

## Frequently Asked Questions on the Recommendation to Remove the Degradation of Benthos Beneficial Use Impairment on the U.S. Side of the St. Clair River Area of Concern

Q. What are Lowest Effect Level (LEL) and Severe Effect Level (SEL) defined as?

A. Lowest Effect Level (LEL) is the level of sediment contamination that can be tolerated by the majority of benthic organisms.” Severe Effect Level (SEL) is the level at which “pronounced disturbance of the sediment-dwelling community can be expected.” It is the “concentration that would be detrimental to the majority of the benthic community” (NOAA, 2014).

LEL and SEL are levels based on the tolerance of a specific proportion of benthic species to contaminants in the sediment. LEL is the concentration of a contaminant that is tolerated by 95% of benthic species and SEL is the concentration of a contaminant tolerated by only 5% of benthic species.

Q. What are Threshold Effect Concentration (TEC) and Probable Effect Concentration (PEC) defined as?

A. Threshold Effect Concentration (TEC) is the level “below which adverse effects on benthic dwelling organisms are not expected to occur.” Probable Effect Concentration (PEC) is the level “above which adverse effects on benthic dwelling organisms are expected to occur more often than not” (MacDonald, 2000).

TEC and PEC guidelines are derived by taking the geometric mean of similar sediment quality guidelines with the same narrative intent. For TEC, the narrative intent is concentrations of contaminations in sediment that below which no adverse impacts would be anticipated. For PEC, the narrative intent is concentrations of contaminants in sediment that above which adverse impacts would be expected to occur.

Q. What is the difference between LEL/SEL and TEC/PEC?

A. Both LEL/SEL and TEC/PEC are sediment quality screening tools known as Sediment Quality Guidelines (SQG). LEL/SELs are one set of SQGs, but there are many others. In the past, where there were at least three different sets of published SQGs for the same chemical substance, TEC/PECs were derived to unify the SQGs into a common or consensus-based value. The LEL/SEL SQG is one of the existing sets of values that was incorporated into the calculation for the TEC/PECs. MacDonald et. al. developed this method in 2000 in a paper titled “Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems.”

For sediment quality screening purposes, the consensus-based TEC/PECs are widely used, but they are one tool in the tool box. It is not uncommon to use either the consensus-based SQGs or individual SQGs or both to screen sediment quality.

Q. How can we remove the Degradation of Benthos BUI when there are areas of sediment contamination on the U.S. side of the river?

A. The levels of contamination which exist on the U.S. side of the St. Clair River are at concentrations which are equivalent to the Threshold Effect Concentrations (TEC). At this level, adverse effects are not expected to occur in benthic macroinvertebrate communities.

Q. How can we remove the Degradation of Benthos BUI when accidental spills still occur?

A. The Degradation of Benthos BUI is specific to legacy contamination of the sediments from decades of unregulated industrial processes, not accidental spills. While spills are a short-term water quality issue; they lack a severe enough volume and duration to result in a high degree of sediment contamination that would impair the benthos. Spills may still occur however; and when they do occur the appropriate regulatory agencies will provide response and handle the appropriate clean-up as deemed necessary.

When the Degradation of Benthos BUI was found to be impaired, it was specific to the legacy contamination on the Canadian side of the St. Clair River; no impairment was found on the U.S. side of the river. A recent review of all available data on the U.S. side confirms that, while the sediment is not pristine, is it also not impacted enough to require any action be taken either in the form of additional sediment characterization or sediment remediation.

Q. Are heavy metals transported from their source to the downstream areas and throughout the St. Clair River?

A. There will be some transport and settling out of suspended sediments and metals in slack water areas throughout the St. Clair River system. In 2011, Szalinska found that due to the high velocities, sediment settling will be limited to a few slack water areas along the St. Clair River and that the distribution of metals and other contaminants are not a problem in the river. Szalinska also suggested that contamination may be found in the St. Clair River delta area or in Lake St. Clair due to the high velocities. However, based on the review of current data, accumulation of heavy metals or other contaminants in the slack water areas or in the delta along the U.S. side of the channel has not been detected.

Q. What monitoring or other regulation will occur to ensure the sediments of the St. Clair River will not become degraded in the future?

A. Degraded benthos in the St. Clair River was caused by decades of unregulated point source discharges. Since the promulgation of the Clean Water Act in 1977, the levels of contaminants discharged to the river have dropped significantly. Anyone discharging or proposing to discharge waste or wastewater into the surface waters of the State is required by law to obtain a National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit program is intended to control direct discharge into the surface waters of the State by imposing effluent limits and other conditions necessary to meet State and Federal requirements. Monitoring results are submitted to the Michigan DEQ for review and compliance determination and yearly inspections are performed by Michigan DEQ staff at major facilities to ensure compliance with NPDES permits.

Q. Who is responsible for ensuring that existing industrial and municipal facilities currently discharging to the U.S. side of the St. Clair River are in compliance with their permits?

A. The Michigan Department of Environmental Quality (DEQ) has regulatory authority to ensure compliance with Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act (NREPA), Public Act 451 of 1994, as amended. Part 31 provides the Michigan DEQ with the authority to issue permits, promulgate regulations, establish standards, conduct monitoring and inspection activities, pursue enforcement action, and engage in research in order to protect and conserve the water resources of the State of Michigan.

Major facilities, in particular, are regulated under their National Pollutant Discharge Elimination System (NPDES) permits. These permits have monitoring and reporting requirements, as well as yearly inspections to ensure compliance with the discharge levels required by the permits.

Q. How are existing industrial and municipal facilities regulated on the Canadian side of the St. Clair River?

The degradation of sediment quality and of the Benthos BUI on the St. Clair River is considered to be impaired due to historic unregulated industrial discharges on the Canadian side of the river and the resulting contaminated sediments.

The existing facilities that continue to operate on the Canadian side of the St. Clair River are now regulated by the Ontario Ministry of the Environment (OMOE) under the Ontario Environment Protection Act (OEPA). Discharge limits are controlled through the Ontario Municipal and Industrial Strategy for Abatement (MISA) program which provides nine sector specific regulations for managing contaminants in industrial discharges. In Sarnia, the industries abide by the MISA organic chemical manufacturing and petroleum sector regulations (Ontario Regulation 63/95 and 537/93 respectively). Limits on municipal discharges are set using specific environmental compliance approvals formerly referred to as certificates of approval.

Now that these point sources have been eliminated or controlled, the Canadians are working to clean up the identified areas of contaminated sediment. Once the sediment cleanup project is completed, the Degradation of Benthos BUI will be assessed on the Canadian side of the river.

Q. How can we remove the Degradation of Benthos BUI when there are still major industrial and municipal facilities continuing to operate on the St. Clair River?

A. Industrial operations are not unique to Areas of Concern (AOC) such as the St. Clair River. The intent of the review of the Degradation of Benthos BUI is to look at whether there is long-term legacy contamination after decades of unregulated industrial activity. Today, the facilities that continue to operate on the St. Clair River are regulated under current permits which are enforced by various regulatory agencies such as the Department of Environmental Quality (DEQ).

The goal of the Area of Concern (AOC) program in looking at the Degradation of Benthos BUI is to address the worst contamination in the Great Lakes. The review of all available data on the sediments of the St. Clair River shows that, while the sediment is not pristine, there are no sites on the U.S. side that have been identified at levels which would require sediment remediation or further sediment characterization.

Q. What are legacy pollutants?

A. Legacy pollutants are contaminants that remain in the environment due to past uncontrolled discharges from industrial and municipal facilities. These chemicals may still be found in the sediment even after years of regulatory control. “Legacy pollutants are often very persistent in the environment; they can be hard to break down and often are not soluble in water” (Ali & Sreekrishnan, 2001). These qualities can make them hazardous to plant, animal, and human health. In rivers, legacy pollutants are mostly found in the sediments.

Q. How can we remove the Degradation of Benthos BUI when there are still major industrial and municipal facilities that may not be in compliance with their existing permits?

A. The removal of the Degradation of Benthos BUI is related to legacy contamination of the sediments in the St. Clair River, not from current compliance issues. Current major facilities operating on the U.S. side of the St. Clair River are regulated by the Michigan DEQ through the NPDES permits, and non-compliance issues with current permitting requirements are handled through the DEQ’s Water Resource Division.

## References

Ali, M. & Sreekrishnan, T.R. (2001). Aquatic toxicity from pulp and paper mill effluent: a review. *Advances in Environmental Research*, 5(2), 175-196 [doi:10.1016/S1093-0191\(00\)00055-1](https://doi.org/10.1016/S1093-0191(00)00055-1)

NOAA. "Frequently Asked Questions (FAQs) about SQuiRTs | Response.restoration.noaa.gov." *Frequently Asked Questions (FAQs) about SQuiRTs | Response.restoration.noaa.gov*. N.p., n.d. Web. 27 Feb. 2014. *(The link provided was broken and has been removed)*

MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. *Arch. Environ. Contam. Toxicol.* 39:2031

Szalinka, E., K. Drouillard, E.J. Anderson, and G.D. Haffner. Factors Influencing Contaminant Distribution in the Huron Erie Corridor Sediments. *Journal of Great Lakes Research*. 2011:37(1):132-139.