SOLEC
Chemical Integrity Workshop

October 8. 2004
Summary

Dale K. Phenicie
SOLEC Steering Committee Member and Workshop Co-chair

Workshop Purpose

- SOLEC 2006 Theme is the Chemical Integrity of the Great Lakes Ecosystem
  - Workshop was to start the dialog regarding “chemical integrity”
  - First step was to seek definitions of “chemical integrity.”

Workshop Format

- Three senior level Great Lakes researchers with varied areas of expertise provided perspectives
  - Definition of chemical integrity
  - How to monitor for chemical integrity
  - What research is needed on chemical integrity
- Four senior level Great Lakes researchers with varied expertise provided discussion comments.
- The Workshop audience was invited to provide discussion comments.
- Discussion points were recorded for SOLEC Steering Committee use.

Speakers and Panelists

- Speakers
  - Dr. Gerald Matisoff – Case Western Reserve
  - Dr. Brian Eadie – NOAA/GLERL
  - Dr. Miriam Diamond – University of Toronto
- Panelists
  - Dr. Keith Soloman – University of Guelph
  - Dr. Murray Charlton – CCIW
  - Dr. Rob Pepin – U.S.EPA Region 5
  - Dr. Joe DePinto – LimnoTech Inc.

What Elements Define Chemical Integrity?

- Dr. Gerald Matisoff – Case Western Reserve University
  - Chemicals important because of interaction with biological function
  - There is also an link with physical integrity
  - Consideration of stressors also important – including non-natives, their impact on food wed, climatic issues, and more direct chemical issues such as sources and exposure scenarios
  - Don’t just focus on toxics – all chemicals can be toxic

What is ‘Chemical Integrity’?

“Biological Integrity is the capacity to support and maintain a balanced, integrated and adaptive biological system having the full range of elements and processes expected in a region’s natural habitat”

James R. Karr, 1991 (modified)

Chemical
~~Biological~~ Integrity is the capacity to support and maintain a balanced, integrated and adaptive biological system having the full range of elements and processes expected in a region’s natural habitat.

* Is Chemical Integrity the capacity to maintain Biological Integrity?

* What about the capacity to maintain the sustainability of human uses of the habitat?

What Elements Define Chemical Integrity?

- Missing SOLEC indicators that might help assess chemical integrity
  - Oxygen – oxygenation/depletion of ecosystem
  - Contamination – rate of progress on AOCs
  - Pathogens – confusion with chemical integrity
  - Deployment of new monitoring technologies – especially at sources
  - Use of models and risk assessment/forecasting tools

What Elements Define Chemical Integrity?

- Recognition that current chemicals of concern are declining and may need to track other substances rather than “worry” about those already on a decomposition track
- Forecasting models are needed to predict effects of biological, chemical, physical and human-induced changes on ecosystems
- Focus on assessment not monitoring and the right indicators of chemical integrity will become apparent

What Elements Define Chemical Integrity?

- Panel reactions
  - Given current chemical detectability its important to focus on significance
  - Must test and validate models – beware of false negatives
  - Must understand and account for additivity in mixtures
  - Must consider chemical impacts in relation to other substance already in the ecosystem – calcium/magnesium rations for example
  - Consider how substance came to be present in the lakes not just their presence
  - Can't just consider chemicals, must include physical and biological factors
  - View lakes as habitats and consider how chemical and biological factors effect habitats

What Elements Define Chemical Integrity?

- Panel reactions, continued
  - Models are needed to include all crosscutting factors
  - Don't just think in terms of impacts on water – chemical integrity is a multimedia issue, couple water, air and, land in assessments
- Floor discussion points
  - Just as chemical integrity affects biological integrity, the reverse is also true
  - New analytical techniques can be applied to archived samples to help fill model input data gaps
  - Broader data sets are needed for assessments – CO_2 and organic carbon for example
  - We must consider the presence of natural substances, especially in the "how clean is clean" debate
  - Toxicology information is needed – not just substance concentrations – when assessments are made
  - We must track management action results as part of the monitoring effort

Monitoring and Research Needs

- Speaker points and highlights
  - A broad range of factors must be integrated into monitoring and forecasting efforts to track chemical integrity – climate change, aging infrastructures, AOC status, rates of contaminant decline, PBTs – nutrients – “new” chemicals
  - Must consider role of “internal reservoirs” of contaminants in continuing risk scenarios
  - Out-of-basin controls are needed – the required scope of these controls must be determined if we are to work towards meaningful ecosystem improvements
  - Must understand lake dynamics – loads, sedimentation rates, media interface flux rates, temperature stratification, etc
  - Need wireless environmental observatories supporting 3D models that already exist
  - Capitalize on knowledge gained in Lake Michigan Mass Balance and apply elsewhere
  - Enhance surveys that identify and track “new chemicals” and do risk assessments for these substances

Monitoring and Research Needs

- Speaker Points and Highlights, Continued
  - To meet future needs we must recruit and retain younger Great Lakes scientists
  - When seeking the “wholeness” of ecosystem integrity societal and political complexities must be included
  - Must maintain and increase resources, funding, and planning for these future needs
  - Must have the resources to respond to multi-media, multi-issue situations we face now and in the future
  - Must improve our ability to apply science to policy making processes – learn to produce information that can’t be ignored politically
  - Monitoring programs must react to and reflect changes in our procurement practices – much resource based manufacturing is now done off-shore, changing impact vectors – now must look at transportation sources rather than manufacturing sources
  - Must recognize the limitations of risk assessment and apply precaution as needed

Monitoring and Research Needs

- Panel reactions
  - A blend of research, modeling, and monitoring is needed
  - In critical policy documents like the WQA we should use narrative standards and avoid firm endpoint that become outdated
  - Must utilize in-situ testing for better efficiency
  - Must increase NPS monitoring efforts and include these factors in models
  - Must monitor for ecosystem effects as well as substance presence
  - Must drive our actions on basis of risk assessment to focus on things that really matter
  - Must track ecosystem responses on basis of communities not individual organisms
  - Governments must improve availability of “raw” data – independent researchers must have access to this information at no cost
  - Political realities are a problem – regulatory agencies must be more proactive
  - We need a new paradigm for how science interacts with politics

Monitoring and Research Needs

- Panel reactions, continued
  - Researchers should not have to wait for politicians to ask for data and set the research agenda – scientists need to direct the resources
- Floor discussion points
  - We don't know how to deal with issues and observations that are outside of the government system
  - Need to include municipal level policy personnel in the process – they must implement it
  - Scientists ARE policy makers – how they transmit information is what is important
  - The media matters – only the "good story" gets reported
  - Education is important – why has SOLEC removed the education indicator from the suite?
  - Reporting is important – a "mixed" SOLEC ranking does nothing for us
  - SOLEC monitoring should be expanded from just mid-lake to shore and tributary mouths

Monitoring and Research Needs

- Floor discussion points, continued
  - Any new WQA Annex 1 standards should be based on a GLI style process – use formula to calculate standards and avoid being instantly out of date
  - Apply GLI standards to tribs as well as lakes
  - How do we maintain scientific objectivity and build consensus?
  - Should scientists be objective?
  - Scientists should build bridges and consensus with the public
  - When looking at chemical integrity look at – rates of change, natural conditions or concentrations, biological conditions and freedom from manmade chemicals, ecosystem form and function in light of human uses and presence, sustainability of human uses

Next Steps

- SOLEC Steering Committee meets December 6, 2004 to start the planning process for SOLEC 2006

Acknowledgements

- Co-chairs
  - Ted Smith – GLNPO
  - Jim Smith – EC Ontario Section
- SOLEC Co-chairs
  - Harvey Shear – EC Ontario Section
  - Paul Horvatin – GLNPO
- SOLEC staff
  - Nancy Stadler-Salt – EC Ontario Section
  - Paul Bertrand – GLNPO
  - Beth Murphy - GLNPO