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Epiphytic lichens (*Usnea* spp. & *Platismatia* spp.) were used to determine spatial distribution patterns and trends of airborne mercury (Hg) and arsenic (As) at the historical Montague gold mine tailings sites in Nova Scotia. Lichens were sampled over gridded transects and analyzed for total Hg and total As concentrations, with spatial trends investigated using ArcGIS. *Usnea* accumulated higher concentrations of Hg compared to *Platismatia*, yet *Platismatia* had higher concentrations of As. This, along with differing spatial distribution patterns between Hg and As across Montague, indicated that Hg was primarily being released as a gas, with As being bound to particles. Areas of known past mining activities (i.e. mine shafts, stamp mills, Hg amalgamation sites) were identified as hotspots for both Hg and As in lichens, reflecting greater inputs of the contaminants from windblown tailings, volatilization, throughfall, and/or stemflow. Contaminated wetland and treed bog sites were also important sources of Hg to the lichens, resulting from Hg methylation/demethylation processes and seasonal drying at these sites that promote particle uplift. *Usnea* and *Platismatia* were effective Hg and As biomonitors, showing potential as air pollution monitoring tools at similar sites in Atlantic Canada. Future lichen biomonitoring studies should incorporate a sampling approach pairing two lichen genera of different morphologies to aid in understanding airborne contaminant mobility across study areas.