surface soil samples, a substantially contaminated sample from an MGP site in each city was analyzed for CSIRs. All these surface soil samples contained PAHs in a pyrogenic pattern. The PAH concentrations ranged from about 500 to 50,000 µg/kg total PAHs. Further, all of the samples appeared to be "weathered" with much lower concentrations of 2- and 3-ring PAHs than higher molecular weight compounds. The MGP site samples contained tarry residues with PAH concentrations in the many thousands of parts per million. A comparison of the PAH profiles and the CSIR values from these samples show that, for some MGP sites, CSIRs can clearly distinguish between MGP PAHs and general urban background. Further, the linear mixing properties of CSIRs provide a tool for allocating PAHs in mixed source samples.

434 PAHs in urban sediments: Forensic approaches for assessing the relative contribution of atmospheric deposition and parking lot sealants K. O'Reilly, J. Pietari, P. Boehm, Exponent

Coal tar-based pavement sealants have been suggested as an important source of PAHs in urban sediment. While this claim is based in part on similarities in the PAH chemistry of coatings and some sediment, further source apportionment is warranted. In a recent study we applied a range of forensic approaches to more than 150 environmental samples including coal tar-based products, runoff from sealed parking lots, atmospheric deposition, soils, highway runoff, and urban pond sediments. Data evaluation approaches included source ratio and double ratio comparisons, histogram pattern recognition, relative ring-class fractions, chemical correlations, and principal component analysis. Given the generic pyrogenic PAH pattern of many of the samples, some of the methods, including source ratios and chemical correlations, could not adequately distinguish the influence of the potential sources of PAHs. Pond sediments that correlated with sealants also correlated with atmospheric particles. Double ratio plots indicated a narrower range of results for sealant products compared to the environmental samples. While samples collected from roofs and roads were similar to sealants, atmospheric particles and urban sediments had the widest range of ratios, suggesting underlying sources that differ by location. Principal component analysis also suggested that there were similarities between the particles collected from sealed lots, roofs, and roads, but that these were different from urban pond sediments. Sediments were more similar to atmospheric particles than to sealant associated samples. The results indicate that sealants are not a primary source of PAHs in urban sediments. The goal of this presentation is to suggest strategies for developing site-specific approaches for assessing the relative contribution of PAH sources including atmospheric deposition and sealants. It should include both chemical and mass balance methods, and it is critical that it considers the full range of potential sources. Based on the data available, our prior study focused on the 16 PAHs classified by the EPA as priority pollutants. Methods for incorporating alkylated PAH and related heterocyclic analysis into to a source allocation effort will be discussed.

435 Influence of Sources and Land Uses on the Distribution of PAHs in Urban Stormwater Pond Sediments J.L. Crane, Minnesota Pollution Control Agency / Env. Analysis & Outcomes Div.; S.K. Hennes, Minnesota Pollution Control Agency / Environmental Analysis and Outcomes Division

The Minnesota Pollution Control Agency (MPCA) collected surficial sediment samples from fifteen stormwater ponds in the Minneapolis-St. Paul metropolitan area during October 2009 in support of coal tar legislation enacted into law in Minnesota during May 2009. Five ponds from each of the following major landscape categories were sampled: residential, commercial, and industrial land uses. Sediment samples were collected from the upper 15 cm of the sediment profile using a drop corer from three sites within each pond. Two field replicates were collected. A subsample from each site was composited together for a separate composite sample. Thus four sediment samples were obtained from each pond. All samples were analyzed for a suite of 18 metals, mercury, carcinogenic PAHs, total organic carbon, black carbon, and particle size. In addition, laser induced fluorescence (LIF) was used as a screening tool for PAHs on all samples. The composite samples were analyzed for chloride, SVOCs, 34 parent and alkylated PAHs, and several emerging contaminants. A thorough QA/QC evaluation of the data has been completed. Total PAHs34 ranged from 1.4 to 235 mg/kg dry wt. with the lowest concentration in a residential area and the highest concentration in an industrial area. As part of a preliminary analysis of the 34 parent and alkylated PAH data set, several PAH forensic techniques were used to analyze the data. The PAH double source ratio plots for the following combinations were analogous to that obtained by Mahler et al. (2005) for coal-tar sealed parking lots for a majority of stormwater sites: fluoranthene:pyrene vs. indeno[1,2,3-cd]pyrene: benzo[ghi]perylene, benzo[a]pyrene:benzo[e]pyrene vs. indeno[1,2,3-cd]pyrene: benzo[ghi]perylene, and fluoranthene:pyrene vs. benzo[a]pyrene:benzo[e]pyrene. A ratio of 14 PAHs to total PAHs34 provided the fraction of pyrogenic PAHs that ranged from 0.68 to 0.78, except for one residential site located near a freeway that had a value of 0.41. The total PAH concentrations were also compared to the LIF results using solid phase micro-extraction (SPME). Strong correlations were observed between the total PAH results and the SPME-LIF results, regardless of the number of PAHs included in the total calculation. Thus, the SPME-LIF technique may be a useful screening tool for PAHs in ponds. Additional data analyses will be conducted to assess sources of PAHs and to determine the influence of urban watershed land uses on PAH concentrations.

436 Spatial and temporal dynamics of polyaromatic hydrocarbons in river sediments. R. Proke≈°, Masaryk University / Research centre for toxic compounds in the environment RECETOX; K. Kubo≈°ová, B. Vrana, Masaryk University / Research centre for toxic compounds in the environment; K. Hilscherová, Masaryk University / Research centre for toxic compounds (RECETOX); J. Klanova, Masaryk University / RECETOX

Spatial and temporal dynamics of polyaromatic hydrocarbons (PAHs) in river sediments were a subject of the large scale study in the river shed of Morava river in the Czech Republic, the industrial area with frequent occurrence of floods. Following the studies focused on behavior of PAHs during floods (transfer of these compounds from bottom sediments to alluvial soils) and in the periods following floods (building up new burdens in sediments), the long-term study reported here was designed. Samples of river sediments from five sampling sites have been sampled for one year with the sampling period of four weeks. In addition to surficial bottom sediments, the samples of suspended material collected in the sedimentary traps, silicon rubber based passive sampler providing information on truly dissolved concentrations of chemicals of interest, and bulk water samples were taken every four weeks. All samples were analyzed not only for PAHs but a number of other legacy and emerging groups of persistent organic pollutants (POPs), they were characterized for their abiotic parameters and correlations of the POP levels with such parameters as well as with the meteorological and hydrological conditions were studied. Distribution of PAHs among the phases of aquatic ecosystem was also assessed, including spatial and temporal variability of such distribution. Such sampling design covered various seasons, temperature conditions, and hydrological situations and allowed for detail assessment of PAH behavior in highly dynamic river system. The results were further correlated with the results of toxicological assessments.

437 Assessment of PFC Compounds in Urban Stormwater Pond Sediments from the Minneapolis-St. Paul, MN Metropolitan Area J.L. Crane, Minnesota Pollution Control Agency / Env. Analysis & Outcomes Div.; S.K. Hennes, Minnesota Pollution Control Agency / Environmental Analysis and Outcomes Division

The Minnesota Pollution Control Agency (MPCA) collected surficial sediment samples from 15 stormwater ponds in the Minneapolis-St. Paul metropolitan area during October 2009 in support of recent coal tar legislation. Five ponds from each of the following major landscape categories were sampled: residential, commercial, and industrial land uses. Sediment samples (upper 15 cm) were collected from three sites within each pond. Two field replicates were collected. In addition, a subsample from each site was composited together for a separate composite sample. All samples were analyzed for a suite of 18 metals/metalloids, mercury, carcinogenic polycyclic aromatic hydrocarbons (PAHs), total organic carbon, black carbon, and particle size. In addition, laser induced fluorescence was evaluated for its effectiveness as a screening tool for PAHs. The composite samples were analyzed for chloride, semivolatile organic compounds (SVOCs), 34 PAHs, perfluorochemicals (PFCs), flame retardants (PBDEs), pyrethroids, octylphenols, nonylphenols, and nonylphenol ethoxylates. The QA/QC evaluation of all of the data from this study has been completed. The emerging contaminant data were collected to determine whether these chemicals were present at detectable concentrations and to gauge whether their presence would be of concern for disposal of

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