

Characterization of PAHs at the Ekati Diamond Mine Using Passive Membrane Samplers

Collaborative Project between Client (Ekati Diamond Mine, Environmental Scientist and Technical Laboratory.

Stephanie Nabess, M.Sc., R.P.Bio (Project Owner)

- Study design, field sampling, data analysis and reporting (M.Sc. Thesis project, Royal Roads University)

Heather Lord, Ph.D (Lead Member Organization: Maxxam Analytics)

- Passive sampler modelling, sampler fabrication and design, laboratory preparation and analysis, technical guidance

EMA of BC Awards Gala

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Project Overview - Problem

Diamond Mine in NWT (since 1992), with operations located in pristine environment surrounded by lakes populated with high value fish species (Lake Trout and Arctic Grayling)

Extensive aquatic effects monitoring program has recently detected:

- low levels of dioxins and furans in lake bed sediments
- undetermined hydrocarbons in fish tissue
- low levels of PAHs at in some lakes and seepage sites

No obvious source of hydrocarbons at mine site.



Sampling Program

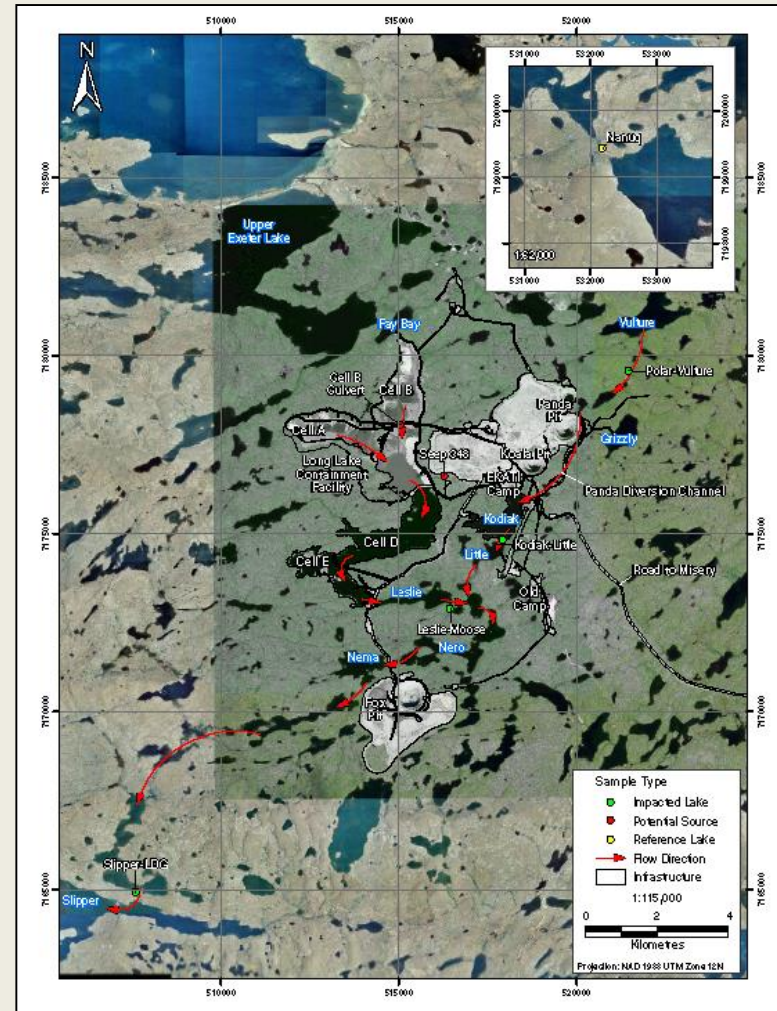
Study challenges:

- Short sampling season (3 months open water)
- Inability to conduct large scale lethal sampling
- Multiple potential source locations
- Variable physical conditions between sites

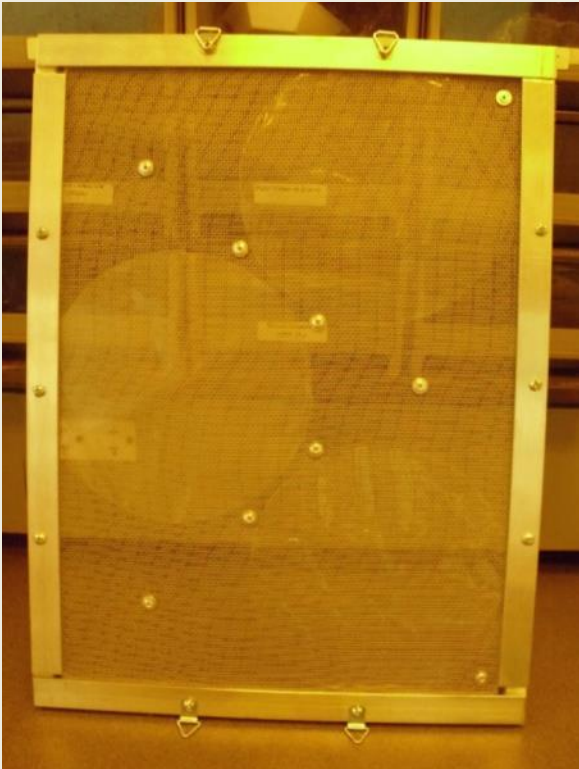
Study design included:

- Passive LDPE samplers (3x 1 month deployments)
- Sediment
- Snow
- Air emissions

All samples were analyzed for a minimum of 18 individual PAHs



Low Density Polyethylene Set-up



Customized Passive Samplers

Conditions modelled prior to program to custom develop samplers which would keep detection limits low and allow for sufficient equilibrium time for PAHs of interest

- Three LDPE circles, 15 cm diameter, 1.4, 3, 8 mil thick
- Screening protects films from damage and keeps films flat
- Support bars and fastening clips for anchoring

Parent PAH reported for all films

Alkyl PAH reported for selected films

Project Success

- Reduced field time and project costs
- Custom samplers provided robust dataset and increased viable sampling sites
- Lower detection limits compared to existing water sampling
- Successful alternative to lethal fish sampling
- Identified source of PAH contamination while concentrations were still below CCME guidelines and toxicity values

