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PCBs IN PAINTED STRUCTURES AND ADHESIVES AND A NOVEL APPROACH TO REMEDIATION

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ABSTRACT: Polychlorinated biphenyls (PCBs) are a group of synthetic aromatic compounds that were historically used in industrial paints, caulking material and adhesives, as their properties enhanced structural integrity, reduced flammability and boosted antifungal properties. Although the United States Environmental Protection Agency (USEPA) has banned the manufacture of PCBs since 1979, they have been found in at least 500 of the 1,598 National Priorities List (Superfund) sites identified by the USEPA. Prior to the USEPA's ban on PCB production, PCBs were commonly used as additives in paints and asphaltic-based adhesives that were subsequently applied to a variety of structures. Government facilities constructed as early as 1930 utilized PCB-containing binders or PCB-containing paints, which are now leaching into the environment and posing ecological and worker health concerns. To date, no definitive in situ, non-destructive method is available for the removal of PCBs found in weathered coatings or on painted structures/equipment. The research described in this paper involves the laboratory development and field-scale deployment of a new and innovative solution for the removal and destruction of PCBs found in painted structures or within the binding or caulking material on structures. The technology incorporates a Bimetallic Treatment System (BTS) that extracts and degrades the PCBs found on the facilities, leaving the structure virtually unaltered. This paper will introduce BTS formulations that are capable of extracting PCBs in situ from painted structures and effectively degrading them via a dehalogenation process. The dechlorination process will be discussed along with potential mechanistic pathways. Factors involved in the selection of the individual components including the bi-metallic particles and the solvent continuum will be presented along with kinetic studies demonstrating degradation rates. The non-toxic BTS formulation may be applied using a "spray-on and wipe-off" process, that in the end leaves the structure relatively PCB-free. BTS has far-reaching implications to older facilities across the world; allowing them to be remediated and reused by implementing a PCB cleanup technology that removes and degrades the PCBs while on the structure. This project has been funded from the DoD Environmental Security Technical Certification Program (ESTCP) and the NASA Office of Space Flight

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