PMTurkeyCOLNPEm Resource

From: Labiosa, Rochelle G [Rochelle.Labiosa@pnl.gov]
Sent: Monday, November 15, 2010 4:56 PM
To: 'Eignor.Diana@epamail.epa.gov'; Beaman.Joe@epamail.epa.gov
Cc: Bryce, Robert W; Kugler, Andrew
Subject: Meeting notes from our conference call on 11/2; NRC and EPA
Attachments: Conference call with EPA_final.docx

Dear Drs. Beaman and Eignor,

Thanks so much again for meeting with us by phone a couple of weeks ago. It provided much clarity on EPA's approach to contaminants of emerging concern, and how our approach to analyzing the impacts of emerging contaminants gels with EPA's state of the science on the issue.

I am attaching our notes from that meeting; please edit and/or change as needed and return it to us with our comments. Please note that there are some references that Diana committed to providing to us.

Please let me know if you have any questions. Thanks again for participating in this process with us.

All the best,
Rochelle

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PACIFIC NORTHWEST NATIONAL LABORATORY — NUCLEAR REGULATORY COMMISSION

Phone/Conference Call Record

Project/Plant: Turkey Point Units 6 & 7

Date/time: November 2, 2010

Time: 12:00 PDT

Attendees:

NRC Team

Andy Kugler	NRC – Environmental Project Manager
Mohammad Haque	NRC - Hydrologist
Michael Masnik	NRC – Aquatic Ecologist
Peyton Doub	NRC – Terrestrial Ecologist
Kevin Quinlan	NRC – Meteorologist

Contractor Team

Bob Bryce	PNNL – Team Lead Environmental Review
Paul Thorne	PNNL - Hydrologist
Lance Vail	PNNL - Hydrologist
Jeff Ward	PNNL – Aquatic Ecologist
Rochelle Labiosa	PNNL - Hydrologist
Jim Laurenson	ICFI – Health Specialist
Ed Carr	ICFI -- Meteorologist

EPA

Joe Beaman	EPA OST: Branch Chief, Ecological Risk Assessment
Diana Eignor	EPA OST: Ecological Risk Assessment Toxicologist

Call title/subject: Turkey Point emerging pollutants of concern (EPOC) in cooling water
Purpose of call: Meeting with Diana Eignor and Joe Beaman of EPA to discuss an approach to evaluating the environmental impacts of contaminants of emerging concern in wastewater (used as cooling water) at nuclear facilities, with the example of the Turkey Point, FL, nuclear power plant expansion.

Call notes:

Andy provided an introduction to our review process.

The Nuclear Regulatory Commission (NRC) is evaluating the environmental impacts of wastewater to be used as cooling water during the proposed expansion of the Turkey Point nuclear plant adjacent to the Biscayne Bay, Florida (PNNL is supporting the NRC in this work). This assessment will set a precedent for what is likely to be a more frequently used water source in the future by nuclear installations and other industrial users. We would like input into our strategy to evaluate impacts under NEPA for aquatic ecology and human health targets.

Rochelle Labiosa led the discussion using the following agenda:

Agenda

Specific Topics:

1) We are developing a plan for conducting a conservative assessment of the impacts of emerging contaminants from reuse water used as cooling water at the plant on aquatic life, human health, and terrestrial ecology. We would like to go through our list of candidates and discuss the strategy with you to see if it appears reasonable, and if we have neglected major considerations.
    a. Are there critical contaminants that have been left out, which have effects at very small concentrations/large bioaccumulation factors/1/2 lives?
    b. Are the target organisms (either consistent – e.g., Daphnia – or the "most sensitive" according to literature data) appropriate
    c. In what way should treatment/conversion in the plant be handled – is excluding plant treatment, cooling tower heating, and volatilization appropriate?

Rochelle reviewed the list with the participants and talked about how the list was derived. These chemicals were measured in effluent from the sewage treatment plant (South Miami Dade Treatment Plant) that will provide water to Turkey Point. South Miami-Dade Treatment Plant will add some filtration and high level chlorination to meet the requirements for water to be sent to Turkey Point. Turkey Point will do additional treatment to reduce nutrients and constituents that will contribute to scale.

Lance clarified that the discharge from the plant will be injected into the Boulder Zone. The primary concern is about contaminant distribution through drift – both the ecological and human health impacts. There was discussion about potential issues for the Boulder Zone, including a description from Paul Thorne, but likely small impact at the place where discharge from the Boulder Zone occurs due to high dilution rate and long residence time.

We will also be concerned with what remains in the solids (~400 tons/day) from the on-site treatment plant at Turkey Point. Solids from the treatment plant will go to a landfill. Diana also asked about what happens to the solids that accumulate in the cooling tower basin. Lance responded that Turkey Point is planning to re-suspend solids that settle in the cooling tower basin and the solids will be injected into the Boulder Zone.

Diana provided some background on contaminants on our list and general information

- She noted that tertiary treatment and longer residence time in the plant can significantly reduce EPOC concentration in water (the material ends up in the solids). When this water is injected into an aquifer and stored for long periods prior to use the concentration can be effectively reduced to zero.
- Dichlorobenzene is very typical; so is nonylphenol (there is a criteria standard, but no state standards yet except for Colorado)
- Coprostanol and Caffeine – they are not too worried about impacts from these chemicals but they are good indicators that you are getting other pharmaceuticals in the water.
- Cholesterol is another indicator – naturally occurring but indicates that some of the pharmaceuticals are getting through.

They consider a number of things as they approach these chemicals:

- First, they look at the universe of chemicals and narrow it down by stakeholder concerns and occurrence data
- Scan the data to see if occurrence is close to toxicity levels
- Look at mode of action – some of them only impact vertebrates (i.e. fish) (previous criteria-setting mode was to look at a suite, but now focusing on organism(s) of concern)
- Many are a concern for chronic exposure rather than acute.
- Data sources – they do QA/QC on the publications to make sure there is appropriate life-cycle analysis, controls, etc.
- Ultimately compare concentration with the no observable effect concentration (NOEC); even if low concentration in South Dade Waste Water Treatment Plant (WWTP) effluent, still could have significant effects.

ECOTOX is an EPA database with lists of publications – some meet criteria for use by EPA, and some do not. EPA publishes a list of studies that pass their criteria, and a list of those that do not – typically as part of the criteria development – this is because people will ask why such-and-such study was not used, and by documenting the reason why EPA provides transparency to the process.

Office of pesticides publishes a list of chemicals and potential effects – i.e. Indole; there are many risk assessments for individual chemicals and mixtures:

Phenanthrene – generally don't see because it sorbs to solids
Flame retardants don't have much of a biotoxicity but they do bioaccumulate. Many are being phased out (bromos).

Mike Masnik asked about bioaccumulation and how to identify if a contaminant bioaccumulates. Diana responded that the material's octanol-water partition coefficient (Kow) and whether or not it is lipophilic can provide some insight; also if they see it accumulating in fish at large concentrations when wastewater concentrations are small, this indicates potential.

The EPA toxics program has guidelines (PBT – persistent bioaccumulative toxic). Maybe look at top 4 that show up on the list.

2) How is EPA approaching establishing aquatic criteria for emerging contaminants with NOECs < 1ng/L? For example, EE2 has an extremely low NOEC – in the noise for MDL – how are such issues being handled when establishing criteria?
    a. Right now they are figuring out the analytical methods – once this hurdle is done, the criteria will be set and then the states have ~6 years to adopt a standard.

3) What emerging/priority contaminants are likely to be regulated over the next 5-10 years? How is the listing/prioritization accomplished? Is there a strategy or guidance for mixtures and/or metabolites?

    Joe Beaman –It usually takes 2 to 3 years to get a standard through the EPA process. Then a state usually takes a minimum of a year to update their standards – they have up to 3 years. Some take two cycles – they evaluate the standard during the first 3 year cycle and adopt it during the second 3 year cycle.

    (However, Diana remarked that with some such as nonylphenol, they are taking more time than typical to implement the standards.) TSD "technical support document" guidance development is underway due to EPOC mandate from Congress (will be published in 2011). Now they are looking at ways to reduce the data burden for passing

the recommended criteria; for one, with pesticides, they are using less data and are using a screening-level assessment to develop benchmarks in a more nationally consistent way. Also new analysis will rely more on extrapolation factors rather than unique contaminants. In a couple of years will have laid out a list and concentration benchmarks under the new streamlined guidelines. There will be a national stakeholder meeting for pesticides discussing tools and methodologies on December 1.

Rochelle asked Joe if they have a list of contaminants they expect to adopt standards for in the next few years. Joe said they don't have a list but they do have a process. He doesn't expect to have standards for the things we are interested in for a couple of years.

4) We would like to discuss challenges in evaluating impacts with a constant 30-40 year source term – in the context of toxic (chronic) and persistent wastewater pollutants.

   Diana mentioned that with EPOC they are typically focusing on chronic effects and looking for data > 30 days duration. Impacts to sex ratios can be seen even after just 30 days of exposure to typical concentrations in streams.

5) Can you provide your perception of any issues with using effluent for wetlands restoration or aquifer recharge projects given your literature review and other research?

Diana indicated that one source of information might be the WateReuse Association (http://www.watereuse.org/association). She has seen that once water receives tertiary treatment and then is put into an aquifer for a reasonable residence time, the water needs little to no treatment to serve as drinking water.

Water Environment Federation – Water Environment Research Federation – good source of info --their research arm (we have some good material from them).

6) Are there guidance documents and/or source and fate studies that are "emerging" soon? FDA/EPA/NAS/SAB, etc.

   Diana will send us a web page
   Fish tissue survey
   Urban streams assessment – fish tissue
   Office of research and development doing research on water, wastewater, injection just about everything

7) White paper guidance for assessments of this nature (assessing impacts of emerging contaminants in cooling tower drift and sludge) – has there been previous collaboration between EPA and other agencies?

Diana has seen no EPA guidance documents about cooling tower drift.

Recommended guidelines/approach:

Look at concentration we have
Look at concentration that causes effects
And we may be able to cross some things off

Other possible additional contaminants of concern:

> Hormones (androgens, estrogen) are typically most damaging at concentrations found in effluent. Do we have hits with any of the other estrogens – the 17alpha ethynyl estradiol – most potent estrogen of all – at very low concentrations can have an impact on fish
>
> E2 is naturally occurring estrogen and the treatment plant can't handle it
>
> E1- can come from cows
>
> Think about hormone replacement therapies for older women – Diana will give us a list

Looked at WWTP around US –

> Lots of data on antibiotics/antimicrobials – triclosan, tetracycline and have impacts at low concentrations
>
> Confined animal feeding operations (CAFO) animals are given androgen which is an endocrine disruptor. There is a lot of info on veterinary chemicals from the FDA and companies. Better source is the company (FDA has full nondisclosure agreements).

Have focused on personal care products, endocrine disruptors, and pesticides

Emerging concerns about nanoparticles. For example Nano silver – they are seeing them in water in different phases – difficult to track back to original nanoparticle to look at full impact (what do you regulate). So she suggested that we not address nanoparticles.

She asked if pesticides can get from neighborhood or farm stormwater runoff that goes to waste water system – this could have androgens from CAFOs in it or agricultural runoff with atrazine, DEET, etc

Microbials would probably all be denatured from high-level disinfection (HLD).

Need to look at volatilization – what is the Henry's law constant and will these chemicals volatilize. Also may have information from DEA from their incineration program to determine effects of heat on chemicals.

Google the chemical and "eligibility registration decision" to get good information on the chemicals (particularly pesticides)

- Pharmaceuticals and personal care products can be removed by reverse osmosis (you end up with a brine with all these things in it and it is hard to dispose of) –
- some biological nutrient removal process take care of steroids and hormones
- some oxidation processes remove pharmaceuticals
- with longer residence time in sewage treatment plant more particles drop out removing more of the material; there may be effective pretreatment that removes these things

Some things like atrazine they find at the top of mountains – they can travel long distances.

Mike Masnik asked - Does saltwater interrupt behavior of these compounds? Diana answered that the only way to denature many of these is high temperatures. Behavior in saltwater seems to be similar to behavior in fresh. Difficult to neutralize these.

Mike also asked how would WWTP effluents compare to the conditions in the Potomac River. Diana answered that dilution models are in place for most WWTPs so you should be able to see relative differences. The highest concentrations seen are in ephemeral western streams where the water is essentially effluent. There are always more biomarkers for estrogenic exposure. They are also hotspots for birth control related hormones. Another point to make is that impacts are seen in these streams (effluent-dominated) and rural headlands out of all other water resources in the U.S.– headlands are typically thought of as pristine, but they have enough rural population, including septics and discharges without treatment to result in some of the highest measured concentrations (treatment really matters).

There was some discussion about whether the drift rate was so low to not warrant much discussion of the topic in the DEIS (6 gal/min per Lance). FPL is planning to use 4 cycles of concentration, however, and over one day almost 9,000 gallons would be expected to fall mainly on the area right around the plant (per Andy). Some contaminants could volatilize, and with those there could be preferential precipitation/droplet formation. We will also need to consider how these materials accumulate in the environment over the lifetime of the plant. Will they be accumulating steadily over long period of time (decades) and are there other processes that would dilute them in the environment or render them less harmful. Diana mentioned that it would be good to get a feel for baseline concentrations currently in the waters near the plant. Are there hormone-disrupted fish and/or crocodiles in vicinity of the plant? Andy mentioned that it would be good after we have our analysis in hand and written in the DEIS to use it as a guide for agencies with regulatory authority to do studies and/or require monitoring as the plant gets permitted and/or comes online.

Jim Laurenson asked about a database similar to ecotox for humans/mammals – there was mention of Pub Med plus new studies from Minnesota. Minnesota Department of Health – Legislature said they needed to evaluate a number of chemicals and they have published many guidance documents/reviews to set criteria (done quickly, may be tentative, but at least good literature reviews). Also, FDA was mentioned as a source for veterinary pharmaceutical data – parallels for human pharmaceuticals, potentially. EPA office of ground water and drinking water could have some health effects, and Diana is going to check with EPA's Office of Science and Technology (OST) health criteria folks about other data sources. FDA typically does not give out info on human pharma due to nondisclosure agreements.

She will forward the paper on triclosan and we can look at the others.

We asked Diana if she would be willing to review and comment on our whitepaper approach/guidelines and she agreed, which will be exceedingly helpful.