Toxics Use Reduction Institute Science Advisory Board Meeting Minutes
March 11, 2021
Virtual Zoom Meeting
12:00 PM

Members Present: Dave Williams (Chair), Robin Dodson (Vice Chair), Christy Foran, Christine Rioux, Heather Lynch, Denise Kmetzo, Rich Gurney, Helen Poynton, Wendy Heiger-Bernays, Lisa Cashins

Members not present: Amy Cannon

Program staff present: John Raschko (OTA), Sandy Baird (MassDEP), Liz Harriman (TURI), Heather Tenney (TURI), Hayley Hudson (TURI), Pam Eliason (TURI), Alicia McCarthy (TURI), Tiffany Skogstrom (OTA), Caredwen Foley (OTA), Hardiesse Dicka-Bessonneau (MassDEP)

Others present: Katherine Robertson (MCTA), Carol Holahan (Foley Hoag ACC), Trisha McCarthy (Coyne PC for ACC), Harry Hechehouche (ACC), Keith Hostetler (Trinity Consultants ADBAC/DDAC ISCs), Kenneth Littel (ADBAC/DDAC ISCs), Judi Anderson, Aron Pollard (Mason Chemical Company), David Jones (Lonza LLC), Hannah Alleman (Household & Commercial Products Association's Ignite Solutions), Emily Hammel (BU SPH), Kate Sande (Quat Residue Group), Karen Acuff

Welcome & Introductions

The chair made an announcement acknowledging that this meeting is being conducted remotely, consistent with Governor Baker's Executive Order of March 12, 2020, in response to the current State of Emergency in the Commonwealth due to the outbreak of the 2019 novel coronavirus, known as, "COVID-19".

All board members were asked to introduce themselves. All attendees were also asked to introduce themselves and state their affiliation using the chat function. Visitors were asked to then mute and use the chat function for any questions or comments, which TURI monitored, thereafter. Visitors were also invited to ask questions or offer comments periodically during the meeting.

Approve January 14th Meeting Minutes

A motion was made to approve the January 14th meeting minutes. The minutes were unanimously approved by the ten board members in attendance.

Program Updates

A written program update can be found on the TURI website along with other supplemental documents that may have been discussed during the meeting. The program update also supplies links to various other resources. A few key highlights were summarized.

Quaternary Ammonium Compounds

The SAB has been reviewing the scientific data for quaternary ammonium compounds as a potential listing under TURA. The SAB will make a recommendation based on this review of the science related to the EHS effects. From there, TURI creates a policy analysis that is reviewed with the Advisory Committee and presented to the Administrative Council. The policy analysis includes the scientific recommendation as well as policy information such as expected use in Massachusetts, opportunities for TUR, and

implications for the TURA program. Should the Administrative Council vote to list a substance there is then a regulatory process including draft regulations and public comment. It is an important reminder that listing under TURA does not limit the use of a substance but rather requires reporting and development of a TUR plan.

Updates since the January Meeting:

- The ADBAC and DDAC EHS summaries have been updated - updates are in red text.
- Materials were added to the LibGuide to address questions asked at the last meeting, including a Q&A document from the Quat Residue Group, several studies to address specific endpoints such as asthma, LLNA, mechanisms, and a Green Screen assessment for ADBAC.
- Earlier this week the members of the Scientific Guidance Panel for Biomonitoring California unanimously voted to ´Recommend the class quaternary ammonium compounds (QACs) be added to the list of priority chemicals'.
- ADBAC ISC (Issues Steering Committee) provided comments to the ADBAC EHS summary last night. That was sent out this morning and the comments will be mentioned as we go through each endpoint.
- We are focusing on the group of 19 ADBAC substances and 5 DDAC substances that are listed on page 13 in the EPA Final Work Plans.
- Rich has obtained confirmation that his filed 'appearance of conflict form' was received by the appointing body, will thus be participating today.

The board reviewed each endpoint of concern, and agreed to start with information that related to both groups of substances and specify any evidence that is specific to only one group.

Reproductive/Developmental Effects

- A board member expressed concern for the reproductive and developmental endpoint, but noted that the available evidence presents varying results. The Hrubec Lab, which tested on ADBAC/DDAC mixtures being used in animal facilities, saw neural tube defects and other effects on fertility in male and female mice. Some effects were also seen in rats. These effects were observed for three generations. These were not guideline studies, but still contain valuable information. Dr. Hostetler's study (provided in pre-print) is on significantly older data from the 80s and early 90's, and only tested one specific substance for ADBAC and DDAC, separately.
- Neural tube defects were observed on gestational day 10, early in the neural tube development. There weren't actually defects at birth, so it can't technically be considered a birth defect. Older guideline studies didn't check at day 10, so they can't be compared.
- Further discussion followed around whether these results can be explained by resorptions, the mother ingesting the young with defects, and other possibilities for why other studies have not reported similar effects.
- The cholesterol and sterol pathway is affected. Delay in neural tube closing may be an endocrine disruptive mechanism rather than a teratogenic effect. It seems like potentially a developmental delay. A board member summarized EPA Comptox data on cell based assays, that can help inform about molecular pathways.
- Nuclear receptors known to be involved in regulation of lipids; exposure to multiple QACs may impact lipid synthesis and/or metabolism. Hormone receptors may be activated or [QACs may] be antagonists.

- Potential biological levels of activity, may alter development or physiology. If this is an endocrine disruptor instead of a general toxicity, differences among species will have different levels of response, sensitivity, and functionality, could get hermetic dose response curve. Endocrine disruption could explain some of the differing results of studies.
- Looking at the receptor data and some of the cholesterol and lipid papers helps form a mechanistic explanation for some of the inconsistencies in the evidence.

Asthma

Board members noted the numerous studies surrounding quaternary ammonium compounds and effects on or exacerbation of asthma, pulmonary fibrosis, respiratory sensitization, or irritation. Included were different endotypes and phenotypes, differences in how endpoints were measured (questionnaire, FEV, etc.), and the question of exacerbation versus new onset of symptoms.

- Some surveillance data shows increase in prevalence of quats and increase in asthma type response to that use.
- Case studies with controlled exposures to quats were well done, though small numbers.
- Gonzales was a key study correlating those with asthma and the products they used - quats were one of the highest used products.
- Dumas – noted issues excluding work exacerbated asthma, potential 'healthy worker effect'.
- Lakind noted that they are irritants and that there is evidence of sensitivity.
- Question about whether quats will initiate asthma-like symptoms or only exacerbate in existing asthma.
- Also noted that animal studies with known exposures have shown effects.

Further discussion was had summarizing key information, concerns, strengths, and limitations of the studies. While there is some valid critique, there is a good amount of evidence pointing in the same direction that quats are asthmagens. There was overall recognition that they are sensitizers and irritants.

Environmental

Board members noted key information from Hora paper and papers referenced from it. There was a lot of discussion surrounding the fate and transport of QACs and in wastewater treatment plants (WWT). Information is lacking surrounding concentrations of these substances in the ambient and natural environment. There is evidence for presence in sediment and sorption, and concentrations in various effluents and point sources.

- Main mechanisms of degradation are biodegradation and adsorption - stable to photolysis, photodegradation, and hydrolysis, and half-lives are quite long.
- Not biodegraded under anaerobic conditions, so they could be persistent in anaerobic reactors.
- QACs can reduce efficacy in WWT and cause major operation problems including, digester failure, changes in microbial ability, and possible antibiotic resistance.
- Quats are removed from WWTPs, via sedimentation, adsorption, still entering the environment from point source pollution
- A board member noted concern for these substances remaining in biosolids and the possibility of them being reused as fertilizer on agriculture. Study from China (Xiang, 2015 will be added to

Libguide) showed QAC's ending up in vegetables from sludge land application, not sure if phytoaccumulating or just migrating onto the plants.

- Aquatic toxicity has been well documented in both guideline and non-guideline studies, specific lethal toxicity of QACs towards rainbow trout and green algae.
- They have been detected in the aquatic environment in varying levels, but many are related to point source locations where we would expect to see higher levels.
- There is evidence of higher concentrations in sediment, but not much information on sediment organism toxicity. Important fact to note is that a lot of the organisms used in aquatic toxicity studies are sediment dwellers. Many invertebrates live at the sediment/water interface and are particularly sensitive to QACs.
- Generally studies are reporting concentrations of QAC's at 1 ug/L; Kreuzinger paper showed higher concentrations released into the environment.
- Once in the sludge, it will degrade over time, but it's not very bioavailable to the sludge where microbes would break it down.

Researchers are finding these compounds in household dust and they have measured them in blood and serum.

Corrosivity

A board member summarized the information gathered after reviewing safety data sheets of several different products containing ADBAC and DDAC at both ready to use and industrial grade concentrates; they typically are mixtures of ADBAC and DDAC. Key hazards noted included inhalation toxicity, high skin and eye irritation/corrosion, including permanent damage.

- The board members were in agreement that it has been demonstrated that these substances are corrosive.

The board finished their discussion and a ten minute break was provided.

Visitor Comments

The chat box was reviewed during the break and it was agreed most comments were comments on the discussion at that moment or additional references and resources. Visitors were allowed to expand on comments in the chat, voice new comments, or ask questions at this time.

A visitor commented that companies should know they are using these substances and should be using them safely. The visitor wanted to check the rationale for the board's deliberations on QACs, and whether it was because of the pandemic and increased use by consumers. Has the focus shifted to use by formulators?

- The TURA program covers all these uses and always considers workers as well as environmental and public health and safety hazards.

A visitor asked the SAB to consider waiting until the next meeting in June, to fill some of the gaps talked about here today and for the new paper that Dr. Hostetler had mentioned.

A visitor commented that a draft document on QACs, a systematic review of existing repro published and unpublished studies, is going to be out soon, estimated within the next month, although there have been delays.

Summary of SAB Discussion

At this time the board focused on summarizing key points and concerns for each endpoint while Heather documented the board's statements by sharing her screen. The board members wanted to make it clear that any statements made today, would be talking about the substances as mixtures, unless specifically stated otherwise.

Reproductive

- Results are mixed as the Hrubec and Melin studies show effects on fertility, but guideline studies don't.

Neurodevelopmental timing/delay

Note lipid and sterol biosynthesis importance in brain and spinal cord development; potentially disrupted/impacted. Neurogenesis and neural system development and timing.

Based on available data from guideline and academic studies there is some concern for early neural developmental effect; no evidence for frank defect.

Some of these effects may be supported by potential endocrine activity in screening assays in addition to mechanistic studies, [like Xu which is in vitro].

Asthma

Evidence in case reports, surveillance studies, and animal studies indicate that QACs are associated with respiratory system irritation and inflammation including those outcomes consistent with occupational asthma and work-exacerbated asthma. Epidemiologic evidence is suggestive with limitations in terms of exposure characterizations (mixtures vs individual QACs), and study population (exclusion of most vulnerable persons or distinguishing between new-onset vs prior asthma).

Corrosivity/Worker Health

- Concern with corrosion: irritation and serious eye damage listed as Category 1 on multiple SDS skin; irreversible.
- In concentrated mixtures; some ready to use listed 1, but may be overly cautious.
- Corrosive.

Environmental

- Environmental effects specific to aquatic organisms seen at low microgram per liter concentrations. WWTP effluent and some surface water concentrations approach these levels.
- Sorption to sediment and sludge is a significant fate and transport mechanism.
- Persistence has been identified by other agencies and information is summarized in the GreenScreen for ADBAC.
    - Not likely in surface water and they do degrade over time.
    - Some persistence in soil and anaerobic conditions.

- WWTP can handle these loadings but when there are larger increases in bioreactors downstream could create failure of these plants and potential to create superbugs.
- Salamova analysis is summarized on EHS summary but not on LibGuide. The paper cites measured QACs in environmental media and in humans as well. Passive air sampling of indoor air space. It is the first study in which these are examined.

From chat:

Though QACs are removed from the previous studies relying on enrichment and isolation of QAC-liquid stream during conventional wastewater treatment via a combination of sorption to biosolids and biodegradation, these compounds are still detected in aquatic environments, especially at higher concentrations in locations downstream of the discharge of municipal WWTP effluents and hospital and industrial (e.g., laundry and food processing) effluents. QACs compounds will increasingly enter the environment through point source pollution, land application of biosolids, or treated municipal and industrial effluent discharges. There are three main attenuation mechanisms for QACs in the aquatic environment: photolysis, biodegradation, and sorption to suspended particles followed by sedimentation. Generally, QACs have been considered stable or relatively slow to degrade by hydrolysis, photolysis, or microbial activity.

QACs like BACs and DADMACs have previously exhibited relatively long photolysis half-lives in aqueous and soil environments. WWTP process is dependent on QAC concentration, structure, microbial consortia, and treatment conditions. If the concentration of QACs is too high, the presence of QACs proves inhibitory to microbial activity and even detrimental to the microorganisms. If concentration of QACs is too low, the QAC may no longer serve as an attractive carbon source for the microorganisms. Levels higher than 2 mg/L have been shown to affect performance and increase biofouling in membrane bioreactors. If given time removal systems can adjust to increasing QAC loadings, but sudden increases in QAC inputs could cause operational problems.

The QACs were not biodegraded under anaerobic conditions indicating that QACs present in anaerobic digesters will remain with biosolids that are land applied. Increasing QAC concentrations could lead to one of two results: digester failure or further acclimation via changes in microbial community structure, potentially to communities that harbor more antibiotic resistance. Perhaps of greatest concern is the proliferation of pathogenic multidrug resistant bacteria (“superbugs”), following exposure to QACs. Indeed, methicillin-resistant Staphylococcus aureus (MRSA) strains exposed to BAC as well as benzethonium chloride had increased resistance to oxacillin and β-lactam antibiotics. Salmonella enterica and Escherichia coli O157 exposed to BAC also developed cross-resistance to antibiotics.

Exposure to BAC at sub inhibitory levels in an aerobic sediment microbial community altered microbial community composition and increased resistance to BAC as well as penicillin G, tetracycline, and ciprofloxacin. Collectively, these studies indicate that BAC is not a universal selective agent for antibiotic resistance, but rather it will alter the antibiotic resistance profiles of microbial communities.

Multiple studies revealed that BAC increased resistance to ciprofloxacin, which is currently a top 5 prescribed antibiotic, and was the most abundant antibiotic found in biosolids in the U.S., an indication of its high usage. Lethal toxicity of ATMACs toward rainbow trout increase with chain length and LC50-24h of 0.6-41 mg/L.

Heather shared the TURA SAB Decision Making Document on the screen and reviewed the criteria that would qualify a chemical to possibly be listed.

Next Meeting

Heather will send out a doodle poll for a meeting sometime in early May. The endpoint summaries documented on the screen today will be found in the minutes.

A motion was made to adjourn.

Adjourn.

Handouts

All handouts were posted on the TURI website prior to the meeting.

- TURA Program Update
- DRAFT EHS Summary for ADBAC
- DRAFT EHS Summary for DDAC
- DRAFT January Meeting Minutes
- TURI 2021: QAC Research Bibliography
- EPA Final Work Plan DDAC
- EPA Final Work Plan ADBAC
- Excel download of EPA Comp Tox Data
- QRG 2021: Responses to MA TURA
- QRG 2020: Cover Letter
- ADBAC/DDAC ISC 2020: Cover Letter
- ADBAC/DDAC ISC 2020: White Paper
- ADBAC/DDAC ISC 2020: Quats Green Chemistry Perspectives

Chat Box Conversation (inserted verbatim from zoom chat)

12:05:08 From Pam Eliason, TURI : Please share your name and affiliation in the chat so we all know who is here. Thank you
12:05:13 From Pam Eliason, TURI : Pam Eliason, TURI
12:05:36 From Harry Hechehouche : Harry Hechehouche, ACC
12:05:49 From KLittel : Kenneth Littel, ADBAC & DDAC ISCs
12:05:55 From Carol Holahan : Carol Holahan Foley Hoag
12:05:57 From Tiffany Skogstrom : Tiffany Skogstrom, OTA
12:06:08 From Caredwen Foley, MA OTA : Caredwen Foley, OTA
12:06:11 From Hardiesse Dicka-Bessonneau - MassDEP : Hardiesse Dicka-Bessonneau, MassDEP
12:06:22 From Emily Hammel : Emily Hammel, Boston University SPH
12:06:33 From Keith Hostetler : Keith Hostetler, PhD, Trinity Consultants on behalf of the ADBAC and DDAC ISCs
12:08:07 From Hannah Alleman - T&F : Hannah Alleman, Household & Commercial Products Association's Ignite Solutions Program
12:08:08 From DAVID JONES : David Jones, Lonza LLC for ADBAC/DDAC ISC
12:09:20 From Aron Pollard : Aron Pollard, Mason Chemical Company for ADBAC/DDAC ISC
12:12:07 From Katherine Robertson, MCTA : Katherine Robertson, Massachusetts Chemistry & Technology Alliance
12:13:23 From Pam Eliason, TURI : TURA conference program and registration here:
https://www.turi.org/Calendar/Spring_Continuing_Education_Virtual_Conference_Sessions
12:21:55 From DAVID JONES : Was it noted that the Salamova report was for 40 homes with only 3 air samplings?
12:26:30 From Keith Hostetler : EPA registers DDAC and ADBAC separatelyh
12:26:39 From Keith Hostetler : but many effects are very similar
12:26:53 From Keith Hostetler : Instances where there are significant differences are very few
12:27:12 From Keith Hostetler : ADBAC is a representative of a cluster
12:27:20 From Keith Hostetler : DDAC is representative of another cluster
12:27:30 From Katherine Robertson, MCTA : Robin, do you have a headphone? That does it to people.

12:29:34 From Keith Hostetler : As pointed at the CA meeting, Dr. Hrubecs use of the term "neural tube defect" is incorrect
12:30:02 From Keith Hostetler : That is correct
12:30:10 From DAVID JONES : Did TURA specify considering data reviewed by regulatory bodies over other types?
12:31:05 From Keith Hostetler : Insufficient data reported to rule out Maternal toxicity
12:31:38 From Keith Hostetler : Definitive 2-gen studies showed no effects
12:31:46 From Keith Hostetler : Dev tox studies - no effects
12:32:06 From Keith Hostetler : Guideline studies were also 2 generation
12:32:29 From Keith Hostetler : Manuscript in preparation, to be published in Birth Defects Research
12:32:35 From DAVID JONES : The ISC has offered to share the global systematic review when completed early this summer.
12:33:22 From Keith Hostetler : You are correct. Key data not reported
12:34:13 From Keith Hostetler : Yes, thanks for noting
12:34:57 From Keith Hostetler : Guideline studies, based on well conducted range finding studies, showed no resorptions in guideline studies
12:35:09 From Keith Hostetler : No Hrubec did NOT measure or report on resorptions
12:36:30 From Keith Hostetler : Systematic review of all literature, by Panel with > 100 years of experience, is in preparation.
12:36:58 From Keith Hostetler : Results to date agree with global regulatory assessments. QACs are not developmental and reproductive toxicity
12:39:17 From Keith Hostetler : sterol biosynthesis "hypothesis" was from mice studies at 120 mg/kg, about 300+ time above conservative estimates of human exposure
12:40:13 From DAVID JONES : Suggest SAB's reviewing the slides from Dr. DeSesso within Keith's presentation to CA Biomonitoring March 8, 2021 regarding repro tox.
12:41:37 From Keith Hostetler : That's why mice are not a good model
12:47:43 From DAVID JONES : Is the CompTox data modeling or actual data? This was the first I believe I have seen it.
12:48:04 From Keith Hostetler : Relative to a point made earlier, about QACs crossing the blood brain barrier. That study utilized very very high doses. Very uncertain and questionable if QACs at expected (trace) exposure levels would every reach the CNS.
12:48:56 From Keith Hostetler : Endocrine disruption endpoints would have been seen in the guideline studies.
12:49:24 From Keith Hostetler : Animials exposed continuously for 2 generations had no changes in organ weights, repro performance.
12:49:49 From Keith Hostetler : Going screening level in vitro data collection AFTER guideline whole animal studies is backwards
12:51:31 From Keith Hostetler : Most troubling missing piece of Dr. Hrubecs work is that they failed to document exposure.
12:57:20 From Keith Hostetler : The academic studies, in large part, have been conducted at doses/concentrations that are far removed from human relevance.
12:57:47 From Keith Hostetler : That's why guidelines studies have a high bar. It must be shown that doses selected will be relevant for human risk assessment
12:58:33 From Keith Hostetler : Just for reference, both EPA and ECHA have concluded that Hrubec work was not relevant for human risk assessment
13:03:29 From Heather Lynch : Keith - is Hrubec discussed in an ECHA dossier or decision document?
13:04:33 From Keith Hostetler : Yes, they explicitly referenced the "ambient exposure paper" and concluded it was not relevant in their review
13:04:40 From Keith Hostetler : We can provide a reference
13:05:49 From Keith Hostetler : Sensitizers?
13:06:10 From Keith Hostetler : Low incidence of dermal or respiratory sensitization linked with QACs
13:07:16 From Keith Hostetler : In multiple classic (guideline) studies, neither ADBAC nor DDAC is classified as a dermal sensitizer
13:07:51 From Keith Hostetler : 40+ years of occupational use - if these were potent "asthmagens" or sensitizers, it would have been recognized long before now.
13:08:00 From Heather Lynch : Keith - yes, please I didn't see anything on Hrubec in the ECHA profile for ADBAC but that is likely pre-2017
13:08:57 From Keith Hostetler : We can send, via Heather Tenney the discussion related to the 2020 review of Product Types 3 and 4 and the DART endpoints
13:09:09 From Keith Hostetler : Those are nose only forced inhalation
13:09:12 From Keith Hostetler : Yes, thanks you
13:09:32 From DAVID JONES : I have been looking for measurement of other environmental materials. Cleaning pollen, dust, etc. can cause reactions. A hard issue, but no study with no other possible asthma triggers to isolate quats.
13:19:56 From DAVID JONES : Quats start breaking down when entering sewer systems. Paper and solids neutralize them. Arnold's work shows POTW treatment efficiency increasing. The slug concern should be discussed. The math for a 5 mgd POTW slug would be an unlikely scenario as a very large volume.
13:24:08 From DAVID JONES : Can that data be specified, Motor oil? Thanks
13:25:09 From DAVID JONES : In which report? thanks
13:26:40 From Keith Hostetler : Quat properties - they do not bioaccumulate
13:29:10 From DAVID JONES : Quats are not volatile. Discharges are not in the air.
13:30:11 From Keith Hostetler : EPA Work Plan (2017), page 40, drinking water discussion is informative
13:31:14 From Aron Pollard : Wastewater treatment plants have products available to neutralize quats
13:32:28 From Keith Hostetler : Correct, very low probability of nitrosamine formation related to QACs
13:33:14 From Keith Hostetler : dust concentrations are parts per million
13:33:27 From Keith Hostetler : blood concentrations are mostly 0-10 nanomolar
13:33:52 From Keith Hostetler : Air detection in the Salamova defies the known properties of quats. VERY LOW VAPOR PRESSURE
13:34:14 From Keith Hostetler : suggests contamination of the air collection methods with other activities (spraying, for example)
13:38:31 From Keith Hostetler : concentrations of free (and bioactive) quats in surface water is very low. They bind to organic particles
13:38:53 From Keith Hostetler : Arnold work describes this in detail

13:40:39 From Keith Hostetler : Corrosive only in concentrate form
13:40:48 From Keith Hostetler : PPE is required for handling the concentrates
13:40:57 From Keith Hostetler : Many systems are automated
13:41:12 From Keith Hostetler : RTU products are NOT CORROSIVE
13:42:03 From Keith Hostetler : Handling concentrates requires PPE
13:42:12 From Keith Hostetler : Exposure is limited.
13:42:27 From DAVID JONES : Job hazard analyses, PPE and OSHA requirements protect workers. Corrosives are many ingredients. Closed loop systems prevent exposure. Ventilation removes vapors if exposed. Plants are safe. I was in them for 35 years.
13:42:28 From Keith Hostetler : Most systems are automated
13:44:05 From The Sandes : context is key with concentrated chemistries. it would be rare for almost any concentrated chemistry to not have a corrosive classification
13:44:10 From Keith Hostetler : They are required by OSHA laws to protect their employees
13:44:16 From Keith Hostetler : YES
13:44:19 From Keith Hostetler : IH program
13:44:29 From DAVID JONES : EPA requires EPA Pesticide Producing Establishment reports annually.
13:45:30 From KLittel : The Stepan 8358 is sold as a 50% or 80% to formulators who mix with other formulation chemicals, vast majority is water. The RTU products typically <0.03% active quat. Handling of the concentrates carry PPE language to protect workers.
13:51:14 From Rich Gurney (he, his) : @ David Jones -Li, Brownawell, Environ.Sci. Techno's. 2010, 44, 7561-7568. page 7567 "The only class of organic contaminants in these sediments that has been found a higher concentrations are total petroleum hydrocarbons, characterized as unresolved complex moistures consistent with the composition of used motor oil.
13:53:18 From Rich Gurney (he, his) : The additional quad I am cursorily finding in the fabric softeners in addition to ADBAC is termed "esterquat" definitely different than the two categories of QUATs we are considering
14:35:30 From christine rioux : Evidence in case reports, surveillance studies, and animal studies indicate that QACs are associated with respiratory system irritation and inflammation including those outcomes consistent with occupational asthma and work-exacerbated asthma. Epidemiologic evidence is suggestive with limitations in terms of exposure characterizations (mixtures vs individual Quats), and study population (exclusion of most vulnerable persons or distinguishing between new-onset vs prior asthma).
14:43:16 From DAVID JONES : This is a new issue, multi-drug resistance. There are documents we can share disputing that. Current theory holds antibiotics cause antibiotic resistance. Is this now up for discussion.
14:48:00 From DAVID JONES : SDSs are typically created following ANSI Z400 standard.
14:49:41 From DAVID JONES : WIll the TURA Green disinfectant actives be considered? In pure form of their ingredients, similar issues like corrosivity will arise.
14:49:55 From Denise Kmetzo : Persistence information summarized in green screen
14:52:38 From Rich Gurney (he, his) : Though QACs are removed from the previous studies relying on enrichment and isolation of QAC-liquid stream during conventional wastewater treatment via a combination of sorption to biosolids and biodegradation, these
compounds are still detected in aquatic environments, especially at higher concentrations in locations downstream of the discharge of municipal WWTP effluents and hospital and industrial (e.g., laundry and food processing) effluents. QACs compounds will increasingly enter the environment through point source pollution, land application of
biosolids, or treated municipal and industrial effluent discharges.There are three main attenuation mechanisms for QACs in the aquatic environment: photolysis, biodegradation, and sorption to suspended particles followed by sedimentation. Generally, QACs have been considered stable or relatively slow to degrade by hydrolysis, photolysis, or microbial activity.
14:52:49 From Katherine Robertson, MCTA : Don't forget to type in Rick's comments.
14:53:05 From Rich Gurney (he, his) : QACs like BACs and DADMACs have previously exhibited relatively long photolysis half-lives in aqueous and soil environments.
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Lethal toxicity of ATMACs toward rainbow trout increase with chain length and LC50-24h of 0.6-41 mg/L
14:54:21 From Rich Gurney (he, his) : Sorry. I have to go start my class. Take care everyone!