



You are here : Home > RAMP > Monitoring Approach and Components > Monitoring Components > **Sediment Quality**

RAMP

RIVER

PEOPLE

RESOURCES

ENVIRONMENTAL MANAGEMENT

Sediment Quality

Depositional areas of waterbodies—including lakes and low gradient, slow-moving sections of rivers—can accumulate sediments over time. Monitoring the chemical content and physical composition of these sediments provides information on how the environment is changing and the natural or human factors that may be linked to environmental change. Sediment quality is an important aspect of aquatic ecosystems, as it can influence the quality of overlying waters and also supports the benthic community. Sediment quality is monitored by RAMP in conjunction with the Benthic Invertebrate component to provide supporting data for interpretation of benthic invertebrate monitoring results.

The **objectives** of the RAMP Sediment Quality component are to:

1. Collect data to characterize the natural variability of sediments in the Athabasca oil sands region, assess predictions documented in EIAs, and meet monitoring requirements of regulatory approvals.
2. Provide supporting information to facilitate interpretation of data from other RAMP components, including Benthic Invertebrates, Climate and Hydrology, and Fish.
3. Identify potential changes in sediment quality that may be indicative of environmental change and chemical inputs from point or non-point sources.



Source: Hatfield Consultants 2009
(click to enlarge)

Sediment samples are collected in the fall from the most downstream sampling location in each depositional river reach sampled for benthic invertebrates, and from each of the lakes and wetlands sampled for benthic invertebrates. Sediment samples are submitted to analytical laboratories for analysis of the following variables:

- Physical variables—% sand, silt, and clay.
- Carbon content—total inorganic carbon, total organic carbon, total carbon.
- Organics—BTEX (benzene, toluene, ethylene, xylene), hydrocarbons by size class (CCME 4-fraction total hydrocarbons; C6-C10, C10-C16, C16-C34, and C34-C50), total hydrocarbons.
- Total metals.
- Target Polycyclic Aromatic Hydrocarbons (PAHs).
- Alkylated PAHs.
- Toxicity—survival and growth of the amphipod *Hyalella azteca* and survival and growth of *Chironomus tentans* midge larvae.

For a complete list of metals and PAHs analyzed, please refer to the relevant section of the RAMP Technical Design and Rationale report and the annual RAMP technical reports (see [Monitoring Results](#)).

The analysis of sediment quality data focuses on key measurement endpoints (i.e., specific sediment quality variables) that have been identified as significant by oil sands EIAs, of special concern or interest in the oil sands region, or of significance to other RAMP components. The key **measurement endpoints** include:

- **Particle size distribution (clay, silt and sand):** sediment particle size is an indicator of depositional habitat, and an important factor affecting organic chemical sorption;
- **Total organic carbon:** an indicator of organic matter in sediment, including hydrocarbons;
- **Total hydrocarbons (CCME fractions):** indicators of the total hydrocarbon content of sediments, with each indicator (fraction) capturing hydrocarbon compounds of different molecular weights (specifically, number of carbon atoms);
- **PAH measurement endpoints:** including total low- and high-molecular weight PAHs, total PAHs, naphthalene, total dibenzothiophenes, retene, and predicted PAH toxicity, to provide an indication of PAH content, potential toxicity, and potential sources of PAHs;
- **Total arsenic and other metals:** arsenic is a metal of concern to some stakeholders, while other metals may exceed guidelines established for the protection of aquatic life;
- **Sublethal toxicity:** sublethal toxic effects of sediment on the survival and growth of the amphipod (seed-shrimp) *Hyalella azteca* or the midge *Chironomus tentans*.

Sediment quality is assessed by comparing measured results to historical, pre-development, and regional baseline values to identify any changes that have occurred and to identify stations with sediment quality that is outside the range of natural variability. The relationship between sediment quality and benthic invertebrate measurement endpoints is assessed using statistical correlation

analysis to identify those habitat features that consistently affect benthic invertebrate community composition.

For more general information on sediment quality, visit the [Water and Sediment Quality](#) module.

Next page: Fish Populations ►

[Website Terms Of Use](#)