura answered - we have not done that yet.

Chris said he had because he already had the spreadsheet with the formula.

Ross said that you just multiply whatever he gets by seven point three.

Laura added it would raise the criteria by seven point three times. That is how it factors into the equation. Seven point three sounds huge in some ways but these criteria, when they change by an order of magnitude that is when we begin thinking the numbers are so tiny, in many cases that seven point three, it changes it by barely by one order of magnitude.

Chris said, do not pay any attention to the other values on the spreadsheet; we were doing some calculations. It is the ones highlighted in yellow, you can see the EPA current recommended criteria and then what it would be with the new slope factor from IRIS. These are all the ones that the seven point three goes to one. Some of these would become more stringent, some would become less stringent.

Laura – Ethel Benzene is not based on Benzo A Pyrene it just changed because the IRIS database updated it and it changed a different way. **All this is to say is that we should consider the IRIS updates, at the very least.** While we can get into looking in great detail about what new studies have come out, evaluate whether those studies would meet the criteria to become part of the IRIS database in the future, we can do that. At the very least, **we should look at the IRIS database as it exists now and consider updating our criteria so that they match that is that is the newest information.**

Questions?

As we move forward, we will incorporate this information into what we are all looking at together, so we will all be on the same page as to where we are trying to get and where we are going. Larry asked regarding the spreadsheet - the manufacturers and then EPA recommended criteria, isn't that what they are recommending now?

That is what they are recommending now, yes.

And they recommended it in twenty fifteen and they are they have not changed it since twenty fifteen it is still their current recommended criteria these criteria that I have highlighted, and they are from twenty fifteen.

Since almost every one of those twelve are carcinogenic, if not all them, it would seem to me the smartest thing to do would be follow the EPA recommendation its more protective and a couple are banned from use.

What I am also saying is that even the EPA recommended criteria for twenty fifteen are in some in some cases out of date. Because of the IRIS database which is what they base their information on they get their data from the IRIS database it's just that when they did it in twenty fifteen they weren't privy to a twenty seventeen update Iris database. Because they did not exist yet, in that way we may need to tweak what we would propose based on that information.

Larry said he does not quite understand cancer slope - to change from seven to one, is that more stringent or less stringent? Laura answered less stringent.

Why would they be doing that for carcinogens the second highest ...

Because they have new research, these cancer slope factors are based on research, most of the research is done on rats, people say I want to do a study and I use a bunch of rats are going to expose them to a chemical and I'm going to see what happens, when they do that and they meet all the criteria in their study, it makes the study acceptable and it was done well and it was done right then it gets added to the IRIS database. That is what happens- with these two studies especially the ones I have highlighted here Kroese et al. 2001 and Beland and Culp 1998. These were accepted into the IRIS database when they revised it three years ago. Because these studies which were presumably, I am assuming they were done on rats and they have factors that convert a rat's exposure to human exposure. It is just all part of what they do when they do that it changed the cancer slope factor because the study showed that the chemical didn't cause cancer to the effect that they thought it had.

Ross interjected what happens when they are coming up with these cancer slope factors based off of those rats that you were talking about one of the main issues they have is, that they are trying to determine what a simple line, with a slope that is consistent from zero exposure to potentially an infinite exposure the problem is the data they have with the studies is narrow they

don't know what the real response is at lower concentrations are usually dosing them with a higher concentration and so they have to interpolate or extrapolate into those lower concentrations. Because they go into these areas where they don't have good information they add on a lot of uncertainty factors and become more conservative, that's what happened with the original cancer slope factor, the new studies came out and gave them more information about what was really happening at those lower concentrations, more representative of exposures in the real world and they realized that they were too conservative based on the uncertainty in the old cancer slope factor this new information allowed to increase the certainty in that and in this particular case, decrease cancer slope factor. All about confidence and in terms of once you get out of the range of the concentration used.

Larry said he would probably look to see who funded these two studies, to see why the slope changed but I'm kind of a cynic about that kind of thing – if it is a proven carcinogen in animals at any level I think we should opt for more stringent controls.

Laura said what we're trying to do in standards is protect the use and in this case we're talking about the use of being exposed to water and fish consumption so, a lot of factors are taken into each of these, we went through the equation last time it has a lot of information and we're going to go through a little bit more this time. The idea is to find the right number that is protective so that you know we can enjoy the water for an entire lifetime for an entire adult lifetime, you'll see in a minute and be safe from it, the more we know that when the new science comes out, especially if it's been accepted in the IRIS database it's been vetted and that doesn't mean that we shouldn't also vet it, it doesn't mean that we shouldn't grab each of these studies and look at them and we can do that. That is the point is to find a new science that better informs the criteria whatever it does to the criteria.

Autumn asked then using the CSF of one for the Benzo a pyrene did that increase any of those standards above our current standards. Did we compare them to the current, yet?

Laura - Yes, it does. And I think that is basically what it is going to do, like Benzo A pyrene, especially, that one, you would take EPA's recommended criteria multiply that by seven point three so this point zero zero zero one two.

Ross added that goes to point zero zero zero nine.
Which is still actually in the case of Benzo a pyrene below the current.

Laura continued that is what it would be that number multiplied by seven point three. So, it would be still more stringent than our current criteria.

Ross - Now that's not the case for Benzo A Anthracene and Benzo b Fluoranthene and would become less stringent, because they are based off the same Benzo a pyrene slope factor. Benzo a anthracene proposes point zero zero one two – they go to one zero zero nine which is higher than our current point zero zero three eight.

Laura -Right so that would just barely put it over.

Ross - It depends on how things were done in the past, somewhat chemical specific.

Laura - And that is pretty much the end of anything fun in the slideshow unfortunately. Except for the small guy. So, let us dive into Anthracene.

I chose Anthracene out of all the chemicals and like I said last time most of this document most of these documents if you look at the whole thing all the way down to like seventy five percent through the document it's exactly the same words no matter what the chemical document you're looking at you'll notice that we go through it anthracene because it changed significantly from the previous recommendation that was one thing.

And there is a big swing between what manufacturers recommended and what the criteria is. It is basically three benzene rings together side by side what a nice picture of it here is ubiquitous in the environment as a product of incomplete combustion of fossil fuels. You find it cigarettes and charbroiled meats that is also used to make dyes and plastics, so it is ubiquitous, its everywhere. And when we go through this, what we are trying to do is find the **whys**; we are trying to find why EPA made decisions on this way or that way. But what will mostly find is the **what's**; what they did, in more detail than what we already know, we're looking for any of the statements where they say this is why we did this the is why we did that. Angie had suggested last time, and we didn't have any objections, to inviting EPA to come talk to us at some point in the future and I'm hoping that that can be at our October meeting I want to give us one more meeting of going through what we want to look at before we talk to EPA and then in October I'd like to invite them to our meeting to. Well we will be so informed by then that will really be able to have great questions for them about what they did.

Open document –

Introduction considered:

- body weight
- drinking water intake
- Fish consumption
- Bioaccumulation factor
- Toxicity values multiplied by relative source contributions or by ten to the minus six.

Problem formulation

- follow the assessment method outlined in two thousand methodology
- chemical is carcinogenic or non-carcinogenic
- look at all the information to decide to determine which is worse
- consider whether toxicity is linear or nonlinear
- cancer slope factor is linear it is a straight diagonal line as you get exposed to more of it you have more of a risk of cancer effect
- nonlinear effect is when you could be exposed to the chemical and the line is flat down at zero where you do not have any chance of developing a negative effect and then it pops off there
- it used to be thought that all cancers effects were linear, and they find sometimes now that they can be nonlinear, so they determine which way it is.
- they include whether you are consuming water and consuming fish - Category A, when you take both of those in consideration.
- they apply relative source contribution when the effect is nonlinear and that is a non-cancer effects and any cancer effects that have a nonlinear structure.
- they account for other potential exposures like dermal and inhalation because they are using their relative source contribution, so they are saying relative source contribution helps to take those things into consideration.
- 2 Slides
- body weight
- drinking water intake
- Ross to discuss these two factors

- updated body weights that EPA uses represents the **MEAN weight** for adults- average body weight
- eighty now and it was seventy previously.
- Drinking water intake.
 - Use the ninetieth percentile for adults which is different
 - two point four liters per day is rounded from two point four one four liters per day
 - You will see that number in the actual table.
 - They are based upon indirect community water ingestion
 - footnote - community water - means the direct and indirect use of tap water so
 - direct means that its consumption of water as a beverage when you are purposely consuming it
 - indirect means you are consuming water because it is in the food that you eat, Rehydration of beverages.

Ross discusses how EPA made their decisions and what options they had to choose from:

- **Slide 1**

When they came up with a body mass origin, they came from the EPA two thousand eleven default exposures factors handbook this is table eight one from that handbook and the recommended values for bodyweight. You can see your circle down at the bottom there's a value for adults, that came from data from the **NHANES (National Health and Nutrition Examination Survey)** that data came from nineteen ninety nine through two thousand six and is starting to get a little old, it is most recent they have.

- **Slide 2**

There's much more data in that particular document that two thousand eleven exposure factors handbook, that document is actually fourteen hundred and sixty six pages long, there's a lot of information and not just on body weight but skin surface areas and all kind of things. So you could actually look at this data and what EPA did in terms of what other options were available, they have their percentiles fifth through the ninety fifth percentile on the body weight as well as the **MEAN** and they also broke it down for decades from twenty one through age eighty. You can then use this data to calculate, it was a little strange that they did not look at youngsters. They didn't go from age zero they just looked at the adults and since the body weight is in the numerator of this equation, then the lower the weight is actually the more conservative, the higher the weight is the least conservative so your fifth percentile would be your most conservative estimate and ninety fifth percentile would be the least conservative estimate. You can then look at a typical human from birth into life expectancy of seventy-eight years what would be their age adjusted values.

- **Slide 3**

I did that, with the information, the table off to the side is where I actually looked at the weight column is one month divided by months in seventy eight years, nine hundred thirty four or something like that and then you multiply that weight times the **MEAN** value that they had in the **MEAN** column and you come up with that weighted average and add up weighted averages actually calculating age adjusted or age weighted **MEAN** body mass. In the case of looking at the **MEAN** if your account from birth to age seventy-eight that age weighted **MEAN** is now seventy-one kilograms instead of eighty kilograms that seventy-one would be more conservative to use in the equation. It kind of aligns with what the original seventy kilograms they use, that original seventy kilograms used was based on earlier data and as we all know Americans are becoming heavier now than what they used to be, that's one of the reasons one in adjusted from seventy up to eighty, interestingly the eighty kilograms that they use they actually fudged that particular number slightly if you look at the value from zero to age eighty it really should be eighty one

kilograms that's what value comes out to be, they actually extended people beyond that they extended the life expectancy in order to get it.

- **Slide 4**

You can do same thing for the other percentiles. We know the West Virginia is the most obese state so that may be the higher percentile will be more representative for West Virginia, in which case an age-weighted ninetieth percentile body mass is ninety four kilograms, higher than eighty kilograms used by EPA and the ninety fifth percentile, which the least conservative, one hundred and three kilograms. And you see the most conservative as an estimate of forty-six kilograms at the fifth percentile. That range anywhere from forty-six to a hundred and three continue to be acceptable depending on what it is you're trying to accomplish; how conservative you're trying to be.

The data is like the most recent data we have shown on a national basis seventy-one kilograms would probably be a better value in my opinion coming from a toxicology standpoint. West Virginia we also know is more obese so that eighty kilogram I think represents a good compromise between what the national standard would be the default would probably be more appropriate for West Virginia which might be that ninety-four kilograms. We do not have good information on what the average West Virginians weighs, we know they heavier than the other states. So that is where they came from, they had a wide range available to them I personally think they came up with what for the state of West Virginia with a good compromise.

- **Slide 5**

Water Intake.

Same thing came from that same large document, The Exposures Factors Handbook. This used a narrower range of data thankfully the more recent data from two thousand (2002?) three to two thousand six and this is number they came up with. It's in table three twenty three from The Exposures Factors Handbook again adults twenty one years or older in ninetieth percentile there's the twenty four hundred and fourteen millimeters per day number that EPA used in the human health criteria calculations - **note**, since drinking water intake is not on the numerator it is in the denominator so here a lower percentile like the fifth percentile would be the least conservative instead of most conservative like it was with body weight and your higher percentiles in ninety fifth percentile would be most conservative.

- **Slide 6**

So again, I was able to calculate different age-adjusted values for the different percentiles they presented in that table. What we see is that age-weighted MEAN community drinking water is again a community, it counts for everybody in the community, whether they actually drank from the water source or not, it's just under a liter per day the tenth percentile is actually zero, ten percent of the people apparently don't drink any water, at all, which is hard to believe but that is what the data showed them. The more conservative estimate at ninetieth percentile again adjusting for the age weight would be two liters per day at the ninetieth percentile opposite ninety percent those typically what we use is kind of our more conservative estimates for things in this case the Dominator, even more conservative at ninetieth percentiles two and a half liters per day which is pretty much in line with two point four that the EPA has. It is not much so that two point four liters per day EPA is using is conservative, not the most conservative, but it is conservative.

- **Slide 7**

On the remediation side, there's a lot more information available in this document The Exposure Factors Handbook we look at just the consumers, not the community, but just the consumer and this is actually, consumers only which would be the people who get their water directly from that particular water source not everybody in the community but people who are just getting it from

that water source and it's a more conservative estimate. That is why we use it on the Remediation side at DEP. Again, we can calculate the same things a fifth percentile, ninety fifth percentile. Note here the same category that EPA uses with the community as the adults twenty one years of age ninetieth percentile is now two point five liters per day instead of two point four, slightly more, that would be a little bit more conservative.

Slide 8

Calculating those out, the average age weighted MEAN goes up slightly to one point one liters per day note the ninetieth percentile from birth to seventy eight is two point two liters per day so the default EPA is using a two point four is still above that and more conservative than that. Ninety fifth percentile which is probably the most conservative estimate you can come up with is two point seven liters per day two point four liters per day is not the most conservative but it is still pretty conservative a high moderate conservative. That is where those values came from, Laura, Chris and I talked about this the other day I sent them this kind of information decided that it would be good for you all to see. where these values that EPA use and where they came from what kind of ranges have available to you how conservative are, they relative to what the data showing for at the national level.

- Questions??
- Laura - A lot of information does anyone want to look at previous slides.
- Autumn -Can you send us a copy of the slides? Yes, they are what has already been sent.
- Ross added that the two thousand eleven The Full Disclosures Factors Handbook that is freely available to the public, it is on the internet, through the EPA, good luck finding what you need.
- **Scott - It seems like the take home from this is there are other ways it could be done, but, in general, the way they did it, we can tweak it a little bit one way or the other, but the way they did it is fairly representative of what we would expect. We could use ninety fifth percentile instead of ninetieth and that could change a little bit we can use body mass we can change it up or down a little bit but it is not we're not looking at gross changes now.**
- Ross completely agreed, particularly, drinking water intake, I think they are being conservative, given the range of values, they are being conservative on the drinking water intake. The body weight, there's that question out there in terms of what West Virginians really are like, what's the most representative body mass for West Virginia and we just don't have good data on that so I think that in the absence of good data, the eighty kilograms at least goes in the right direction to adjust for the body mass the heavy body mass of West Virginians and again it depends on how conservative you want to be they can go much more conservative, we or they could go much more conservative by lowering that body mass keeping it at that seventy/seventy one kilogram.
- Laura - we know that when the representative of a West Virginia national average.
- Ross -that's why I think it's a pretty good balance right there, more data would help us to help really pinpoint that number down a little bit I think there could be some play there, but the question is where are we going to get the data, who's going to do the study, whose going to pay for that kind of study and get that done so in the absence of that good data I think the eight kilograms is reasonable.
- Laura thank you very much that was helpful.

- Evan asked from Ross's point of view as an Environmental toxicologist, when you are choosing a body mass, why does it make sense to use a **MEAN** for that instead of something more protective. Why does it make sense to protect the **MEAN** West Virginian, rather than most West Virginians?
- Ross - that's a very fair question Evan, because I actually we had internal discussions about that as well as like they could have gone ultra conservative and say Let's use the fifth or tenth percentile, I think part of that is it just the internal knowledge that you have about what's really going on and some of it is like in the case we know that the data is now getting old and the trend for American's is to get heavier, not lighter. We could however, if you really want to parse that, you could get into the differences of adding on muscle mass and bone mass verses fats, those behave differently as well but if you're getting a whole level of toxicology that I don't think we want to get into one.
- The other issue is that we have to be careful of always being ultra conservative, because if you have all of your estimates are based on the most conservative, what you end up doing is you end up propagating exponentially those conservative aspects to the point where you are no longer reasonable with your estimates. We tend to go back and forth between **MEAN** or a ninetieth percentile, those are the two most common **MEANS** and ninetieth percentile.
- The **MEANS** you will tend to find, we use those on the things, like in the case of this particular equation, things that are going to be in the numerator things that will increase, you lower it from the ninetieth percentile to the **MEAN**. Whereas things that are in the denominator that are going to decrease it you go to the higher value, so you use the ninetieth percentile on the things are in the denominator
- Laura - In this case the drinking water, right?
- Ross - That is correct, the use of the ninetieth percentile for drinking water the **MEAN** for the denominator the **MEAN** for the body mass because it is in the numerator. As a toxicologist you could make the argument that they should be going lower than the **MEAN**, or even the median, there is always arguments about that, this is just something that EPA established in policy back in the seventies and early eighties that they're going to do that for the things that would – in order to like if you - in order to things that would be the numerator rather going ultra conservative and propagating the conservative values and we are going to balance it out by using the **MEAN** rather than in the denominator and that's generally how the strategy they take whether or not that is the correct strategy to use Evan and that is certainly debatable but that is accepted has been accepted policy by EPA and states throughout the country in the last thirty years.
- Any follow-up on that Evan?
- Laura - that's why I like going through this document that we're going to continue in a minute is what we mostly find as EPA is telling us what they did, which is great now I mean in and if we lived in less informed world they would just throw out a number and say this is it, just deal with it and at least we get to look into the details of exactly what they did and what decisions were made and what we know for sure is they use that **MEAN** for body weight but they use the ninetieth percentile for drinking water and so we know that and looking into it more detail like this is really helpful so thank you for doing that for us Ross.
- Getting back to the criteria documents. I wanted to at the beginning of this to show you where these are. If you just Google EPA Human Health Criteria you'll get to their website that has a long list of all their criteria and it's not just a list it's a table and a table or all of the chemicals listed.

When you click. I am going to show you quick because I think it is not helpful to see. Do you see my google now?

- Where these criteria documents come from. This is national recommended water quality criteria table for Human health criteria. The one that we're looking at is actually anthracene that's why purple here I've clicked on it recently so when you go to the stable you can click on any of these to go to their criteria document that's really helpful and then you just click view the document and it opens. Or downloads in my case and that is where we are looking at this this is about twenty five actually pages and we're just going, what we're doing is going down through this we started with this section one introduction I just wanted to see this really quick so you can see you can go look at any of these any time. That is where they are. So back to this, now we are in our section four point three which is the fish consumption rate.
- For drinking water EPA used the ninetieth percentile for this to come up with the twenty two grams per day and for all of these they are only looking at adult population as Ross mentioned before and they state that at the end of these documents to their they say so are recommended criteria for adults is this and that they use the ninetieth percentile of fish consumption based on the N HANES data for fish consumption as well.
- Ross – can I interject one thing about that choice to use adults? Because adults are going to consume more that is in the denominator. Using the adults for fish intake and water intake - those are more conservative. If you want to – using the adults for the body masses less conservative but it is balanced out by, again, comparing apples to apples they went with the most conservative for the intakes but in order to make sure you're comparing the same thing if you use the adults as on the conservative side intakes you have to balance it out using the adult body mass. Apples to Apples
- there is some potential for mutagens, that kids may be more impacted by those that adults and Benzo a pyrene is an example of a mutagen compound as well but.
- Laura - When you look at the criteria documents for those for the chemicals that are considered mutagens EPA references that and then as well to say here's what we did to consider it further as a mutagens you.
- Ross – it is the simple factor of three.
- Laura -Next slide we are going to get into the bioaccumulation factor. And what I highlighted here is interesting because it says the Bio accumulation factors are not intended to reflect fluctuations over short periods because the criteria are designed to protect over long periods, lifetime exposures, so it's interesting to see that they state that. To make it clear that we are not talking about short term exposures and things that change on a day to day basis because the criteria are designed and calculated to be protective over a lifetime.
- And then they mentioned that the approach that they followed is based on the figure three point three dash one from the technical support document and since it was so fun last time we'll be looking at that one more time with this example because I get to click to show all my little arrows. It will be the most fun thing. Their approach to bioaccumulation factor they are basically saying that they use field measured B. A. F. if possible which there are very few field measured BAF that are available and if they didn't have that then they use the bioaccumulation factor they estimated a bioaccumulation factor using a bio concentration factor and that happens in some cases they were able to do that for some of these criteria and then for many of them are most of them they didn't have a B. C. F. or a B. A. F. study so they used the K. O. W. method and that's

also described in their technical support document, how they get to that method. And they use publicly available databases to come up with these, but they are limited to what's in those databases and sometimes a lot of the information that database could be updated there may be more studies that could be added to that, but haven't been yet.

- So we're way down into this criteria document now we just now got to the part where they're actually going to talk about Anthracene that the criteria documents based on, so here they looked specifically at Anthracene to run it through the figure to see what method they would use to estimate the bioaccumulation factor -a list of these bullets here the observation the facts about Anthracene but it's a nonionic organic chemical it has moderate to high hydrophobicity and it has a high metabolism or its highly metabolized. So, and then we go through the fancy figure three again so basically we go through the figure with that information and we get down to, they were unable to locate any peer reviewed bioaccumulation factors so or lab measured bio concentration factors so they needed to use available BCF's for trophic level two and three to estimate and arrive their national bio accumulation factor so they went through this. So, they went through this to determine the Bioaccumulation factor for anthracene which is just slightly different than the one we looked at last time but basically this is the structure that they use to make decisions on which procedure to use to estimate a bioaccumulation factor. They ended up Procedure two, in Procedure two they use number three no not they did not have a Lab B.C.F. so they had to use trophic level two and trophic level to estimate it. Okay, so again about the chemical specific which meaning that they are talking about Anthracene here specifically this is just basically restating what it said on the previous slide that day they used the B.C.F. to estimate the trophic level, because they didn't have specific data on Anthracene to use.
- Okay so now we get to the Hazard identification and dose response so what they use an R. F. D. which is an estimate. Of course, it has uncertainty factor in it inherently, and it's supposed to reflect the daily oral exposure to human population to the to the substance without appreciable risks over a lifetime so that's basically saying again that they base the R. F. D. on exposure over a lifetime.
And then they get into talking about chemical specific toxicity value for anthracene specifically they used reference dose of three to minus one and that was based on a nineteen eighty-nine study just for this chemical. There has been no observed effect level to derive their R.F.D. and they use IRIS program to apply this uncertainty factor of three thousand. So, they get the reference dose and then they incorporate to cancer slope factor, these are basically all the parts of the equation we have looked at in the past. We talked about the cancer slope factor quite a bit already because we noticed that it was a new factor changing and some of our criteria particularly Benzo a pyrene.
- We will learn more about that later. Okay so we get to relative source contribution which as we've said before is what they use when they aren't using reference dose and this is basically when they divide the criteria by a certain factor what they actually do is multiplied by a factor that's less than one. Many of these are multiplying it by point two because that is what they often get to and you'll see it we have there's another decision tree that they go through from the technical support document to determine what relative source contribution they will use or if they can determine on their own based on what data is out there. This basically describes the portion of other reference dose that is from water sources and you assume that all the rest of it is coming from all the rest of your exposure from those chemicals are coming from other sources other than water.
- Laura - Specifically, for Anthracene it is a low molecular weight poly cyclic polycyclic aromatic hydrocarbon which is a PAH and again here is where it says what it is used for. There is a lot of other sources of Anthracene that humans are exposed to other than water like air and food and they also include fish and shellfish from and inland and near shore waters because its outside of

this too. When they are figuring out what this relative source contribution is, they are going to take whatever they know about exposures to this chemical from other sources to figure out what they are going to divide it by. They also look at the chemical and physical properties of it, in this case that they're looking at the vapor pressure they are looking at the actual pounds of anthracene's that are released into the air per year, they take all that into consideration and it shows they actually have a significant source of this chemical that are outside of water especially air, air is a significant source of exposure to Anthracene. They show that recent information regarding the concentrations of anthracene in drinking water couldn't be identified so they don't know recent data on how much of it is actually in drinking water they actually had samples taken in two thousand one in ten states it was undetected in those samples so they're working with you know the data that they have that which is limited. They finish this paragraph by basically saying that the exposure to Anthracene from the ingestion of drinking water is not really known or at least current exposures so, what they have is a lot of limited information they need to figure out what this relative source contribution would be. I'm not going through this figure in detail because it was just too big has too many details on it basically this is the decision tree that they go through and this is figure four one from the technical support document you can that's not available online as well. And in this case they get down to so the population of concern is what they start with and then they identify relative exposure sources they determine whether adequate data are available in this case, no, as we just discussed and then they. Say whether there is a significant known or potential source other than sources of concern which in this case is drinking water and they get down to the bottom they decide to use the twenty percent of the reference dose. so that's where they get to the twenty percent relative source contribution for this specific chemical and they apply this to everyone that they do and in many cases they end up with a twenty percent and you can see when you look at this figure that that has a lot to do with they're just not being a lot of really detailed information to help them know more about. Exactly precisely where the exposures are coming from, so they go with a conservative approach and say let us go up twenty percent when we do not know more information.

- Now we are down to the summary portion of the document. And so, they use a non-carcinogenic toxicity endpoint for anthracene because it is non carcinogen. They make a statement here, that is what I mentioned before about the adult population, but this this criterion is designed to protect the general adult population from the non-carcinogenic effect of this exposure over chronic lifetime of exposure.
- So that's how they how they sum up each one and like I said these go through every criteria that they that they did we're not going to take out one hour of every one of our meetings to go through eleven more of these but you can see how these documents are set up and the kind of decisions that EPA makes when designing these criteria. That concludes going through the document and I'd like to open now so we can discuss a little further any of the things that we've talked about we can go back and look at slides if you want to see something else on them or ask additional questions or really just talk about what we have gone through today.
- Autumn - it appears that I'm frozen on my video but I'm hoping you can still hear; I have two questions or comments that I'm not sure that we can answer them today we might need to weigh in on them or maybe Ross has answers. So, when they came up with the factors for the human health criteria, they were different from the factors that they are using for remediation. I am just wondering why wouldn't EPA use the same factors that they use and remediation for the human health criteria? Maybe that is a question that we would ask EPA when we have them.
- Ross - I can speak to some of that, a lot of it has to do with what your end goal is, in the case of human health criteria on the water quality standards It's the general goal of being able to protect the general public whereas on the remediation side we are dealing with very specific sites where

we can calculate what the risks are at that particular site and we are tasked to make sure that the exact concentrations that are in those locations, at those sites are not going to create any excessive health risks based on the exposure pathway. Whereas as we've talk about in the past for the water quality criteria this is a different type of end point that you are dealing with in terms of water quality criteria, it is not necessarily the water that's going to we're not looking at water quality standards are going to be going directly to somebody's house because the water that's in that surface water will still overwhelmingly go to a public water supply and go through all the treatments that are required by the safe drinking water act, that's a big part of it, it's different angles in terms of what their perspectives are for what you're trying to accomplish.

- Laura -Is it more of an acute exposure that you are looking at it in remediation
- Ross – No, we look at Chronic exposures as well, the difference we will have there is we consider cancer risk over the lifetime of the individual whereas what we refer to as hazardous and non-cancer risk on the remediation side we're look over what would be considered the typical expected exposure duration, which is based on how long somebody is usually working at one place, if it is a place of work or an industrial sites or how long does somebody usually live in one particular residence before they would move on because once they leave from a non-cancer standpoint the hazards are gone associated with that site whereas exposure to things that are carcinogenic those we stay with them for the rest of their lives so we consider the lifetime exposure. It is usually twenty-five years for people on average to work in one place is twenty-six years in terms of where they live. That is functionally the main difference between remediation and water quality standards. Looking at the entire life expectancy here in West Virginia for the Water Quality Standards - that is pretty good I am glad they are doing it.
- Thanks for asking that question autumn.
- We have any other questions along those lines.
- Autumn asked - This is different, but kind of related, so there's certain chemicals, speaking with physicians, there are certain chemicals that will accumulate in the fat tissues and I'm just wondering how that is factored into the calculations, is that part of like the bioaccumulation factor, where is that accounted for in that calculation?
- Ross said he hasn't looked at they're at their documentation that should be where it is in the Bioaccumulation Factor, so your metals tend to attract a fats, those should have very high generally speaking should have higher bioaccumulation factors .
- Laura added the bioaccumulation factor is based on an accumulating in fish and then we consume the fish so that's all based on the trophic levels of fish and how they can accumulate and that's why they use the KOW so often, as we talked about last time, that describes the chemical's tendency to dissolve into water and thus mostly leave the fish or its tendency to stay in fat or oil and thus its tendency to stay inside the fish and accumulate there and so that's the bioaccumulation factors based on its accumulation in fish not so much in people, the factor that talks about people is really just a body weight that we talked about earlier
- Ross added, but the bioaccumulation factor in fish account for the fact fish have fat as well so certain chemicals are more likely to accumulate in fish depending on how hydrophilic or hydrophobic, they are
- Laura said as Ross mentioned earlier that you know you could take into consideration the addition of weight on people as muscle mass versus body fat but that is not something that has

been looked at or taken into that detail its body weight in general, just observed body weight and as we mentioned before what EPA used in this equation is average adult body weight.

- Questions??
- Jennie asked about the spreadsheet with orange and green, she said she was not following some of the orange verses green.
- Laura asked if it was the one Chris had on Ohio?
- Jennie responded no it was the West Virginia one that had color coding on the manufacturer's recommendations for whether they were higher or lower than EPA?
- Laura responded that is basically what the orange and green meant in basic terms.
- Jennie continued that she was not necessarily following which ones are higher which ones were lower so the first is green it is for point zero zero three four and it says the EPA is higher.
- Laura said she meant to revise that, it was supposed to be equal to or close to or higher but those were meant that they were very close.
- Jennie continued it is off by an order of a magnitude, right?
- Scott added that those really are not that close. They are an order of magnitude off.
- Laura added these don't necessarily need to be sorted in this way, we really need to look at them in more detail to see which ones we can live with the EPA recommended criteria and which ones we would want to put off or think about in the future or whatever. That's not going to be as simple as I would hope it would be especially since we just recently realized that the IRIS database also affects several of these which are marked in light grey here, as we talked about earlier so yes I think, in general, Jennie this just wasn't the most useful way to look at these in this order.
- Jennie – that is fair, I just was trying to figure out my brain was messed up. For the direction that was supposed to be.
- Laura said we will send out a new version of this as soon as we can with information that in addition to like gray shading it'll also show you what the new IRIS number is and how that affects it. It will show it all. It is just this spreadsheet so that we can keep it to one spreadsheet showing us showing us everything that we need to just that we feel like we need to see.
- Laura needs colors to be the most descriptive
- Invite EPA to come speak to us at the October meeting
- Look at tables that show us how they did their bioaccumulation factors and exactly how they calculated bioaccumulation factors next meeting
- Proposed Next Meeting - September 30 at 10:00am - Not good for everyone
- Meeting on Tuesday, September 29 at 10:00am

- Discuss bioaccumulation factors in more detail - part of our September meeting, that is again looking at the spreadsheets that EPA has given us and I think that they are publicly available on their website I don't think they just sent to West Virginia specifically, they're just there and well check those out
- We will go over the update of the spreadsheet that we are going to work on to show you more about how the IRIS database revisions have affected some of the criteria. And to talk about, how that will have an effect on what we want to look at for next year. I just want to mention I do not know if we have sent out Chris have, we sent out an email yet about our current criteria revisions? Last week we submitted to the secretary of state's office our Agency approved version of the rule which, that is the version that comes from the public comment period. We submitted that to the legislature, the only revisions that we made to it were- we changed slightly in the language that establishes this we're going to make it clear that we are providing recommendations to the secretary from this workgroup and we also removed the proposed variances that we had put in there for the office of special reclamation.
- So, revisions are made based on the public comments that we received and. You can view the agency approved document on the secretary of state's website now. And you should have if you have commented on it received an email that states that we did that and our response to comments document, those are all on the secretary of state's website.
- Laura asked Jason, do we have any idea when were when those will be taken up when our rules are to be taken up by the LRMRC. – Not sure when the LRMRC will take up our rules.
- Jason answered in chat – we do not know and have not heard from Judiciary Chair