Great Lakes Binational Toxics Strategy
Integration Workgroup Meeting Summary
Chicago, Illinois

December 1, 2010

Welcome and Introductions

Allan Sommer of Battelle, facilitator for the meeting, welcomed participants to the Great Lakes Binational Toxics Strategy (GLBTS) Integration Workgroup meeting. Esther Bobet, Regional Director of Environmental Protection Operations, Environment Canada (EC), and Canadian co-chair of the GLBTS, provided introductory remarks. Esther commented on the agenda and the presentations planned for the day. Esther welcomed everyone on behalf of EC. Ted Smith of the United States Environmental Protection Agency (EPA), Great Lakes National Program Office (GLNPO), welcomed everyone to the meeting as well and noted that Gary Gulezian, Director of GLNPO, could not be present due to an illness in the family. Ted provided an update on the status of renegotiations of the Great Lakes Water Quality Agreement (GLWQA), noting that considerable progress has been made. A third plenary session in the GLWQA renegotiation process is scheduled for early next year, which will trigger another opportunity for public consultation in the spring. The governments are making steady progress in the negotiations.

Participants around the table and on the phone introduced themselves.

- Mike Murray, National Wildlife Federation (NWF), provided updates on two projects that NWF is undertaking with respect to the GLBTS:
    - 1) NWF is completing a survey of environmental non-governmental organizations' (ENGOs) engagement in Great Lakes chemicals policy work, and
    - 2) A project to develop environmental management systems (EMS) at firms in the Great Lakes region. Due to a lack of funding for pollution prevention (P2) work at present, NWF is engaging in broader toxic chemicals work.
- Carri Lohse-Hanson, Minnesota Pollution Control Agency (MPCA), reported that this year, 2010, is a chemical reduction milestone for the Lake Superior Lakewide Management Plan (LaMP), and the LaMP Chemical Committee is working on a milestones report. Carri also announced that MPCA received funding for toxic reduction projects such as removing PCBs from schools, reducing mercury, and installing drop boxes for collection of pharmaceuticals.
- John Jackson, Great Lakes United, has been involved in the GLWQA renegotiation process and in work with Lin Kaatz Chary on the Great Lakes Green Chemistry Network. John requested that the meeting include a discussion of the future of the GLBTS and how progress in renegotiating GLWQA affects the future of the GLBTS.
- Adele Iannantuono, Health Canada, is collaborating with EC on Canadian biomonitoring for chemicals of concern.
- Erin Newman, EPA Region 5, has been working with industry to reduce perfluorooctane sulfonate (PFOS) releases in electroplating.
- Alan Waffle, EC, Canadian secretariat to the GLBTS, announced that hard copies of the final GLBTS 2008-2009 Biennial Progress Report were available at the back of the room.

Chapter 9, which reports environmental monitoring results, shows the progress that has been achieved. The report also describes significant progress that has been made in remediating contaminated sediments. Alan encouraged everyone to pick up a copy and read the report. The final report will be posted online at www.binational.net.

- Ted Smith commented that much work has been accomplished under the Great Lakes Restoration Initiative (GLRI) during fiscal year 2010, with $475 million dispersed among 16 agencies and several grants. EPA is working with sister agencies on the fiscal year 2011 budget for GLRI. EPA is preparing to issue requests for proposals (RFPs) for the coming year, and a P2 category will be included.
- Anne LeHuray, Pavement Coatings Technology Council (PCTC), reported that, since the last GLBTS meeting, PCTC has raised awareness among sealcoating contractors of best management practices to reduce the environmental impacts of coal tar sealant application.

Overview of National Wildlife Federation ENGO Survey

Michael Murray presented highlights of NWF's survey of ENGOs on chemicals policy, the GLBTS, and the GLWQA. In June 2009, due to concern over diminishing ENGO involvement in the GLBTS, NWF conducted a survey of ENGOs in the Great Lakes Region with the intent of possibly engaging ENGOs further. The survey attempted to assess ENGO interest in chemicals policy and changes in their work in the recent past, whether they were previously involved in the GLBTS, and changes they would like to see in a future GLBTS-type forum, as well as desired characteristics of a revised GLWQA.

Respondents were not randomly selected but were targeted ENGOs who had previous involvement in the GLBTS or the GLWQA review process. NWF also considered Great Lakes coalitions involved in toxics work. NWF surveyed 180 groups, both U.S. and Canadian, and 73 ENGOs completed the survey. However, not all respondents answered all questions.

A variety of types of organizations responded, ranging from state or provincial to national organizations. The location of respondents represented all of the Great Lakes Basin, with significant representation from Ontario. Staffing levels among organizations responding ranged from no full time staff to more than 30. The extent of chemicals policy work was predominantly small to moderate. Approximately 10% of respondents had no significant involvement in Great Lakes chemicals policy issues.

Regarding the emphasis of chemicals policy work, ENGOs reported engaging in a significant amount of work on emerging chemicals of concern, approximately one-third of survey respondents. Nearly half of respondents reported that their chemicals policy work had remained the same over the past decade. Respondents provided various reasons for increased or decreased chemicals policy work.

Ten ENGOs who were previously involved in the GLBTS described positive aspects of the GLBTS and reasons for disengaging from the GLBTS. Positive aspects of the GLBTS included: binational, collaboration and coordination between sectors, discussion and information sharing, some progress and creative programs, and action plans/reports. Reasons for disengagement included organizations' staffing changes and travel limitations, and limited accountability and

assessment of progress in the GLBTS. Of 10 respondents, five indicated that they would engage in a GLBTS-type forum in the future.

Respondents indicated a few desired characteristics of the GLBTS that were very important or extremely important: clear and aggressive goals, objectives, and timeframe; regular and comprehensive reporting; accountability mechanisms; and evidence of (or potential) effectiveness.

A large majority of respondents were involved in GLWQA activities in some way. A majority of respondents indicated that the following characteristics of a revised GLWQA were extremely important: clear governance and accountability, including opportunities for public engagement in decision-making; and a structure that addresses emerging issues.

In summary, ENGOs remain active in Great Lakes chemicals policy work and are interested in a future GLBTS-type forum. NWF will be releasing a final report of the survey results electronically soon. Slides from the presentation are available at www.epa.gov/glnpo/bns.

Questions

1. Can we use your slides before the final report is available? What did you learn through your conversations with ENGOs that didn't get into the summary? *Response:* Please wait for the final report, which will be available in a couple of weeks. We learned from other ENGOs the importance of various characteristics of the GLBTS and GLWQA. However, the survey was not designed to obtain specific details like a focus group would. Much has been conveyed by ENGOs through other means, such as the GLWQA process, but the survey itself did not allow for a broader understanding of respondents' views.
2. Did any survey questions provide insight on respondents' views for increased accountability and reporting? *Response:* There were no specific components on that. In a few cases, respondents provided comments on their answers. In general, the survey results indicated that ENGOs liked comprehensive reporting. Comments submitted through the GLWQA process also gave some indication of desired characteristics of a renewed GLWQA.
3. For organizations focused on chemicals of emerging concern, did respondents target chemicals or groups of chemicals in particular? *Response:* The results did not provide a sense of specific chemicals, other than a few respondents who indicated specific groups of chemicals. There seems to be interest in chemicals of emerging concern generally.

Workgroup Updates & Path Forward for HCB & B(a)P, Dioxins/Furans, and PCBs

HCB/B(a)P Workgroup

Steve Rosenthal, EPA Region 5, U.S. co-chair of the HCB/B(a)P Workgroup, provided an update on workgroup activities. Steve acknowledged Tom Tseng of EC, the Canadian workgroup co-chair, who was not able to attend the meeting. Steve summarized the U.S. presentations given at the previous day's workgroup meeting.

- Emission Inventories – The most recent inventory for benzo(a)pyrene or B(a)P represents releases for 2002. Major sources of B(a)P are coke ovens and residential wood combustion. No further inventories of B(a)P have been released by the Great Lakes Commission. The workgroup may need to find another source of updated B(a)P inventory information. Hexachlorobenzene (HCB) emissions are declining. The largest source of HCB is pesticide application, followed by burning/combustion sources, and chemical facilities such as those in Louisiana and Texas.
- Todd Nettesheim, EPA GLNPO, presented data from the Integrated Atmospheric Deposition Network (IADN). B(a)P levels are higher in urban areas than rural areas, although there has been a downward trend in some urban areas like Chicago. IADN data indicate that retene, an indicator of wood smoke, is increasing in rural areas and decreasing in urban areas, corresponding to increased use of residential wood-heating devices.
- Margaret Jones, EPA Region 5, presented information on HCB in pesticides; HCB is an unintended byproduct of manufacturing. Information on pesticide ingredients is confidential, which makes it difficult to determine actual levels of HCB contained in individual pesticides. One pesticide, PCNB, has been discontinued due to contamination at a manufacturing facility.
- The largest area source of B(a)P is residential wood combustion. To achieve reductions, wood stove buy-back programs provide incentives for homeowners to purchase new, lower emitting wood stoves. The most recent program began in Dane County, WI, this past year and will provide incentives of about $800 per stove. Supplemental Environmental Projects or SEPs are another way to fund wood stove buy-back programs. An SEP uses funding from enforcement actions for environmental projects. An SEP in southern Indiana may provide funding for a wood stove buy-back project in that area. A model regulation is being developed for wood boilers to encourage municipalities to implement restrictions that limit emissions. Vermont is initiating a buy-back program for wood boilers, which cost in the range of $10,000 and make a buy-back program more challenging.
- The workgroup has discussed the issue of coal tar sealants for a few years due to scientific research showing the impact of coal tar sealants on PAHs in the environment. The workgroup reviewed recent scientific studies on the environmental impact of coal tar sealants and human exposure through household dust.
- Bruce Steiner, American Coke and Coal Chemicals Institute, gave a presentation on recent changes to the coke industry, which has suffered during the recent economic downturn. Presumably, an updated inventory would show lower B(a)P emissions from coke ovens due to lower production levels (but 2002 estimates are the most current available).
- The Midwest Clean Diesel Initiative, administered by EPA Region 5, provides grants for verified technologies that reduce diesel emissions, which are a source of B(a)P.

Shawn Michaljuk, EC, summarized the Canadian presentations given at the previous day's workgroup meeting.

- Sonya Kleywegt, Ontario Ministry of the Environment (MOE), described MOE programs with respect to HCB and B(a)P, including air regulation work, Toxics Reduction Strategy, and sewage treatment plant monitoring.

- Andrew Horsman, Ontario Tire Stewardship, described the stewardship program that manages scrap tires in Ontario. Ontario has not had any scrap tire pile fires, a source of B(a)P, in recent years.
- Victor Li, EC, provided updates on EC's residential wood combustion program, efforts to reduce household waste burning, and an investigation of coal tar sealants.

Questions

1. It is not clear why the HCB content of pesticides can be kept confidential when it is a contaminant. This should be public information. The governments are urged to change regulations (that allow pollutants to be classified as Confidential Business Information) when a chemical is a hazard to the public. The Council of Great Lakes Industries (CGLI) might avoid legal measures by talking to its industry constituents about the HCB content of pesticides. *Response:* The HCB content of pesticides is available to EPA staff with clearance in the Office of Pollution Prevention and Toxics (OPPT), but the information is difficult to obtain. Dale Phenicie of CGLI worked with industry a few years ago to obtain better estimates and report aggregated information (to avoid disclosure of confidential information). Perhaps the report that Dale prepared could be verified by staff at EPA. EPA is beginning to question many industry claims of Confidential Business Information. EPA can consider other ways of making contaminant information available or more accessible in ways that may not reflect product formulations.
2. Have you obtained a recent update on Minnesota's policy on cleaning stormwater ponds that are contaminated with PAHs? *Response:* The report by MPCA was presented at the HCB/B(a)P Workgroup meeting. The MPCA asked Minnesota cities who wish funding for cleaning stormwater ponds to issue a ban on coal tar sealants.
3. Anna Soehl, Great Lakes Commission, provided an update on efforts to release 2005 B(a)P inventory estimates. The Great Lakes Commission is focused on implementing a new database system. Anna identified some errors in the 2005 B(a)P inventory and is working to compile an accurate inventory that will provide the HCB/B(a)P Workgroup with more recent estimates than the current 2002 inventory. Anna also cautioned against comparing the 2005 inventory estimates to the 2002 inventory, as there may be new sources added to the 2005 inventory that make the two inventories considerably different. *Response:* It would be helpful to have the B(a)P data by source category as well as the broader categories of point, area, on-road, and non-road.
4. We are fortunate to have a comprehensive air emissions inventory. Suggestions for priority air contaminants would be welcome and helpful to provide to Anna of the Great Lakes Commission.

Dioxin/Furan Workgroup

Erin Newman, EPA Region 5, U.S. co-chair of the inactive Dioxin/Furan Workgroup, provided an update on dioxin issues as well as an update on levels of dioxins/furans in Ontario. Anita Wong, EC, the Canadian co-chair, was not able to attend the meeting.

Both Canada and the U.S. have met the GLBTS challenge goals for dioxins/furans. The U.S. has no new inventory of dioxin emissions. The latest inventory is for the year 2000 and indicates an

89% reduction in emissions from a 1987 baseline. Canada's most recent inventory represents dioxin/furan emissions in Ontario for the year 2008. Releases of dioxins/furans in Canada have decreased by over 90% since 1988. Household waste burning is the largest source category in Ontario, followed by land application of sewage sludge, on-road diesel vehicles, and other sources. There have been large emissions reductions in the past decade, with exception of household waste burning and diesel vehicles, which increased emissions slightly.

In Canada, compliance with Canada-wide Standards is on track, as indicated in a 2009 progress report required by the Canadian Council of Ministers of the Environment. With a few exceptions, the waste incineration, pulp and paper boiler, iron sintering, and electric arc furnace sectors have met their goals, and all municipal waste combustors are scheduled to close by the end of 2010.

EC is conducting a Dioxin Modeling Project that investigates the global dioxin/furan budget and examines pathways of dioxin/furan transport across the globe. Global modeling results show that East Asian emissions exert the strongest influence on Canadian dioxin/furan levels, particularly in Western Canada. Indian emissions have a stronger influence on U.S. dioxin/furan levels than Chinese emissions. The project is expected to be completed in spring 2011, and final project results will be available next year.

In the U.S., backyard waste burning is the largest source of dioxin/furan emissions. Reductions have been achieved from 1987 to 2000, that latest year that inventory estimates are available. EPA's Dioxin Reassessment will not be released in 2010, as previously anticipated. Issues raised by the National Academy of Sciences must be addressed by EPA before the report is released. There is much interest in the report, and completing the report remains an EPA priority.

Regarding burn barrels, outreach to local communities continues. New York passed a statewide burning rule that eliminated burn barrels, agricultural plastics burning and leaf burning; this is the most progressive regulation in the basin. Michigan is trying to make amendments that will strengthen its statewide burning rule. Agricultural plastics burning is an issue worth investigating further. Slides from the presentation are available at www.epa.gov/glnpo/bns.

Questions

1. Has there been any discussion of the potential for a new electric arc furnace in the Lake Superior Basin? *Response:* No, there has been no discussion.
2. In the U.S. inventory, medical waste incineration represents greater than 25% of emissions, but decreases have occurred since the 2000 inventory was compiled? *Response*: U.S. inventory data do not show the effect of the promulgation of Maximum Achievable Control Technology (MACT) standards for medical waste incinerators, and full implementation is not reflected in the 2000 inventory. There are no plans to update the inventory, but emissions have dropped, similar to the emissions for municipal waste combustors.
3. Many goals for reducing dioxin/furan emissions have been met, but is there discussion of setting new goals to address remaining emissions? With percentages, there is no sense of

the magnitude of releases, and lacking an inventory, we do not have data to assess the current level of emissions. *Response*: Backyard trash burning would represent over 50% of a current emissions inventory. There are no plans to compile a new inventory. EPA's 2000 inventory cost millions of dollars to compile, and funding for a future inventory is hard to come by. However, EPA's Dioxin Reassessment may spark renewed interest in reducing dioxin emissions, for example from backyard trash burning.

4. What is EPA doing to monitor new sources of dioxin/furan emissions, such as electric arc furnaces? Do you make sure that regulators who issue permits consider the GLBTS objectives? *Response*: Canada is monitoring dioxin/furan levels, but the U.S. is not. The U.S. dioxin monitoring network was shut down. There are no air emissions data, and regarding regulatory measures, nothing can move forward on the U.S. side until the Dioxin Reassessment is released.

PCB Workgroup

Brad Grams, EPA Region 5, provided an update of PCB reduction efforts. At present, the U.S. cannot provide an update of its PCB inventory; PCB data are being moved to a (RCRA) database, which will be real time and publicly available for searching. The new database will include updated information on PCB capacitors as well.

EPA is developing an advanced notice of proposed rulemaking (ANPR) to eliminate or reduce current authorizations for use of PCBs. It is uncertain how the new rule will affect voluntary programs, such as PCB transformer phase-outs. EPA is considering other voluntary actions for PCBs in ballast and used oil, with an emphasis on removing PCB-containing ballast from schools and government buildings.

Ken De, EC, the Canadian co-chair of the PCB Workgroup provided an update on Canada's PCB regulation that was published in 2008. EC is continuing voluntary outreach activities to promote compliance; 14 workshops were held in Ontario, but additional sessions are needed to inform PCB owners of EC's online PCB reporting system. Recently, EC held a two-day meeting to address outstanding PCB issues and focus on the work plan for the coming year. EC has implemented the online PCB reporting system but has not developed the software to download data from the online system. EC enforcement officers are pursuing non-compliance issues. Canada has removed large numbers of in-service PCBs, which will help to meet or exceed the Canadian GLBTS goal for PCBs. Canada now uses the same definition of high-level PCBs (>500 ppm) as the U.S.

Questions

1. With EPA's push to eliminate sources of PCBs, are there plans to offer resources for understanding available substitutes and alternatives? It would be helpful if information on available substitutes and alternatives were built into EPA's plans. *Response:* PCBs have been banned for many years, and there are numerous alternatives available, which are more economical than PCBs. The issue is replacing equipment in operation that has service life remaining. For PCB ballast, it is an issue of insufficient resources to replace. Alternatives for PCB ballast are readily available and more energy-efficient. Additional

outreach and education are needed to convey the importance of replacing outdated PCB ballast with newer alternatives.

2. When will EC have downloaded data available from its online PCB reporting system? *Response:* It depends on resources available within EC. Ken is manually entering data from the system into a spreadsheet to analyze and share. Interested users can request that EC headquarters include them as users of the data to receive information when it becomes available.

Update on U.S. Action Plans

Brad Grams, EPA Region 5, provided an update on the management of the following priority substances in the U.S. Chemical Management Program:

- Benzidine dyes and pigments
- Nonylphenol (NP) and nonylphenol ethoxylates (NPEs)
- HBCD (hexabromocyclo dodecane)
- Siloxanes (Future Action Plan under Consideration)
- Isocyanates/Diisocyanates (Future Action Plan under Consideration)

In June 2010, Brad provided an update on chemical action plans issued by EPA's Chemical Management Program. At that time, Kate McKerlie provided an update on Canada's actions for emerging contaminants of concern, and those actions remain the same. In the U.S. three new action plans have been released for benzidine dyes and pigments, nonylphenols/nonylphenol ethoxylates, and HBCD. There are plans to develop action plans for siloxanes and isocyanates/diisocyanates.

Regulatory actions for priority substances include required reporting to EPA's Toxics Release Inventory (TRI), chemical testing ("Test Rule") under the Toxic Substances Control Act (TSCA), manufacturer controls such as Significant New Use Rules (SNUR) and listing as chemicals of concern, and chemical bans or restrictions.

Voluntary actions include Design for the Environment (DfE) program actions, stewardships and phase-outs, risk management actions, green chemistry and alternatives analyses, and P2 actions.

For benzidine dyes and pigments, EPA's action plan addresses 48 dyes derived from benzidine and its congeners. The action plan focuses on products that use benzidine dyes and pigments such as textiles, paints, printing inks, paper, pharmaceuticals, laboratory reagents and biological stains. The food industry also employs benzidine dyes and pigments, and more recently, uses have been found in lasers, liquid crystal displays, ink-jet printers, and electro-optical devices. EPA is concerned due to the potential risk of exposure from using products containing benzidine, basically because of its carcinogenicity. EPA has proposed actions that are primarily regulatory, including SNURs and eliminating a SNUR exemption to address potential concerns from imported textiles. Other rulemaking actions are being considered primarily due to concerns about imported products.

NP is a concern due to its persistence, bioaccumulation potential, and toxicity. NPEs are less toxic and persistent than NP, but NPEs are highly toxic to aquatic organisms and degrade into

NP in the environment. Both NP and NPEs have been found in environmental samples. EPA is looking for more testing information. EPA has proposed regulatory and voluntary actions. Regulatory actions include a SNUR, test rule, and adding NP and NPEs to TRI reporting. Among other voluntary actions, the Textile Rental Services Association of America (TRSA) has agreed to phase-out NPEs in industrial laundry detergents, and the phase-out has already begun in coordination with EPA's DfE Safer Detergents Stewardship Initiative (SDSI) program.

HBCD is a brominated flame retardant used in expanded polystyrene foam (EPS) in consumer products and the construction industry. HBCD is widely used as an alternative to PBDEs. Exposure is a primary concern, as HBCD presents human health concerns based on animal test results (potential reproductive, developmental and neurological effects).

The action plan for HBCD proposes regulatory and voluntary actions, many of the same actions as PBDEs. These include a SNUR, rulemakings to add HBCD to the Concern List of Chemicals and to TRI, a DfE alternatives assessment for HBCD, and potentially other TSCA rulemakings to regulate HBCD.

For isocyanates/diisocyanates, EPA is working to develop a product stewardship program with industry and to integrate chemical information and training into existing programs.

EPA has requested assistance from stakeholders in pursuing additional voluntary actions, including:

1) Monitoring/surveillance of chemicals in the environment, particularly fate and transport information.
2) Health and safety testing, where information is lacking.
3) Development of green alternatives.
4) Supplemental information, such as market and product specifications (which processes need these chemicals, where product is sold, how exposures can be avoided, etc.)

Next steps for the action plans include soliciting comments and discussing potential voluntary efforts to address concerns with these toxic chemicals. Action plans are available online. Comments can be submitted to Brad or to EPA headquarters. Slides from the presentation are available at www.epa.gov/glnpo/bns.

Questions/Comments

1. The Alkylphenols & Ethoxylates Research Council has reviewed the action plan for NPE and found it deficient and containing errors. NP and NPEs are not persistent and bioaccumulative. The action plan does not reference other EPA assessments and documents for these compounds. The action plan does not acknowledge water quality criteria for NPEs. *Response*: The action plans are a roadmap for policy. They are not binding. We can discuss omissions with EPA OPPT. Omission of criteria may reflect a lack of information in many cases.
2. Will information in the action plan for benzidine dyes and pigments be included in the Buffalo River cleanup plan? Is someone helping to make that connection or to make the

appropriate parties aware that data on benzidine should be collected? *Response*: Brad can help make the connection.

3. Regarding potential voluntary actions, is EPA headquarters issuing broad solicitations for advancing the goals of the action plans? Is the GLBTS a good forum for advancing those goals? *Response*: EPA Region 5 is the only region with a full TSCA program that includes monitoring and alternative components. The GLBTS can offer suggestions through EPA Region 5 (Brad), whether they relate to phasing out a chemical or developing a green chemistry standard.
4. There is no "green chemistry standard". There is no information standard on greener chemicals and processes. Green chemistry refers to 12 principles for the design of chemical products and processes that reduce the use of hazardous substances. California has passed legislation regarding green chemistry, but it is important not to refer to a green chemistry standard. *Response*: A different standard, casually being referred to as a "green chemistry standard," is being developed by the Federal Trade Commission related to labeling and claims of "green" products.
5. Industry representatives will discuss the potential for voluntary actions with industry stakeholders. *Response*: EPA headquarters is looking to EPA Region 5 for direction on conducting monitoring and surveillance. There is value in the GLBTS and work being done in the Great Lakes region. In Canada, in the context of the CMP, affected sectors are being encouraged to initiate voluntary initiatives, similar to the request put to U.S. stakeholders.

Highlighting an Example of Industry Excellence

Graham Knowles, Vinyl Council of Canada, presented the Vinyl Council of Canada's initiation of a voluntary program for the reduction of tin stabilizers, transfer and upgrade of the program to an official Environmental Performance Agreement, and implementation experience to date.

Graham described the issues with non-pesticidal organotins in the early 2000s. Tributyl tin and other organotins were an issue due to a rapid increase in volume of use, toxicity, concerns with the use of surrogates, and rinsing of blending vessels. The Vinyl Council's approach was to maintain a dialog on organotins and to investigate the issues with compounders. Compounders are companies who handle tin stabilizer, which is added to polymers. The Vinyl Council created a guideline that covers storage, bulk tanks, totes or intermediate bulk containers and drums, handling dispensing, spill prevention and minimization, waste disposal, management systems and reporting. In 2004, the guideline was distributed to compounders to implement, and a consolidated report of implementation by 100% of compounders was provided to EC.

EC initially proposed a Memorandum of Understanding (MOU) and later an Environmental Performance Agreement as a means to continue industry's implementation and reporting, and obviate the need to consider the designation of mono and dialkyl organotins as toxic under the Canadian Environmental Protection Act (CEPA). Risk was being minimized by virtually eliminating exposure. By 2010, most compounders (30 of 32) had fully implemented the guideline. The first pilot verification of implementation was completed in December 2008. The guideline was further revised in 2006. The Environmental Performance Agreement was signed

in March 2008, the verification protocol was negotiated, with consequences for companies who do not follow the guideline, and agreed upon by summer 2008.

The verification approach is constructive, but lessons have been learned. The outcome has been compliance with the guideline, with only two facilities requiring corrective action and only minor items needing correction. The Environmental Performance Agreement has protected the aquatic environment from organotins. An additional 19 verifications must be completed.

The conclusion is that an Environmental Performance Agreement serves the purpose of managing plastic additives. Graham encouraged stakeholders to use it as a voluntary measure of addressing toxic chemicals in the Great Lakes. Slides from the presentation are available at www.epa.gov/glnpo/bns.

Questions

1. Do stabilizers tend to be metallic elements? Is the increase in the use of tins due to replacement of lead? Also, the possibility of incinerating tin waste, alluded to in the presentation, could be a pathway of contamination. *Response:* Heat stabilizers for vinyl tend to be metallic-based because that is how the chemistry works. The increase in tin is not due to a reduction in the use of lead. There has been volume growth of tin over the past 10 years. Compounders who incinerate their waste material employ waste management companies. The Environmental Performance Agreement does not require that compounders obtain letters verifying proper containment of waste. Most waste is disposed in secure landfills suitable for hazardous waste.

Report out on Emerging Chemicals Screening in Multi-Media Working Group Meeting

Beth Murphy, EPA GLNPO, provided an update on efforts to screen emerging chemicals in the Great Lakes environment. Sean Backus, EC, could not attend the meeting.

Beth described a newly formed Monitoring and Surveillance Workgroup whose goal is to establish a baseline for chemicals of emerging concern. The workgroup is currently an informal workgroup but is working toward formalization with a formal name. The workgroup is co-chaired by EPA and EC, and meets annually. Membership is limited to EPA and funded principal investigators, EC, and United States Geological Survey (USGS). Many EC and EPA monitoring and surveillance programs are represented, as well as other agency projects, such as the USGS Tributary Monitoring Program. The workgroup provides a binational forum to communicate the workplans and outcomes of programs represented by the workgroup, and seeks areas of potential cooperation, integration, and coordination. The workgroup also provides a forum for exchanging information and knowledge on potential future toxic chemicals for consideration (early warning/forecasting). Objectives of the workgroup include identifying areas for potential specific, focused studies, and identifying opportunities with the Cooperative Science and Monitoring Initiative (CSMI).

The new workgroup hopes to focus on the science and generate data for decision-making bodies, providing environmental stewardship to groups such as the GLBTS, Great Lakes Lakewide Management Plans (LaMPs), EPA OPPT, and Canada's Chemicals Management Plan (CMP).

The workgroup will make effective use of resources, both people and technology, strive for technological innovation (new methods), and coordinate technological tools (instrumentation, field equipment, and in-situ samplers). The workgroup's focus is monitoring legacy, emerged, emerging, and re-emerging chemicals in the Great Lakes environment. The workgroup will continue to coordinate monitoring and surveillance on critical substances and priority toxics, and will continue to proactively identify emerging substances as part of an early warning system. The workgroup is utilizing the CSMI rotational cycle of monitoring the Great Lakes (Lake Superior in 2011). Benefits of the CSMI include cooperation on method development, interlaboratory comparison, sample sharing, capacity building, joint publications/science integration, and partner engagement (e.g., states/province). Slides from the presentation are available at www.epa.gov/glnpo/bns.

Questions

1. Stakeholders would like to be engaged in this new workgroup. Stakeholders can be considered one of the workgroup's clients. Many monitoring programs are being undertaken, and it would be helpful if the workgroup could integrate many of these. Please incorporate more people into your conversations. *Response*: The workgroup does not intend to be exclusionary but hopes to focus on the science. The workgroup is open to collaboration and communication.
2. It was suggested that a GLBTS stakeholder workgroup be formed as part of a future GLBTS. Industry can be helpful in developing analytical methods, for instance. *Response*: Access to industry would surely be helpful. EPA and EC have just begun to coordinate, but this idea will be considered.
3. Do changes in the GLWQA affect this workgroup? *Response*: GLWQA may be moving toward a focus on monitoring and surveillance, but it is uncertain if the workgroup will serve the GLWQA. We hope to continue the workgroup regardless of the outcome of the GLWQA renegotiation.
4. What defines an emerging versus emerged chemical? *Response*: When a chemical is detected in environmental media, it can be considered emerged. The workgroup is using a targeted approach to monitoring chemicals in the environment. A chemical moves from emerging to emerged once it has been added to GLNPO's fish monitoring program routine analyte list.

Wastewater Treatment Update

Gary Klečka, Dow, Sonya Kleywegt, Ontario MOE, and Shirley-Anne Smyth, EC, provided an overview of how compounds of emerging concern are being quantified at wastewater treatment plants (WWTPs), the related concern about the land application of biosolids containing these compounds, and how effectively treatment technology can remove compounds of emerging concern.

International Joint Commission 2009-2011 Priority: Effectiveness of Wastewater Treatment Plants for Removal of Chemicals of Emerging Concern

Although an employee of Dow, Gary Klečka represented the Great Lakes Science Advisory Board of the International Joint Commission (IJC) and a multi-board IJC Workgroup on Chemicals of Emerging Concern (CECs). The IJC CEC Workgroup was charged by the IJC with assessing the performance of WWTPs for removal of CECs, by examining a subset of the WWTPs in the Great Lakes Basin to provide a sampling of information, and by conducting a literature review of the effectiveness of CEC removal technologies to provide information on additional enhancements that might be possible for WWTP upgrades. The IJC CEC Workgroup was also charged with assessing the human and ecosystem health effects of CECs; Ted Smith will address the latter charge. Ted and Gary are co-chairs of the IJC CEC Workgroup. Several team members and a few consultants are helping to interpret data.

The IJC CEC Workgroup's approach was first to develop an inventory of WWTP facilities that discharge into the Great Lakes Basin, and then to develop a survey of operating parameters for selected facilities. The workgroup also conducted a literature search of the effectiveness of CEC removal technologies, and performed an analysis of field studies of the performance of full-scale facilities. A report to the IJC is due in June 2011.

Deliverables generated by the effort include databases of U.S. and Canadian municipal WWTPs, a map illustrating facility locations, and summary statistics of facility by type of treatment.

The Canadian database includes 470 total facilities in Ontario, not including WWTPs operated by First Nations and industrial facilities. Sixty percent of Canadian facilities inventoried provide secondary or tertiary treatment. Secondary treatment plants are typical of larger communities. All cities with a population greater than 100,000 employ secondary treatment, typically with chlorine disinfection.

In the U.S., a total of 1,595 facilities have been identified to date in the eight states bordering the Great Lakes. The database is currently a draft in progress, and the treatment types of 376 facilities have yet to be assigned. Development of a map illustrating facility locations is also a work in progress.

Through a survey of 33 facilities selected on the basis of geographic distribution, size, facility type, hydraulic loading, and disinfection technology, operating parameters were obtained from 25 facilities. Activated sludge was the most common secondary treatment technology used by the facilities surveyed (17 plants). Biological fixed-film technology was the second most common technology (4 plants). Solids residence time (SRT) is a critical parameter that affects CEC removal (i.e., CECs that are biodegradable). High SRT is associated high CEC removal. It is expensive to operate at higher residence times. However, advanced technologies may not always be required to achieve high removal of CECs. Biological nutrient removal systems often remove some CECs more efficiently than activated sludge systems that are operated at lower SRTs.

Through a literature search of the effectiveness of CEC removal technologies, the workgroup is looking for proven technologies using a weight of evidence approach to the analysis and interpretation of results, considering physical-chemical properties, biodegradability, laboratory studies under controlled conditions, pilot plant results, and full-scale observations. Over 700 citations were obtained through the search. The literature references address approximately 288 different CECs. The analysis of the effectiveness of CEC removal technologies has not been completed.

An analysis of field studies of facility performance at full-scale facilities (not necessarily in the basin) is also being conducted. Numerous reports are being collected and combined with a weight of evidence approach. The information collected will be integrated into a final report that summarizes all of the workgroup's efforts described above. The final report will be submitted to the IJC by June 2011. Slides from the presentation are available at www.epa.gov/glnpo/bns.

Questions

1. Do you know if the activated carbon beds at Niagara Falls New York plant have proven effective? Will that analysis be part of the report? *Response*: It is not certain whether the analysis will only look at the effectiveness of treatment technologies for removing CECs or whether it will look at the effectiveness of specific plants. The survey of 25 facilities was to obtain detailed information on the types of technologies and how facilities were operating, and there was quite a range of operating parameters. The goal is to determine which technologies are likely to be effective and how to optimize operating conditions for those technologies, including activated carbon beds.
2. What is the difference in the definitions of advanced and second or tertiary treatment? *Response*: The terminology was self-reported by WWTP operators, but secondary treatment traditionally refers to activated sludge. Advanced treatment includes membrane bioreactors, biological nutrient removal, or any alternative biological technology such as activated carbon, reverse osmosis, or ozonation. Tertiary treatment is sand filtration or similar technologies.
3. What are the plans for disseminating the report that is submitted to the IJC? *Response*: The report to the IJC will be a high-level report that is restricted to 10-20 pages. The final report will be shared with the public, and findings will be published by investigators in scientific journals.
4. Are there CECs that are not susceptible to biodegradation? If so, what are they and how can they be addressed? *Response*: Yes, there are chemicals that are not biodegradable, such as PBDEs. There are multiple mechanisms, in addition to biodegradation, for removing chemicals from WWTPs. Absorption to biosolids is one way to achieve removal if a compound is not biodegradable, and there are options for photodegradation to remove chemicals from biosolids (e.g., before land application). Ozonation and volatilization will also remove compounds. Various mechanisms are being taken into account.
5. Do we understand by volume what is being discharged? What else do we know about the facilities inventories? For example, are data being collected on the problem of combined sewer overflows (CSOs)? *Response*: Of the overall mass of wastewater treated in the basin, over 80% comes from large municipalities, and there are smaller municipalities

with lesser levels of treatment releasing a smaller volume of water, but we cannot obtain detailed information without sampling those smaller facilities. Due to resources, we cannot collect data on CSOs, although it is an important problem to address. Our project will give us insight into the likelihood of removal of CECs from WWTPs. It will provide general information about the effectiveness of removal of CECs. Specific facility information can only be obtained by collecting data on influent/effluent at a facility over a period of time. Some studies of specific facilities are being conducted, and in general, the findings are common. There is also the problem of analytical methods (reliability and availability) and adequate detection limits. There is need for improvement.

6. Will the final report include recommendations for WWTP facilities to improve the removal of CECs? *Response*: Yes, we plan to include such recommendations in the final report.
7. Will there be additional work to analyze the two groups that were not represented in the analysis, particularly industrial plants (steel plants) that have in-house treatment plants and account for a large release into the lakes? *Response*: It could be an opportunity for a 2011-2013 IJC priority cycle. The IJC's charge to the IJC CEC Workgroup was to look at a sampling of facilities to provide information which might be derived if a more fulsome evaluation was undertaken. The problem of CECs will likely be the focus of further investigation well into the future.

Ontario Ministry of the Environment Sewage Treatment Plant (STP) Studies

Sonya Kleywegt, Ontario MOE, has been involved with three major initiatives related to sewage treatment plants (STPs) in Ontario: a survey of STPs, a literature review of treatment technologies, and a study of treatment, chemistry and toxicity. In the survey of STPs, MOE monitored 48 STPs in Ontario for influent and effluent from 2004 to 2005. The sites monitored represent 70% of Ontario STP discharges.

Chemical analyses conducted on samples of influent, effluent, sludge, and leachate included 13 conventional contaminants and a number of non-conventional contaminants. Typically, more compounds were detected at STPs with greater levels of treatment (tertiary or advanced). A greater number of chemicals were detected in sludge than in either influent or effluent. Removal of conventional contaminants increased with increasing levels of treatment. Removal of non-conventional contaminants varied by contaminant and was influenced by type of treatment and operational conditions. Acute toxicity generally declined with increasing treatment levels. Levels of ammonia (used to measure acute toxicity) in effluent contributed 94% of acute toxicity.

The second initiative was a literature review of the effectiveness of treatment technologies and operational conditions in reducing non-conventional contaminants in municipal effluents. Non-conventional contaminants included pharmaceuticals, hormones, and endocrine disrupting compounds. The results of the literature review supported the key findings of the 48-plant survey of STPs. The literature review findings suggest that the selection of treatment technologies for the removal of non-conventional contaminants should be selected on the basis of reducing targeted contaminants, reducing whole effluent toxicity (WET), and the net environmental benefit (e.g., some technologies may require additional energy consumption).

The cost of treatment increases for increasing levels of treatment, but greater levels of treatment achieve greater reduction of contaminants.

The third initiative was a multi-year treatment, chemistry and toxicity study that investigated the links among treatment, chemistry, and removal of legacy pollutants and contaminants of emerging concern. The study involved a pilot and a full-scale study of two STPs in Ontario that were both operating as nitrifying activated sludge systems. Six different sewage treatment technologies were evaluated. The preliminary findings represent 50% of the data collected. The full set of data is still being analyzed. Most industrial chemicals were detected around their method detection limits. Bisphenol A and NPEs were consistently detected in effluents. Pharmaceuticals and hormones were detected in effluents at nanogram per liter (ng/L) levels. However, ethinyl estradiol (EE2) was detected infrequently, perhaps due to limitations of the detection limit.

Next steps are to conduct further studies using influent from two full-scale STPs to analyze different types of treatment technologies, collecting data on chemistry, ecotoxicity, and biomarkers. MOE will also evaluate sludge from each treatment technology. MOE will also address the issue of land application of contaminated biosolids in collaboration with Agriculture Canada and Agri-Food Canada. Slides from the presentation are available at www.epa.gov/glnpo/bns.

Questions

1. The findings for mercury in effluent at Ontario STPs seemed higher than data previously reported on mercury levels at plants in Michigan. Can you explain why? *Response:* No, more information is needed to explain the results.
2. In the analysis of sludge in the 48 STP survey, were raw sludge samples analyzed or treated biosolids? *Response*: They were sludge, not biosolids.
3. What did the slide showing no short- or long-term ecotoxicity effects and a weak estrogenicity effect relate to? *Response*: That slide indicated the results of the full suite of six standard ecotoxicity tests at the two nitrifying plants investigated in the treatment, chemistry and toxicity study. The estrogenicity results reported were also for both plants.

Canada's Chemicals Management Plan (CMP) Wastewater Monitoring Program

Shirley-Anne Smyth, EC, described monitoring for compounds of emerging concern in Canadian municipal wastewater. The monitoring effort is being conducted as part of the CMP Wastewater Monitoring Program. One component of CMP is monitoring and surveillance to: quantify exposure levels and generate information that is needed to identify risks and inform risk management; understand the environmental fate and behavior of chemicals; and evaluate the performance of control actions. The wastewater monitoring program investigates data on legacy contaminants, emerging contaminants, and trace contaminants in wastewater effluents and residuals (solids). The data from the program will be used to determine if measures can be taken to control the release of contaminants to the environment. WWTPs were not designed to remove contaminants.

For the monitoring program, EC selected 25 WWTPs on the basis of several factors, including location, type of treatment process, volume of discharge, and other factors. For the first two years, 25 WWTPs were monitored, six of which are located on the Great Lakes. Analytes were selected on the basis of CMP risk assessment and risk management priorities, considering the availability of analytical methods and capacity, and funding resources. In the first two years, measured analytes included:

- Bisphenol A and other phenols
- Perfluorinated compounds (e.g., PFOA, PFOS)
- Brominated flame retardants (PBDEs and others)
- Nonylphenols
- Volatile methyl siloxanes
- Pharmaceuticals and personal care products
- Selected metals
- Conventional wastewater parameters

As examples of preliminary results obtained through the monitoring program, influent concentrations of PBDEs are much higher than effluent concentrations, with high percent removal of PBDEs for various types of WWTPs. For PFOA, effluent concentrations are generally higher than influent concentrations, indicating that PFOA remains in the water (in the final effluent) and does not partition to solids. The lowest concentrations of PFOA are found in raw influent for all treatment types. There are a variety of results for the various compounds monitored, and there are more data to analyze and report. Next steps are to report results to the CMP Risk Assessment and Risk Management groups, design and conduct sampling for year 3 (2011-2012), report results to participating WWTPs, and publish results in scientific journals. Slides from the presentation are available at www.epa.gov/glnpo/bns.

Questions

1. Did you also sample sludge? *Response*: Yes, raw sludge was sampled, as well as advanced treated sludge, and treated biosolids at all sites with solids treatment processes.
2. Do you expect similar results to PFOA for similar fluorinated compounds? *Response*: The results for PFOS (results not shown) are not as bad as the results presented for PFOA. There is an issue of analytical effects and other potential compounding factors.

Report out on SETAC Annual Meeting

Ted Smith, EPA GLNPO, provided information related to the development of a *Strategy for Assessing Exposure to and Effects of Toxic Substances in the Great Lakes*. This effort is the other piece of the IJC Workgroup on Chemicals of Emerging Concern. The impetus for developing a *Strategy for Assessing Exposure to and Effects of Toxic Substances in the Great Lakes* can be found in the findings and recommendations contained in the 2007-2009 report to the IJC. Some of the findings in the IJC report were reiterated in the conclusions of a Wingspread Conference that was organized by Deb Swackhamer of the University of Minnesota and held in June 2010.

Recommendations contained in the 2007-2009 report to the IJC included developing appropriate tools to adequately assess the exposures and impacts of chemicals of emerging concern in the Great Lakes Basin. Current efforts to fulfill those recommendations include:

- Enhanced surveillance of contaminants of emerging concern in air, fish, sediments, mussels, and gull eggs through the Muir-Howard screening project and the binational surveillance workgroup that Beth Murphy described previously.
- Effects-based surveillance projects being conducted by U.S. Geological Survey (bird surveillance), National Oceanic and Atmospheric Administration (Mussel Watch program), and U.S. Fish and Wildlife Service in collaboration with USGS and EPA (Early Warning System Project).
- Literature survey on effects of contaminants of emerging concern, conducted by researchers at the University of Wisconsin-Milwaukee (final report due in March 2011).
- Development of a *Strategy for Assessing Exposure to and Effects of Toxic Substances in the Great Lakes*, which is being led by the EPA Office of Research and Development.

As part of efforts to develop a strategy, EPA organized two technical sessions at the Society of Environmental Toxicology and Chemistry (SETAC) conference in November 2010. The SETAC sessions provided an overview of the Wingspread Conference and a discussion of tools, frameworks, models, and monitoring programs that are relevant to an effects-based surveillance strategy. The adverse outcome pathway (AOP) model is a conceptual framework, developed by Gary Ankley of EPA, that portrays existing knowledge concerning the linkage between a direct molecular initiating event and an adverse outcome, at a level of biological organization relevant to risk assessment. Various biomonitoring tools are needed to assess endpoints at biological levels ranging from macro-molecular interactions to population-level responses.

Next steps are to revise the draft strategy and hold an experts consultation in April 2011 to obtain input on the design of an effects-based surveillance system. As a result of the experts consultation, EPA plans to revise the draft strategy and prepare a report that is due to the IJC by June 2011. Slides from the presentation are available at www.epa.gov/glnpo/bns.

Questions

1. How will the April experts consultation be organized and how will experts be selected? *Response:* EPA has not begun to identify experts or to plan the consultation.
2. The AOP model seemed to be in development when Gary Ankley presented it at SETAC. Will it be further developed as part of your policy development? *Response*: That has yet to be determined. EPA will begin to develop the strategy and tools and then refine the AOP model iteratively. EPA does not want to wait to validate the model to begin field work, but will learn from field work to inform the model.
3. Gary Ankley has noted that other stressors, besides chemicals, impact ecological effects. Will you keep this in mind? *Response*: At a past GLBTS meeting, we heard about a multi-stressor model. This is on EPA's radar screen, among other priorities to be considered.
4. Ray Vaughan requested that EPA forward to him any information on effect-directed work.

5. Regarding the endpoints presented, what is driving a move away from regulatory endpoints to population and other endpoints? *Response*: Animal tests are very expensive. Tools and rapid assessments can provide more information with fewer resources.
6. Who is working on this project? It seems that stakeholders are not included. Industry would like to be included in the project. *Response*: The work is sanctioned by the IJC, who requested a report that addresses the charge given to the IJC CEC Workgroup, by June 2011. Ted Smith is acting as co-chair of that workgroup, but there is much overlap with work being conducted in the Great Lakes region. This is an IJC effort that takes advantage of all resources available. The GLBTS is an open forum for all stakeholders, and EPA is presenting progress on the effort in an attempt to keep stakeholders informed.

Next Steps/Agenda Planning for 2011

Esther Bobet thanked all speakers for their presentations, which indicated that progress is being made in addressing sources of contaminants of emerging concern. We hope to see further progress in the future. Esther invited participants to send ideas for other issues or areas of study for future GLBTS consideration to the GLBTS co-chairs. At present, there are no meetings of the GLBTS planned for 2011. Meetings for GLWQA early next year (2011) will inform the future of the GLBTS. The next meeting of the GLBTS may be under different circumstances, depending on the outcome of GLWQA renegotiations. The governments will inform stakeholders when information becomes available.

Discussion

1. The governments are urged to put priority on posting the meeting's presentations online. Industry is extremely interested in the work presented. The GLBTS is the only forum at which to learn about government efforts being undertaken with respect to contaminants of emerging concern. Industry requested that the governments consider convening stakeholders in a regular forum, regardless of the outcome of GLWQA negotiations. *Response:* The governments are sensitive to stakeholders' desire to convene a forum for sharing information.
2. ENGOs are frustrated with the governments' failure to post information regarding the progress of the GLWQA renegotiation process. The GLWQA website has been non-operative for 6 months or longer. Similarly, for the GLBTS, ENGOs requested that stakeholders receive regular updates on the status of the GLBTS. *Response:* The GLBTS co-chairs will relay the comment about keeping the GLQWA website up-to-date to their respective headquarters. There have been dialog and consultation with stakeholders over the past several months, with teleconferences on specific issues, and more GLWQA consultations are planned for next spring. When the governments have a clearer idea of the future of the GLBTS, a meeting will be called. There will be provisions for stakeholder engagement in a future GLBTS.

December 1, 2010, Integration Workgroup Attendees

LAST NAME	FIRST NAME	ORGANIZATION
Anscombe	Frank	US EPA, GLNPO
Bobet	Esther	Environment Canada
Brauer	Sue	US EPA, Region 5
Bugg	Sam	Shedd Aquarium
Chary	Lin Kaatz	Great Lakes Green Chemistry Network
Cooke	Marcus	CCI
Craddock	Michelle	US EPA, GLNPO
De (by phone)	Ken	Environment Canada
DeLeo (by phone)	Paul	American Cleaning Institute
Fogarty	Kendra	Canadian Consulate
Grams	Bradley	US EPA, Region 5
Guerrero	Tracy	Silicones Environmental, Health and Safety Council
Iannantuono	Adele	Health Canada
Jackson	John	Great Lakes United
Jasim (by phone)	Saad	International Joint Commission-Great Lakes Regional Office
Klečka	Gary	Dow
Kleywegt	Sonya	Ontario Ministry of the Environment
Knowles	Graham	Vinyl Council of Canada
Kubitz	Jody	Cardno ENTRIX
Kuper	George H.	Council of Great Lakes Industries
LeHuray	Anne	Pavement Coatings Technology Council
Li	Victor	Environment Canada
Lohse-Hanson (by phone)	Carri	Minnesota Pollution Control Agency
Losey (by phone)	Barbara	Alkylphenols & Ethoxylates Research Council
Michaljuk	Shawn	Environment Canada
Mitchell	Tricia	Environment Canada
Murphy	Beth	US EPA, GLNPO
Murray (by phone)	Mike	National Wildlife Federation
Nettesheim	Todd	US EPA, GLNPO
Newman	Erin	US EPA, Region 5
Patel	Rajen	US EPA, Region 5
Pelz	Oliver	BP Global Product Stewardship
Phenicie	Dale	Council of Great Lakes Industries
Phillips	Kelly	Environment Canada
Rosenthal	Steven	US EPA, Region 5
Sinovic	Sarah	Shedd Aquarium
Smith	Ted	US EPA, GLNPO
Smyth	Shirley-Anne	Environment Canada
Soehl	Anna	Great Lakes Commission
Sommer	Allan	Battelle
Spicer	Mary-Ann	Environment Canada
Steiner	Bruce	American Coke and Coal Chemicals Institute
Strader	Evelyn	Council of Great Lakes Industries

LAST NAME	FIRST NAME	ORGANIZATION
Taylor-Morgan (by phone)	Joy	Michigan Department of Natural Resources and Environment
Thomas	Amy	Battelle
Vaughan (by phone)	Ray	New York State Attorney General's Office
Waffle	Alan	Environment Canada
Winnebeck (by phone)	Kate	New York State Pollution Prevention Institute