PFAS CAP Advisory Committee Meeting

WA Department of Ecology | Room 2S-20 | 300 Desmond Drive, Lacey, WA 98502
August 30th, 2017 | 9:00 am – 4:00 pm
Facilitated by The William D. Ruckelshaus Center (Chris Page and Kara Whitman)

Attendees:

Advisory Committee Members *

Jessica Bowman* –FluoroCouncil
Tom Bruton* (webinar/phone) –Green Science Policy Institute
Alissa Cordner* (webinar/phone) –Whitman College (Asst. Professor of Sociology)
Steve Gilbert* –Institute of Neurotoxicology and Neurological Disorders (INND)
Doug Kelly* (webinar/phone) –Island County Environmental Health
Rhonda Kaetzel*–Agency for Toxic Substances and Disease Registry (ATSDR)
Kendra Liebman* (webinar/phone) –Naval Facilities Engineering Command Northwest
Mary Catherine McAleer* –Association of WA Business (AWB)
Rory O'Rourke* (webinar/phone) –King County Department of Natural Resources and Parks
Don Robbins* (webinar/phone) –Port of Seattle Aviation
Heather Trim* (webinar/phone) – Zero Waste Washington
Abigail Welch* (webinar/phone)—Port Gamble S'Klallam Tribe

Interested Parties

Maryon Atwood (webinar/phone) –Citizens of Ebey's Reserve
Simona Balan (webinar/phone) –CA Department of Toxic Substances Control
David Batts –King County Water and Land Resources Division
Noah Burgher –Senator Wellman's office
Anya Callahan –Toxic Free Future (TFF)
Lisa Cox (webinar/phone) –Oregon Department of Environment Quality
Jessie Curry (webinar/phone) –Outdoor Industry Association
Tom Fox –Island County WRAC (sitting in for Advisory Committee member John Lovie*)
Chris Generous (webinar/phone) –US Navy
Anne Harvey (webinar/phone) –Whidbey Island Water Keepers
Peter Hildebrandt (webinar/phone) ALCOA
Peggy Horst (webinar/phone) –W.L. Gore & Associates, Inc.
Nels Jonson –Washington Attorney General's Office
Doug Kelly –Island County Environmental Health
Erika Kinno –King County Local Hazardous Waste Management Program (KC - LHWMP)
Stephen Korzeniowski (webinar/phone) –BeachEdge Consulting, LLC
Evan Laganis (webinar/phone) –AGC Chemicals Americas, Inc.
Mike LaScuola (webinar/phone) –Spokane Regional Health District
Grant Nelson –American Chemistry Council
Jan Odano –WA State Senate Energy, Environment & Telecommunications Committee
Catherine O'Neill (webinar/phone) –Northwest Indian Fisheries Commission (NWIFC)
Perry Pineda (webinar/phone) –Shell Oil Products
Ivy Sager-Rosenthal –Toxic Free Future (TFF)
Howard Scartozzi –Fire Training Academy Regional Direct Delivery Program
Tim Shestek –American Chemistry Council
Shirlee Tan –Public Health Seattle King County
Larie Valeriano –Toxic Free Future (TFF)

Lisa Wellman –Senator 41st Dist. Mercer Island
Carina Wells –Toxic Free Future (TFF)
Sarah Wightman (webinar/phone) –Marten Law
Jill Wood (webinar/phone) –Island County Public Health

State Agency Staff

Kelly Cooper –WA Department of Health (DOH)
Elmer Diaz –WA Department of Health (DOH)
Lauren Jenks –WA Department of Health (DOH)
Jeff Johnston –WA Department of Ecology (Ecology)
Anne Knapp – WA Department of Ecology (Ecology)
Amy Leang (webinar/phone) –WA Department of Ecology (Ecology)
Cali Mathieu – WA Department of Ecology (Ecology)
Barbara Morrissey –WA Department of Health (DOH)
Cheryl Niemi –WA Department of Ecology (Ecology)
Jim Pendowski –WA Department of Ecology (Ecology)
Brian Penttila –WA Department of Ecology (Ecology)
Darin Rice –WA Department of Ecology (Ecology)
Garin Schrieve –WA Department of Health (DOH)
Brenda Smits (webinar/phone) –WA Department of Ecology (Ecology)
Kara Steward –WA Department of Ecology (Ecology)
Scott Torpie –WA Department of Health (DOH)
Kari Trumbull –WA Department of Ecology (Ecology)
Saskia van Bergen (webinar/phone) –WA Department of Ecology (Ecology)
Jim White –WA Department of Ecology (Ecology)
Andy Wineke –WA Department of Ecology (Ecology)
Ken Zarker –WA Department of Ecology (Ecology)

Introductions and Agenda Review. Darin Rice (Ecology – Hazardous Waste and Toxics Reduction Program Manager) welcomed everyone and noted that to prevent and mitigate toxic chemical releases, Ecology inspects hundreds of business each year, does cleanup work, and treats soils at special facilities. Most toxics released in Washington state (WA) no longer come from "traditional" point sources, but the slow and steady release of chemicals in millions of consumer products. Concern is growing over toxics in products; Per- and Polyfluorinated Alkyl Substances (PFAS) are in many (carpet, outdoor gear, firefighting foam, metal plating, food wrapping, etc.) and can potentially contaminate water, air, and soil.

Chemical Action Plans (CAPs) provide a comprehensive look at the uses and impacts of the most problematic chemicals, and seek to identify the best ways to eliminate or reduce those impacts. CAPs include an open, public, and transparent process. The progress on this CAP slowed, but Ecology staff and funding have returned and are committed to the process. Events over the past year have brought PFAS issues to the forefront and this underscores how important it will be to develop recommendations to both deal with contamination issues when they arise and prevent future contamination.

Lauren Jenks (Department of Health, or DOH) also provided a brief welcome. PFAS levels in the water supply for thousands of people in Airway Heights, WA exceeds the EPA lifetime health advisory level. This has forced many in the community to use bottled water, which is unacceptable. There are large sources and smaller, ubiquitous sources. This CAP will get people together from across the state to inform the best path forward. These processes have power, with the CAP for lead, completed in 2009, now in implementation and setting a precedent. Ecology and DOH have high hopes for this process to address PFAS chemicals.

The facilitator, Chris Page (William D. Ruckelshaus Center), reviewed meeting logistics then asked each attendee to introduce themselves and provide their ideal outcome for the process. Ideal outcomes include:

- Great recommendations
- Open discussion
- Agreement to keep people safe
- Best available science underpins the recommendations
- Comprehensive dialogue and approach
- Finish in a timely fashion
- Plan is science- and risk-based
- Identify resources necessary to address the problems
- Concrete actions
- Long-term advice and solutions for addressing the problem
- Work "upstream" (instead of after problems identified)
- Plan should have solutions that work for everyone
- Protect drinking water

Chris discussed the role of the PFAS Advisory Committee (the Committee) during the process going forward. DOH and Ecology convened the Committee to fill in gaps in knowledge, provide information, and advise the state agencies charged with developing the Plan and determining the actions it recommends. The Ruckelshaus Center will serve as a neutral party to facilitate productive dialogue between the Committee members, the public, and Ecology and DOH. Interested Parties and Committee members should contact Chris Page and/or Kara Whitman to discuss any concerns, ideas, or issues they would like to address. Chris reviewed the agenda and suggested ground rules for the meeting and communication moving forward. No changes were made to the agenda.

Steve Gilbert (Institute of Neurotoxicology and Neurological Disorders, or INND) asked Ecology, DOH, and the Committee to think about why the state is always "playing catch-up," and urged everyone to look at the bigger picture to avoid the need for CAPs in the future. Senator Lisa Wellman asked for some clarity on what a CAP looks like when it is done, and asked what the anticipated amount of time is before achieving the final CAP. Darin provided the Senator with a copy of the CAP for Poly-Chlorinated Biphenyls (PCBs).

Kara Steward (Coordinator of the Ecology PFAS CAP): PFAS CAP Summary. Kara summarized the CAP process, described previous CAPs, and reviewed the scope, process, timeline, and logistics. Washington state develops CAPs to recommend actions to reduce and phase out Persistent, Bio-accumulative Toxins (PBTs): their uses, releases, and exposures (the CAP process is codified in Washington Administrative Code (WAC) Chapter 173-333). PBTs present concerns because they travel long distances, cross environmental media (air, water, soil, organisms, etc.), and do not biodegrade. Addressing PBTs requires not only the integrated use of all Ecology's tools and programs, but partnering with DOH. The two agencies have worked on five different CAPs:

- Mercury (2003),
- Poly-Brominated Diphenyl Ether (PBDE) flame retardants (2006),
- Lead (2009),
- Polycyclic Aromatic Hydrocarbons (2012), and
- PCBs (2015).

Each CAP differs based on the chemical(s) being addressed. An economic analysis will not be done until a set of recommendations have been solidified for inclusion in the plan.

Kara explained that this CAP will address PFAS substances, including long-chain perfluoroalkyls, their precursors, related substances, and intended substitutes. It will look at WA sources and provide recommendations, including a comprehensive look the range of sources from industrial discharges to everyday products. The process will include collaborative, advisory input from the Committee and interested parties. Kara reviewed the timeline:

- Rest of 2017: Ecology and DOH continue collecting information and working on draft chapters
- Late September: draft chapters available to the Committee and interested parties
- Early October: Committee input on draft chapters
- 2018 calendar year: implementation of interim PFAS CAP recommendations, and finalization of the CAP document and recommendations.

The meeting today is for Ecology and DOH to present what they know at this point, highlight data gaps, and to seek input on the science base and potential recommendations before drafts are distributed for input.

Ecology set up a PFAS CAP listserv to send out communications, updates etc. All interested parties, AC members, and attendees of the 8/30/17 meeting have been added. All documents related to the PFAS and draft chapters ready for public review will be posted on the website https://www.ezview.wa.gov/?alias=1962&pageid=37105. Notifications of any new postings go out via the listserv. The agencies will issue draft chapters from mid-to-late September through early October, a few chapters at a time. Kara added that the product testing report was withdrawn from Ecology's website and will not be published as an Ecology publication.

Q&A/COMMENTS

- **C.** Request Ecology and DOH take quick action on "non-essential uses" of these chemicals, e.g. food packaging; this Committee member asserted that PFAS chemicals are not necessary in food packaging.
- **C.** In response, another Committee member requested a broader discussion of what would comprise "essential" vs. "non-essential" uses. Some of these uses may not fit into a CAP structure.
- **Q.** Timeline clarification: 8/30/17 meeting: presentation of available information, data gaps, and what needs to be done. Ecology and DOH will then issue draft chapters for review. Interim CAP findings (uses, exposure, and potential recommendations) will be ready in December 2017, with further consideration of interim actions and recommendations. There will be more added to the next iteration of the CAP, to be developed next year in 2018. Darin Rice explained that they did an interim step for the PBDE CAP and it worked well.
- **Q.** Will the draft include time, totals, and economic data? **A.** Yes, once the recommendations are pulled together, they will pull in an economist.
- **C**. The chemical that is in the Rule is the long chain, but the CAP will also look at substitutes.

ACTION ITEM: Ecology to post a .pdf of the presentations from this meeting on the "EZview" website and a notice sent out to the listserv. (COMPLETE)

Scott Torpie– DOH, office of Drinking Water. Scott Torpie summarized current knowledge of PFAS in drinking water supplies in Washington. Scott explained the Unregulated Contaminant Monitoring Rule (UCMR): every five years, the U.S. Environmental Protection Agency (EPA) selects up to 30 chemicals for public water systems to monitor in drinking water, selected on the basis of their potential public health impacts. EPA has conducted this assessment three times. The third round of UMCR sampling included six PFAS chemicals from 2013-2015 performed by 113 WA Public Water Systems serving more than 10,000 people, and 19 smaller systems. This represented 94% of people on public water. There are 4000 Group A water systems[1] subject to the Safe Drinking Water Act. Three water systems had detections of PFAS compounds. Detections of PFOA and PFOS, two of the six PFAS compounds sampled under UCMR3 lead to further sampling on a voluntary basis. EPA has set a lifetime

[1] Group A Water System: 15 or more service connections. 25 or more people/day for 60 or more days/year. 1000 or more people for two, or more, consecutive days.

health advisory level for PFOS and PFOA (individually and collectively) in drinking water of 70 parts per trillion (ppt= 70 nanograms per liter (ng/L) = 0.07 micrograms per liter (ug/L)).

- The community of Issaquah (King County) tested and found high levels of PFOA and PFOS and then installed treatment at a cost of $1 million.
- Fairchild Airforce Base (Spokane County) tested and detected PFAS that ranged from no detection to 2,300 ppt (∑6 PFAS compounds measured up to > 4,400 ppt) in and around the base. Decection of PFOA and PFOS at high levels in two for the City of Airway Heights' drinking water supplies led to a bottled water advisory for 9,000 people over a 24-day period, and a prison (Airway Heights Correction Center) threw out $1.5 million worth of food. Detections appeared many miles from the base.
- Naval Air Station Whidbey (Island County) tested 210 drinking water wells within 1.5 miles of two naval air station facilities. They found that seven homes had PFOA of 130-660ppt, one home had PFOS of 2500 to 3800 ppt, and six homes detected PFOA less than 70ppt.
- At Joint Base Lewis-McChord (JBLM) (Pierce County), Fort Lewis and McChord Field have separate water systems. Fort Lewis shut down one well that exceeded 70ppt, while McChord shut down three wells that exceeded 70ppt (found some upwards of 240 ppt)

Next steps for DOH: continue to support impacted communities and coordinate activities with the local health jurisdictions. DOH will also respond to the request for rulemaking and fund more PFAS sampling.

Q&A/COMMENTS

- **Q.** Is the PFOA and PFOS concentration listed, and/or detected, for each individual compound? **A.** There are no enforceable health standards for unregulated contaminants sampled under UCMR. UCMR sampling is intended to support decision-making on regulating new contaminants. EPA established a lifetime Health Advisory level (HA) for PFOA and PFOS, but there is no HA level established for the other four PFAS compounds sampled under UCMR3. PFOA and/or PFOS were detected in Issaquah, City of Dupont, and JBLM Lewis. In Issaquah and Fort Lewis one or more other PFAS compounds were also detected.
- **Q.** Can interested parties access the raw data? **A.** Yes, the data collected under UMCR3 is available to the public. However, DOH does not have all the data collected by Fairchild, particularly from single-family homes (to protect property owners).
- **Q**. Are the Navy and Airforce data accessible? **A**. Kendra Leibman explained that the Navy information is on the website and will provide the link (the data have no locational information).

ACTION ITEM: Kendra Leibman (Navy) to send the URL to the military installation PFAS data. (COMPLETE)

Navy Link -
https://www.navfac.navy.mil/navfac_worldwide/atlantic/fecs/northwest/about_us/northwest_documents/environmental-restoration/pfas-groundwater-and-drinking-water-investigation.html

- **Q.** Why has water testing not been done on private wells? **A.** Private wells are a concern; however, the agencies only have jurisdiction on public water systems. Island County is trying to manage expectations around the base, as there are no regulations for individual exempt wells serving homes.
- **Q.** Who will test the water and who will take care of it? **A.** We don't have this information. Lauren Jenks explained that DOH is working to develop a risk map. After the UCMR3 data came out, the U.S. Department of Defense (DOD) tested all their bases. This led to the discovery of the contamination. DOH is potentially testing up to 500 more public water systems to see what else is happening.
- **C.** DOH should consider sampling near fire training facilities etc.; Issaquah connected pollution in water to a fire training station**.**

- **Q.** Do we know the procedures and projects, or are they only reporting on the PFAS levels? **A.** Both bases are aware of the use of fire foam, and located where it was used. It was used over long period of time for training, though there are other potential sources of PFAS contamination surrounding both areas. It is not clear that military is responsible for all this contamination.
- **C.** Communities do not want to wait many years to find out how to prevent further contamination. The more we can tie it to specific products or procedures, the better.
- **Q.** What about other airfields where this foam may have been used, or may be in use (i.e. SeaTac, Boeing Field, Paine Field)? **A.** DOH is building a map to identify water systems at risk, based on knowledge of PFAS products and procedures. They used information from a Harvard group to determine risk factors for aqueous film-forming foam (AFFF) and Waste Water Treatment Plants (WWTP) receiving waste.
- **Q.** Are we in a peak or trough of using this stuff and where is it being used? **A.** Some of this type of usage information is hard to get. We do know it is not just a legacy use issue.
- **C.** The DOD is testing many of their sites, but only ones with known uses.
- **Q.** At Fairchild Airforce Base, they are proceeding with a site investigation (SI) and taking a measured approach due to cost restraints. This SI will not produce the kind of information as would the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, aka Superfund). They are starting to see secondary contamination because of the Airway Heights contamination.
- **C.** Reportedly the Navy sampled all its drinking water sources across the country and has not found any impacted (or requiring alternative drinking water). They are doing a preliminary assessment and SI of Whidbey Island bases. This could lead to finding secondary contamination.
- **Q.** Is there any information known about AFFF use other than on air force bases, e.g. at training facilities or boats? **A.** This is on the Navy's radar, and they need to get the spatial distribution of the potential contamination. **C.** The military has gotten out in front of this, but is it likely to be a bigger problem than just military sites? There is a need to keep the bigger picture in mind when looking at this.
- **Q.** Are any people in Airway Heights getting filters? **A.** They received bottled water during the May-June advisory. Airway Heights is being supplied by its own uncontaminated wells and an intertie with the City of Spokane. Individual homes in the surrounding area with high levels of PFAS continue to receive bottled water. The Air Force is considering options for a long-term mitigation strategy (filters, hooking up to public water system etc.).

Drinking Water Standard for PFAS Chemicals (Lauren Jenks, DOH): The next step in looking at drinking water standards for PFAS chemicals is to update the executive team (October 2017 in Yakima, WA). They are putting together what they need to make a recommendation to the Board of Health, and would like input from this Committee.

- **Q.** Are we confident in the EPA lifetime health advisory level of 70ppt for PFAS? **A.** DOH is confident in this number, as it protects of sensitive populations.
- **Q.** Are we confident with the chemicals it includes? **A.** DOH is starting to think they need to expand the list to cover the PFAS tested in the UMCR3 testing, as other PFAS are bio-accumulative and have similar toxicity. They may recommend other PFAS be included in the 70ppt health advisory level.
- **Q.** Do we need something enforceable?
- **Q.** Implementation questions? **A.** When they get closer to 70ppt, it gets more difficult, and may be below the action level. If they look at other PFAS chemicals, will this bump it up over the standard? There is benefit to keeping all of the long-chain below 70ppt. It is hard to tell a community that other chemicals don't matter when they have similar properties, but without enough literature to make a recommendation.
- **C.** It might be helpful to explain why other jurisdictions have established much lower standards. It really depends on the information base, which is why there is such a range of standards across the US.

Cleanup Standards Update (Jim Pendowski, Ecology): The Model Toxics Control Act (MTCA) is the regulatory process used to get contaminants out of the environment through the Toxics Cleanup Program (TCP) at Ecology. This is a technically-prescribed process, legal framework, and operating premise with three steps: remedial investigation (parallel process to CERCLA/Superfund); review a range of options for removal, prevention of movement etc.; and preparation of a remediation plan.

However, currently PFAS compounds are not classified as a contaminant under MTCA, so no cleanup standard exists. The question is, what level to set the cleanup level too? If DOH ascertains the minimum protective level for groundwater and drinking water, TCP will then have the basis to calculate soil and groundwater standards. Once it is identified as a contaminant in a legal sense, Ecology can move forward. TCP needs to have a standard to clean up discrete sites. The advantage of WA moving forward is that sometimes we are more successful when we create our own set of standards, then get the federal government to adopt them. This State is unique because of its remedial program and ability to respond to contaminants. WA has a grant program to underwrite studies and cleanup actions, however there is currently no capital budget, and funding to local health departments was lost.

Refer to the Cleanup Standards Summary provided on the PFAS CAP site for more information: https://www.ezview.wa.gov/Portals/_1962/Documents/PFAS/CleanupStandards.pdf

Q&A/COMMENTS

- **C.** Additional information DOH should seek: how is fire foam utilized (spatial distribution, frequency, storage etc.)? Not all fire stations are spraying this stuff everywhere all the time.
- **Q.** Is there requirement about chain of custody for where the contaminants are and go, and/or is there a mechanism that would initiate this? **A.** Much of the information is proprietary.
- **C**. Caulk was found to be a PCB source when they did the CAP for PCBs. Liability arose as a significant barrier when trying to locate caulk in schools. They need to consider/solve this issue as part of the CAP to address the issue. i.e. Who pays for it?
- **Q.** In developing cleanup targets with DOH, what chemicals would be included? **A.** We know more about the PFOA and PFOS (than other PFAS chemicals). Part of the process for setting cleanup levels is consultation, and Ecology would work closely with DOH.
- **C.** Activated carbon is typically a vehicle for cleanup. However, they still must deal with the carbon after filtering the water. **A.** The process is to stop the release, remove the source, then pump and treat water. If there is spent activated carbon, the liable party needs to safely dispose of it. If solid waste, it may get a hazardous designation. Activated carbon is sometimes incinerated, and can be re-used in many cases (the spent carbon is taken back from the user to the supplier, sintered to remove contaminants, then re-sold as regenerated carbon), so not all goes to the landfill.
- **C.** A regulatory hook may be the Children's Safe Product Reporting rule. Textiles are a big source of PFAS, and the state could expand the list to consumer products (in addition to children's) that require reporting.

***Chemistry Overview – Brian Penttila (Ecology)*:** Brian works as a "safer alternative" chemist: when an issue is found, he helps identify alternatives (Alex Stone previously filled this position at Ecology). A decent amount of information on PFAS exists in the literature. A 2006 study by Sinclair and Kannon[2] found more PFAS in the effluent of a wastewater treatment facility than in the influent. This increase in PFAS through treatment had to do with the presence of precursors that could not be determined using the analytical chemistry methods available at the time.

[2] Sinclair, E., & Kannan, K. (2006). Mass Loading and Fate of Perfluoroalkyl Surfactants in Wastewater Treatment Plants, ES&T, 40(5).

PFOS and PFOA have a low vapor pressure and are ionized at normal pH, so they don't evaporate. They are soluble in water and assumed to travel by water, so they are not likely candidates for long-range transport. However, a study by Smithwick et al in 2005[3] found evidence of biomagnification of PFAS in the arctic. Some other PFAS chemicals (such as fluorotelomer alcohols) are volatile and vaporize into the air, where they are bombarded by radicals, which changes them to PFOAs (stable degradates). It takes about two weeks for airborne chemicals to travel around the planet.

A wide variety of chemicals are under consideration for potential inclusion in this CAP. These chemicals typically include long-chains of carbon atoms, with endings tailored to the desired use application (varied functional groups). Over time, industry developed shorter-chain products (6-chain and 4-chain carbons), changing the functional group endings for the desired use. While the U.S. chemical industry has shifted from long-chain to short-chain PFAS, many of these legacy compounds are still manufactured and sold and are also found in materials in landfills. The fluorinated portion of the molecule is very stable, while the hydrocarbons have weaker bonds and are susceptible to breaking down.

Globally, over 100 companies could be involved in the production of PFOS and derivative products (mostly produced abroad). Many products coming out of China still contain longer chains from manufacturing. PFOA emissions dropped substantially in other developed countries when production ended; however, production of PFOA shifted to China and less developed countries, and no restriction exist on these products coming into the U.S.

ACTION ITEM: The graph in the presentation is to be corrected (FluoroCouncil members do not manufacture PFOS) and this should be noted, before posting to the PFAS EZview website. (COMPLETE)

In 2015, the Swedish Chemicals Agency (KEMI) conducted a survey of PFAS substances and concluded that there are "probably more than 3,000 commercial highly fluorinated substances in circulation on the global market."[4] Other surveys have also identified large numbers of perfluorinated substances. For example, a 2007 OECD report on precursors to PFAA listed nearly 1,000 substances.[5] A 2017 publication by Xiao reports that over 450 new PFASs have been identified in the published literature between 2009 and 2017.[6] Xiao attributes this to the rapid developments in qualitative and quantitative analytical chemistry techniques in recent years. While methods have greatly improved, they are hindered by the lack of analytical standards.

Even the most advanced analytical techniques can quantify only a small number of PFAS substances. There is only one validated analytical test method, EPA method 537, and it can only quantify 14 analytes. Cutting edge research laboratories, like that of Dr. Jennifer Field at Oregon State University can measure about 70 substances.

[3] Smithwick et al., 2005, "Circumpolar Study of Perfluoroalkyl Contaminants in Polar Bears (Ursus maritimus)." Environ. Sci. Technol., 39, 5517-5523.

[4] KEMI. (2015). Occurrence and use of highly fluorinated substances and alternatives Report from a government assignment. Stockholm. Retrieved from https://www.kemi.se/global/rapporter/2015/report-7-15-occurrence-and-use-of-highly-fluorinated-substances-and-alternatives.pdf

[5] OECD. (2007). Lists of PFOS, PFAS, PFOA, PFCA, Related Compounds and Chemicals that May Degrade to PFCA. Organisation for Economic Co-operation and Development (OECD).

[6] Xiao, F. (2017). Emerging poly- and perfluoroalkyl substances in the aquatic environment: A review of current literature. Water Research, 124, pp. 482-495.

Advanced analytical work in Europe, like that at the Federal Environment Agency - Germany (UBA), can similarly quantify only 65 substances.[7]

Many environmental samples show a large fraction of precursors not found in standard analytical methods. Sample oxidation treatments, such as the total oxidizable precursor (TOP) method,[8] can convert unknown precursors to measurable PFAS (i.e., AFFF precursors that could not be measured before oxidation appeared in analytical measurements after treatment). More data are needed to understand this. [FluoroCouncil Note: Comments from the FluoroCouncil indicate that they believe that the TOP method may not give a correct picture of what actually happens in the environment and that care should be taken in interpreting results from this method.] Legacy PFAS chemicals and their degradates will be around for a long time, even after usage is phased out.

There are large data gaps that affect our ability to address PFAS substances. As documented above, there are hundreds or thousands of overlooked PFASs, partly an issue of disclosure and regulatory requirements, and gaps in knowledge of product nature and composition. [FluoroCouncil Note: Comments from the FluoroCouncil indicate that they believe that the "hundreds or thousands" number is a gross overstatement.] Product testing can help fill this gap. There is a vast gap in analytical methods and data on fate properties. Ecology is supporting cutting-edge analytical development. PFASs can generate degradates with high persistence, and those product impacts will remain long after production ends. Ecology has a program supporting green chemistry and safer alternatives.

Q&A/COMMENTS

- **C.** The presentation focused on fluorotelomers, but other products (fluoropolymers, higher molecular weight polymers) still fall in the universe of PFAS.
- **Q.** Are polymers registered? **A.** The Regulation for Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH), does not require polymer registration since these high molecular weight chemicals are not bioavailable. Industry has studied some of those polymers and these studies suggest they may break down in landfills and become more bioavailable. There is also some unreacted monomer in the polymer material.
- **C.** A FluoroCouncil representative asserted that the breakdown of side-chain fluorotelomer polymers into volatile fluorotelomer alcohols occurs on a much longer time scale than was indicated in the presentation. The results shown are from research by Washington.[9] The jury is still out on the science and there are challenges related to the analytical chemistry. [FluoroCouncil Note: The FluoroCouncil subsequently provided additional references regarding the half-life of side-chain polymer degradation: Russell et al., 2008 EST, and 2010 Chemosphere.]
- **Q.** Will the CAP scope be separated by categories (i.e. PFAS manufactured intentionally, PFAS created un-intentionally, and PFAS "naturally" generated)? **A.** Not decided yet. Recommendations out of this process will have to be focused. This speaks to the importance of input from the Advisory Committee. The CAP identifies recommendations, but does not require anyone do anything (not a regulatory process).

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[7] Frömel, 2016, "Investigations on the presence and behavior of precursors to perfluoroalkyl substances in the environment as a preparation of regulatory measures." Federal Environment Agency – Germany (UBA). Retrieved from https://www.umweltbundesamt.de/sites/default/files/medien/378/publikationen/texte_08_2016_investigations_on_the_presence_and_behavior.pdf

[8] Houtz et al., 2016, "Poly- and perfluoroalkyl substances in wastewater: Significance of unknown precursors, manufacturing shifts, and likely AFFF impacts," Water Research, 95, pp. 142-149.

[9] Brian Penttila's presentation referenced the article: Washington & Jenkins, 2015, "Abiotic Hydrolysis of Fluorotelomer-Based Polymers as a Source of Perfluorocarboxylates at the Global Scale," ES&T, 49, 14129-14135

Uses, Regulations, Product Testing – Kara Steward (Ecology): PFAS was produced in the 1940s to 1950s for use in nonstick cookware along with water-resistant and polymer coatings; and in the 1960s for fire-fighting foam, lubricants, and stain-resistant coatings. Since 2000, there have been significant reductions in the production and use of PFOS and PFOA. A Swedish study estimated annual historical production of PFOS and related substances at 3000 tons, and PFOA and related substances at 150 tons—reduced to a current production of approximately 10 tons of PFOs/related substances per year and 5.5 tons of PFOAs/related substances per year. The European Union (EU) estimates that 80% of current PFOS is from metal plating, and production of PFOA precursors may amount to 20 tons per year. A 2009 WA waste characterization study approximated 10.2 tons of PFOS in landfills.

Kara discussed regulations for PFOS/PFOA and PFAS. The EU REACH addresses (to some degree) how they are used, with at least one country having an advisory level on use of PFAS in food packaging. EPA has a drinking water health advisory, new use rules, soil screening guidance, PFOA stewardship, and the UMCR3. State actions and/or listings also exist in 19 U.S. states for one or more of the following: effluent, fish tissue, groundwater, products, soils, surface water, and waste. Federal and State drinking water rules/limits for PFAS compounds vary widely (between .013ppb (= 13ppt) and 7 ppb (=7,000ppt). Studies with varied analytical methods have looked at PFAS in products. Ecology will conduct product screening in 2018 looking at a variety of AFFFs, carpet and its care products, cosmetics, food packaging, paints and lubricants, and textiles. The final CAP will include list of acronyms and products tested, along with a summary of information provided for products sold in WA State. Regular testing is done on children's products (most products containing these chemicals are made in China).

Q&A/COMMENTS

- **Q**. Have they looked at body burden information? **A**. See Elmer Diaz's presentation to follow.
- **Q**. One meeting attendee asserted that PFOA and PFOS are not used treat paper or textiles. They are potential degradation products of the substances used in these treatments (specifically, PFOA and PFHxA themselves are not used for these applications).

PFAS and Human Health – Elmer Diaz, Toxicologist (DOH): Elmer provided an overview of health concerns with long-chain PFAS. These include liver and metabolic impacts, developmental and reproductive effects, immune suppression (suppressed antibody production), endocrine effects, and neurotoxicity, PFOA and PFOS are developmental toxicants in animals. Many studies have observed reduced ossification, decreased neonatal survival, body weight changes, and altered puberty, and delayed mammary gland development. EPA has stated that there is suggestive evidence of carcinogenic potential for PFOA and PFOS in humans, and the International Agency for Research on Cancer (IARC) has classified PFOA as possibly carcinogenic to humans.

PFAS levels in the U.S. population are declining slowly. The four most abundant long-chain PFAS found in human biomonitoring are: PFOS, PFOA, PFHxS, and PFNA, and they have been frequently detected in 100% of people tested. There is a long residence time in humans, due to poor excretion of PFOS and PFOA (animals excrete these chemicals faster), as a result body burden can build-up overtime. Age-specific behaviors by children can contribute to higher exposures than adults. Such children's behaviors include:

- Spending more time on the floor than adults,
- Exploring surfaces with their mouths,
- Ingesting more indoor dust than adults, and
- Drinking more water per pound of body weight than adults.

Humans most commonly are exposed through food, water, and dust (in adults the largest pathway is food, while in children dust ingestion is also important). [FluoroCouncil Note: "Fluorocouncil is not aware of definite data indicating that food is the largest pathway compared to water or simply a combination of a number of

pathways. Market basket studies have not indicated food to be the major source unless you are eating only fish from "contaminated" waters. If there is bona fide evidence that food packaging vs food in general is the root source, these references should be provided."] A food section in the health chapter explains and document studies in detail. This section will be updated with more references.

Animal research has shown developmental impacts from PFAS at low exposure levels. In humans, PFAS have been found in the serum of pregnant women, amniotic fluid, placenta, umbilical cord blood, and breast milk, and have been measured in infants' blood serum shortly after birth. At birth, infants have roughly the same serum levels of PFOA as their mother, but these serum levels will surpass maternal levels during infancy due to consumption of breastmilk or formula made with contaminated water.

As stated in an earlier presentation, health advisory levels around the U.S. and the world vary widely. EPA's number of 70ppt is in the lower end. The EPA's health advisory provides lifetime protection, including sensitive life stages for the developing fetus and children. EPA reviewed the lowest observable adverse effects in animal studies, used modeling to convert animal doses to human equivalent doses, and reviewed studies in people exposed in the workplace and to environmental levels of PFO and PFOS. PFAS in your water can contribute significantly to body burden levels.

It is well established that serum PFAS concentrations are elevated in communities with PFAS in drinking water, as compared to the general population. An example of this is presented in this graph, where the levels of PFOA and PFOS in the serum of Minnesota residents is higher compared to the levels of the U.S. general population. These residents had drinking water levels above the health advisory – up to 2,000 ppt. The graph on the right shows the serum levels of PFOA and PFOS in women from California who had detections of one or more PFAS in their public water system. Median PFOA and PFOS serum levels were higher among those with detectable levels in water compared to those without detectable levels.

We reviewed available information on three short-chain PFAS compounds, this include PFHxA, PFBS, and PFBA. These compounds appear to be well-absorbed orally, and rapidly excreted. Studies indicate that they have lower toxicity, and bioaccumulation. They have similar endpoints in rodents, but require higher doses to see an effect. There are important data gaps and little information on immune effects, hormone disruption, and cancer in the majority of short-chain compounds. There is only available toxicological information on PFHxA, and 6:2 FTOH. Elmer stated that developmental effects of PFAS can emerge across the life course, but there is a lack of testing to determine this. More detail information is presented in the health chapter, short-chain fluorinated alternatives section.

Shorter-chain PFAS are highly persistent; as a result, they have the potential to become globally distributed. We have some concerns since they have high potential for exposure through water and diet. The question is, are the short chain alternatives safer? There is a need for more study on the toxicity and bioaccumulation of short-chain PFAS. They are similar in structure to long-chain, are soluble in water, and mobile in soil. We understand as part of the Stewardship agreement that EPA has evaluated these "safer alternatives" for safety, but the lack of transparency and proprietary nature of chemical production hinder independent assessment. There is also concern that short-chain PFAS are more difficult to remove from drinking water, as the activated carbon method is less efficient at removing the short-chain.

Other outstanding research questions: can short-chain PFAS migrate more efficiently from treated paper to food? Are they more likely to be taken up by plants? DOH is working on answering these questions. Next Steps:

- Mapping potential PFAS sources to guide further investigation of drinking water.
- Develop options for additional water system testing.

- Develop evidence-based advice for home gardens, crops with impacted water.
- Develop policy options for addressing other PFAS.

Other problems identified:

- Health follow-up on impacted communities – exposure and health effects study
- Detections in WA fish exceed provisional screening values.
- Need data on exposures in consumer products
- Data gaps in toxicology information and exposure potential cause uncertainty.

Q&A/COMMENTS

- **Q.** Are data available on compost? **A**. There are some data on biosolids used as soil amendments (from wastewater treatment plants (WWTP) and industrial waste). It appears that some biosolids do contain PFAS.
- **Q.** Will there be a list of reference citations available for the committee to review? **A.** Yes. The draft chapters will have all references.
- **Q.** The Center for Disease Control (CDC) has done population monitoring and blood testing on some of the exposed populations. Is WA considering developing a methodology in the public health laboratory to assist communities? Is this important going forward to assist impacted communities? **A.** They need to sample a large population to get at questions about long-term health, and Airway Heights does not have a large enough population to achieve statistical power in such a study. DOH is advocating for a national study, with a standardized protocol so all states can join. A large epidemiological study is available on PFOA. It would be nice to have a study of sites impacted by AFFF. People with long-term exposure deserve an answer on what health impacts they should be monitoring.
- **Q.** Does DOH prioritize firefighter exposure in the assessment? **A.** They did a literature review, and it appears that firefighters are not showing higher levels than the background. A few papers found some that some folks at AFFF training centers were higher, but those did not use a large sample size.
- **C.** An attendee stated that short-chain PFAS are not PBTs. The FluoroCouncil has a bibliography on short chains they can share. PFHxA – PFOA had a use as a polymerization aid. PFHxA is a degradation product associated with short chains. There are not more short-chain/side-chain polymers than long-chain ones.
- Note: some disagreement exists between parties on the science base in the following discussion:
    - **C.** Brian Penttila explained that the majority of current levels of PFOA in the environment are due to emissions from its historic use as an emulsion polymerization aid in polymer production. Washington's work suggests that the breakdown of side-chain fluorotelomer products in landfills will, over time, contribute PFOA as a degradate of the 8-2 fluorotelomer alcohols released from side-chain polymer breakdown. Similarly, current side-chain products are made from 6-2 fluorotelomer alcohols and will, over time, release quantities of PFHxA as degradates of the new side-chain products. The 6-2 alcohols, like the 8:2 alcohols are volatilie, can travel long distances before they break down in the atmosphere to PFHxA and PFOA.
    - **C.** One participant said the assertion that the bulk of PFOA comes from degradation is false. They urged Ecology to be careful about supposing hypothetical degradation in a landfill. Much is absorbed on the soil and not bioavailable. C-6 is not manufactured – and there are small concentrations of degradates. [FluoroCouncil Note: The FluoroCouncil subsequently added that PFOA may be released from its manufacture and use as a PPA in Asia. If PFOA production and use go down over time, the PFOA emissions that come from degradation of PFAS products will increase as a percentage of the total PFOA in the environment, but the precise percentage number is not known at this time.]
    - **C.** Brian added that the timescale of the breakdown is not definitive in the literature. If products are in the environment, degradates can be expected (but the timescale is not sure).
    - **C.** The PFOA associated with producing fluoropolymers is not going away – much of it is made in China.

- **Q.** Has anyone done a mass/volume study? **A.** There was a 2006 paper that looked at ocean volume estimates of these materials. (Put this topic in the "parking lot" for later discussion.)

ACTION ITEM: FluoroCouncil to share a bibliography on short-chain.
PARKING LOT ITEM: Mass/volume study and ocean volume estimates.

PFAS and the Environment - Callie Mathieu (Ecology): Callie reviewed available information about pathways of PFAS to the environment and PFAS detections to date in the environment. WA has not yet ascertained the relative importance of these pathways: discrete product use, WWTP effluent, stormwater, atmospheric deposition, biosolids, and landfill leachate. There is widespread occurrence of PFAS in the environment around the world in surface water, groundwater, WWTP effluent, marine and freshwater sediments, and freshwater fish tissue.

Studies of urban and WWTP-impacted lakes show an increasing trend in PFAS from 1980s to 2010; however no trend emerged in rural lakes. Marine monitoring studies found less PFAS detection, and lower PFAS concentrations, in marine sediments than in freshwater lakes. In 2008, researchers found widespread occurrence of PFAS in surface water. In 2016, they found fewer detections in the range of 5-50 ng/L, with the highest surface water concentrations found in WWTP-impacted water bodies (e.g. West Medical Lake, which has no outflow and a long water residence time). In 2016, researchers expanded the analyte list to 25 compounds and found mostly perfluoroalkyl acids in surface waters. They noted that WA sites show PFAS concentrations 1-2 orders of magnitude lower than sites in other states impacted by AFFF or manufacturing. They found consistently lower concentrations of PFAS in WWTP effluent in 2016 than in 2008, and saw a shift from PFOA in 2008 to PFHxA (C6), and PFPeA (C5) in 2016.

Studies of fish tissue show no consistent increase or decrease between 2008 and 2016. Fish from urban lakes had the highest concentrations (comprised mostly of PFOS). Fish tissue showed similar levels to other states, but AFFF sites were lower than other states. Osprey egg concentrations, assessed in 2008 and 2016, showed no change in concentration between the years. Most sites tested were within the range of what is found in Europe, with three exceptions (Lake Washington, West Medical Lake, and Lower Columbia River). Lake Washington had the highest concentration. Bioaccumulation appeared in 2016: PFOS and long-chain PFAAs increased up the food chain. PFOA and short-chain PFAAs appeared in water, but not in biota.

Data gaps include sources to urban water bodies, data on a larger suite of PFAS compounds, and PFOS fish tissue data sufficient to inform fish consumption advisories. Data conclusions: urban and WWTP-impacted water bodies in WA have higher concentrations of PFAS, short-chain PFAS are found in effluent and in WWTP impacted surface water, but no biota, and the PFOS and long-chain PFAAs are still a widespread issue in biota.

Q&A/COMMENTS

- **Q.** Did West Medical Lake water levels correspond with fish tissue data, and did that study include hatchery fish? **A**. There was a confounding factor in West Medical Lake: WA Department of Fish and Wildlife (WDFW) stocked it with rainbow trout in 2016. The 2008 study looked at residential fish, which had higher levels.
- **Q.** Is there any plan to do marine sampling (shellfish) near Whidbey Island? **A**. Yes, WDFW has done some work on juvenile salmonids in Puget Sound, but has not gotten the data yet (not sure if samples taken near Whidbey Island specifically). **Q.** Is there a difference in the uptake of PFAS compounds in marine versus freshwater? **A**. Callie has not seen a study on this.
- **Q.** Referring to a pie chart in an earlier presentation showing the exposure in percentages (food, dust, soil): has any test of food, dust, and/or soil validated these assumptions about intake and exposure? **A.** This is one of the data gaps. There are a handful of small studies on a variety of foods in the regular diet, but

background levels in soil are not known (all soil studies have been done around contaminated sites). What about house dust studies? There have been a few studies on this that will inform the CAP chapters.

Committee Dialogue (C=Comment; Q=Question; A=Answer):

- **C.** It is important to know how much of this stuff is being used/produced and how much is out there. Where is it seen, and how much is there?
- **C.** Contamination issues around the state, and health effects from long-chain substances, have been well documented. While U.S. companies no longer manufacture long-chain PFAS, products manufactured in other countries entering the U.S. can continue to contaminate and expose WA residents.
  - We want to prevent those products from reaching the market here. Does WA have the regulatory reach?
  - The carpet industry has switched to short chain, and there may be a rule not allowing carpets to be imported with long chain.
    - **C.** There is some activity at the Stockholm Convention. Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride are identifed as POPs (persistent organic pollutants) under the Stockholm Convention.[10] PFOA, and PFHxS were nominated for inclusion in the Convention; however, there is still an issue around what would be exempted. [The Stockholm Convention website states that the following chemicals are under review in the POPs Review Committee: Pentadecafluorooctanoic acid (CAS No: 335-67-1); PFOA (perfluorooctanoic acid), its salts and PFOA-related compounds; Perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds.][11]
- **C.** Nothing prohibits manufacturers from making it here, it is voluntary action. An agreement with EPA (PFAS Stewardship Program) phased out long-chain substances for companies that participate (e.g. 3M, companies in the FluoroCouncil).
- **C.** Toxics Free Future put recommendations in writing. They would like to ban long- and short-chain PFAS in food packaging, and want drinking water standards to include short chain as well. The rationale for the latter are what TFF considers indications of serious concerns* over the short chain PFAS in drinking water: short chain are more mobile, and current treatment methods are more effective with long chain **(TFF to submit citations in support of this with the organizations comments on draft CAP chapters).*
- **C.** There have been early actions in Cosmetics on PFAS, and this CAP should identify additional early actions, with urgency around AFFF to find safer alternatives while still meeting the desired product qualities.
- **Q.** Can the agencies clarify what the CAP would focus on regarding the long chain versus short chain as an interim step? The issues on Whidbey Island involve long-chain compounds, but short chain should not get left out if they pose a potential risk. **A.** Ecology wants to work with this Committee to identify early actions for the interim document and are open to all chemicals in the class. Military bases are currently moving to short-chain options, but if in the long term these present just as big a problem, then the agencies may need to address the short chain now. At this point, the scope of work is on everything in the PFAS class.
- **C.** The biggest concern for some pertains to public health and how to convey the proper understanding of PFAS exposure and its health risks, and ultimately how to reduce those risks. We need consistent information on health risks, exposure, and treatment options. Could the plan include public outreach recommendations?
- **C.** Another attendee expressed support for action sooner rather than later, and would like to see short-chain PFAS included. They expressed concerned about PFAS in compost (the public will be concerned about this), and would like to see recommendations on PFAS regarding gardens.
- **Q.** What are the likely sources of PFOS in urban lakes? **A**. This is unknown. The biggest *uses* of PFOS were AFFF and carpet. If the *source* was carpets, it would show in the effluent, so the source of PFOS is more likely historical use of AFFF. Other studies have correlated higher density of traffic with higher levels of PFOS in

[10] http://chm.pops.int/TheConvention/ThePOPs/TheNewPOPs/tabid/2511/Default.aspx
[11] http://chm.pops.int/TheConvention/ThePOPs/ChemicalsProposedforListing/tabid/2510/Default.aspx

urban areas. This may be from a product we are not aware of (waxes?). A Swiss study looked at the flow of these substances, and that showed emissions from industrial uses such as chrome plating made their way to WWTP. However, WWTP effluent that receives chrome plating waste was sampled for this project and had very low levels.

- **C.** Public health agencies have limited capacity and funds, so would really like to see CAP recommendations of where to look for each county's highest risks and what the highest priority actions are. It will be vital to include substitutes, and address everything that will need to be addressed so we don't have to do this again.
- **C.** King County Local Hazardous Waste Management Program (LHWMP) has a stable revenue stream, with the mission to address the lifecycle of hazardous materials. They prefer to work "upstream" as much as possible, and would like to look at short chain as well. They want to maximize reach, impact, and equity, and PFAS fits all these criteria. LHWMP has no formal program for PFAS, and await CAP completion. They are eager to see specific recommendations, and find a nexus with their work (they may be able to take on some recommendations in the CAP).
- **C.** We need a better understanding of the use of firefighting foams in the state: historical, current, and future planned uses. 500 test wells are not much; more well testing is needed, using a risk-based approach.
- **C.** What do we know so far about presumed sources like AFFF? Howard Scartozzi (Fire Training Academy Regional Direct Delivery Program) said this stuff is in many places: fire trucks, buildings with sprinkler systems where petroleum products are used. Public water systems have an obligation to address cross connections. This could leverage what public water systems do, to discover where all this stuff is being used.
- **C.** The CAP should address how to dispose of older products (already purchased) to keep them out of the waste stream. Darin Rice noted that military installations are inventorying older foams to dispose of them. This needs to get done within the dangerous waste regulations, perhaps using a bounty program such as that for mercury switches.
- PFAS in Food packaging—perspectives from the discussion:
  - **C.** We need to better understand the use of fluorinated chemicals in food packaging. Long chain is no longer used, but what about short chain? What level of scrutiny does the FDA give these?
  - **C**. Lots of data needs to be submitted on products before they can be used in food packaging. The FDA standard for safety is "no harm," if any study showing harm comes to FDA attention, they can revoke the use of that product or substance. *Response:* The process for approval is not that rigorous. FDA allowed long chain prior, and use only stopped because companies said they would stop.
  - **C.** It is difficult to identify which PFAS substances are allowed in food packaging, as there is no data available. This regulatory framework is not rigorous enough.
  - **C.** Fluorinated compounds are used in food packing for oil and grease resistance. No alternatives provide the same performance, and some available alternatives bring negative consequences.
  - **Q.** Are PFAS compounds approved for food contact in packaging considered compostable? Does FDA look at what food paper gets composted? **A**. We don't know.
  - **C.** FDA gets 120 days to review materials submitted by industry. This FDA process could be looked at, with recommendations for the review process.
- **Q.** CAP recommendations: can local jurisdictions help gather information for this CAP? **A.** Yes, local jurisdictions could help to gather data, and help to develop recommendations.
- **C.** Testing is expensive for communities; they may need financial resources. This is a huge cost burden on the State. Is there a way to tax the chemical makers to address the full life cycle? Who is the responsible party? Can the CAP address who should be responsible for financially addressing the cleanup/prevention of exposure, e.g. through a hazardous substances tax (on the first use)?
- **C.** For firefighting foam: are there alternatives that won't create these problems? Without good alternatives, what are best management practices (BMPs) for using the foam and collecting the water? BMPs have been created for textiles (FlouroCouncil can provide). If BMPs exist for firefighting foam, information on them is

not getting out – need to address the outreach piece. NOTE: FluoroCouncil has provided BMPS for firefighting foam (see below).

BMPs for textiles: http://fluorocouncil.com/PDFs/Guidance-for-Best-Environmental-Practices-BEP-for-the-Global-Apparel-Industry.pdf; BMPs for AFFF: http://fluorocouncil.com/PDFs/Best-Practice-Guide-for-Use-of-Class-B-Fire-Fighting-Foams-PDF.pdf

- **C.** Textiles alternatives assessment needs updating; new science was just reported at a dioxide meeting.
  - **ACTION ITEM**: Laurie Valeriano to share information on the textiles alternatives assessment with Ecology, DOH, and the Committee.
- **Q.** How would we know what businesses are using bulk products, with no reporting requirement? Are they being imported, used in manufacturing of secondary products?
- **C.** Aviation hydraulic fluids are no longer needed; safe alternatives have been found—has Boeing switched?
- **C.** Disposal: what happens to the products when they expire? County facilities accept small household hazardous waste amounts; larger quantities would need to go to State hazardous waste. When firefighting foam expires, it is often used for training.
- **C.** New York- State funds are used for the collection of expired waste of this type.
- **C.** The Navy currently has millions of tons of this foam in storage. [FluoroCouncil Note: From the Darwin 2011 report done for the FFFC, the Navy had 269,000 gallons of PFOS-based foams in storage which equates to about 2.42MM pounds or 1210 tons. And given that was 6 years ago, the residual quantity left is likely significant less than 1000 tons.]

Next steps:

ACTION ITEM: Ecology to work with internal team to pull the chapters together for review. (ONGOING)

ACTION ITEM: Ecology to begin to roll out some DRAFT Chapters in late September. (COMPLETE)

ACTION ITEM: Kara Steward to put all interested parties, meeting attendees, and webinar attendees on listserv and provide link to EZview webpage. (COMPLETE)

ACTION ITEM: Kara Whitman to draft meeting notes for 8/30/17 Committee Meeting (COMPLETE).

Next two meetings of PFAS CAP Advisory Committee: 11/1/17 and 12/12/17 at Ecology HQ Lacey, WA.