To describe the spatial and temporal distribution of 16 parent PAHs in edible fish tissue from the Athabasca/Slave River System, Canada

INTRODUCTION

Polycyclic aromatic hydrocarbons (PAHs) are ubiquitous compounds, which originate from both natural (e.g., forest fires, natural hydrocarbon seeps) and anthropogenic sources (e.g., combustion of fossil fuels, coal burning, use of oil for cooking and heating). Their presence in the Athabasca basin is a result of a highly dynamic system with natural and anthropogenic inputs. Parts of the Athabasca River and its tributaries, which over geological time have incised into the oil sands deposits, receive natural inflows of PAHs from the McMurray Formation (Dowdeswell et al. 2010, Akre et al. 2004). The development of oil sands in the area is also a source of PAHs (Kelly et al. 2010). The main contaminants in fish tissues were collected for PAH measurement. 15 g wet mass (wm) of fish muscle was extracted for 24 hr in a Soxhlet apparatus with 250 ml dichloromethane before concentration to 0.1 ml under a stream of nitrogen. The extract was then analyzed by GC-MS using a Hewlett Packard (HP) 7890A GC fitted with 60 m, 0.25 mm i.d. DB-5 silica capillary column and a HP 7683 series autosampler in selective ion monitoring (SIM) mode.

METHODS

Fishes were collected in the summer and fall of 2011 and spring 2012 in cooperation with First Nations fishers, and regional and federal agencies. A total of 425 fishes of 5 species were collected. Bile and muscle tissues were collected for PAH measurement. 15 g wet mass (wm) of fish muscle was extracted for 24 hr in a Soxhlet apparatus with 250 ml dichloromethane before concentration to 0.1 ml under a stream of nitrogen. The extract was then analyzed by GC-MS using a Hewlett Packard (HP) 7890A GC fitted with 60 m, 0.25 mm i.d. DB-5 silica capillary column and a HP 7683 series autosampler in selective ion monitoring (SIM) mode.

RESULTS: ALKYLATED PAHs

Concentrations of PAHs in muscle of the 425 sampled fishes contained a mean concentration of 30 ng/g wet muscle. Mean concentrations for all species, locations, and species, and seasons of 2-ring, 3-ring, 4-ring, 5-ring PAHs and 6-ring PAHs were 5.8, 10.7, 7.2, 4.6 and 1.5 ng/g, wm, respectively. Concentrations of 16 PAHs in specific species collected in the vicinity of Fort McKay, varied among seasons, ranging from 11 ng/g, wm (burbot, summer) to 33 ng/g, wm (goldeye, summer) with mean of 48 ng/g, wm. Concentrations of PAHs in fishes collected in the vicinity of Fort McMurray, varied among species and season and ranged from 1.3 g/g, wm (whitefish, summer) to 33 ng/g, wm (goldeye, summer) with a mean of 13 ng/g, wm. Whitefish contained the greatest concentration at all locations and seasons with a mean of 32 ng/g, wm.

ACKNOWLEDGEMENTS

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