CURRENT APPROACHES TO PCB SPILL CLEANUP IN THE U.S.

John P. Woodyard, P.E.
Roy F. Weston, Inc.
Walnut Creek, California

Spill Cleanup Standards/Policies

Polychlorinated Biphenyls (PCB's) have been regulated in the U.S. since 1979 under the Toxic Substances Control Act (TSCA). While the use of PCB's have declined significantly since that time, utilities, industry and government agencies continue to phase out the productive use of PCB in electrical and mechanical applications. However, residual contamination from former use for spillage of PCB still exists, and spills occasionally occur from continued use in authorized applications.

Addressing PCB contamination from new and old spills varies according to the age of the spill and the medium contaminated. Under current U.S. Environmental Protection Agency regulations, spills occurring before 1979 are allowed to remain in place unless or until they present a risk to human health or environment. PCB spills occurring between 1979 and 1987 are regulated under TSCA and are considered "illegal disposal" requiring some action upon discovery or notification. In 1987, the EPA finally published a national PCB spill cleanup policy, designed to set more uniform standards for PCB spills of different types and in different locations. The most commonly cited standard in practice is 10 ppm PCB in soil and 10 mg/100 cm^2 on solid impervious surfaces. These two media represent the most common spill locations. EPA also set procedural standards for cleaning areas contaminated with PCB contaminated oil, focusing particularly on spills from PCB contaminated mineral oil transformers.

These standards, while representing informal policy and therefore subject to negotiation, provided a benchmark by which engineers can measure the effectiveness of selected spill cleanup and decontamination procedures.

While the age of a spill governs the applicable regulatory standards, the difference between old and new spills has a technological impact as well. Aging spills can tend to migrate further into soil, concrete, and other media, thereby complicating the cleanup and requiring the use of more thorough decontamination techniques. Absent the lack of visible traces common to a more recent spill, characterization of an older spill can be more expensive and complex.

Remedial Technology Innovations

Fundamental spill cleanup technology is well known and has been practiced for many years, typically involving the use of solvents, detergent washing, and/or excavation of soil. The primary force driving innovative spill cleanup technology development is the continuing discovery of major old spills, requiring more efficient and inexpensive removal and decontamination techniques.

The primary focus of technology innovation in spill cleanup has centered around decontamination of soils, concrete, and mechanical equipment. One notable innovation associated with all of these problems is in the spill assessment phase, where increasing sophistication has been brought to sampling and analytical procedures, data interpretation, and remedy specification. Soil sampling and treatability studies are becoming more common on large-scale spill cleanups, and sequential vertical sampling of concrete and metal surfaces is a well-developed science used in defining the most appropriate remedial technique.

The discovery and remediation of major PCB spill sites have been driven lately by increased activity in the gas pipeline industry regarding past PCB contamination condensate disposal practices, and by the growing attention paid to industrial concerns when auditing property prior to purchase. These and other factors have slowly increased the backlog of PCB contaminated soil requiring remediation and treatment, which in turn has driven the price of commercial disposal higher. Most PCB contaminated soils and sludges generated in high volumes at individual spill sites are presently disposed of using commercial TSCA permitted landfills. A variety of soil washing, dechlorination, and biological treatment techniques are being developed and offered on a commercial scale driven in part by landfill restrictions (1000 ppm) on chlorinated hydrocarbons. Few of these systems have been applied to full scale spill sites, however, except under the auspices of the EPA "Superfund" technology demonstration program.

Decontamination of industrial equipment and buildings contacted by PCB contaminated lubricants, hydraulic fluids and electrical insulating fluid over the years is of increasing concern to industry, particularly when property is being purchased for other industrial applications. A variety of fundamental, proven techniques are available for decontamination of equipment and building surfaces such as concrete, many of which have been adapted from nuclear decontamination experience. Building decontamination technologies include surface washing with detergent or solvent, paint stripping, and concrete removal to varying depths. Concrete removal in particular is seeing increased emphasis, as worker health risk assessments at manufacturing facilities more commonly recommend PCB/concrete removal.

Emerging Problems

While most of the PCB remediation technology developed over the years has been directed at electric utility problems involving small scale spills from transformers and capacitors, the expansion of the problem to other industries and the increasing scale of projects has driven the further development of new technology and the refinement of the state-of-the-art.

Concrete contamination remains one of the least understood problems in industry, and is the subject of a broad range of test cleaning projects and sampling research. Similarly, the growing discovery of PCB contaminated paint (from manufacture in many cases) has spawned some innovative thinking among remedial contractors regarding both sampling procedures and decontamination techniques. Mechanical and hydraulic paint stripping is receiving greater attention than surface washing, particularly in older manufacturing facilities and on equipment.

The gas transmission and distribution industry has recently received increased attention in the PCB area due to widespread contamination of pipeline systems and condensate from PCB compressor fluids used years ago. Past disposal practices of the condensate, as well as residual contamination of pipeline and associated facilities, has confronted industry with over 100,000 cu yds of potential PCB treatment and disposal demand as well as a variety of decontamination problems. The emergence of the gas industry as needing large scale, low cost solutions to PCB cleanup has again spawned increased research into innovative technologies for surface and soil contamination.

Standards of Practice

PCB spill cleanup was traditionally thought of as an emergency response problem, where company technicians or contractors would respond to individual spills and provide containment and cleanup services. With the rapid decline in PCB use in electrical equipment, many more recent PCB cleanup projects have centered around older, large scale decontamination problems. Coupled with the increased sophistication in site assessment and sampling procedures, the practice of PCB decontamination has become a more deliberate science, involving an ever-increasing focus on specialized site assessments and innovative specifications for remedial technologies. Consultants at the same time have become better acquainted with field procedures and sampling options, and have increased the sophistication of their specifications and project management practices. The end product of this increased sophistication is improved cost control.

One noticeable trend related to cleanup specifications is the increased use of procedural standards, or "method specifications" for cleanup. EPA's spill cleanup policy provides a performance standard (or cleanup criteria) for concentrated PCB spills, yet also provides procedural standards (double wash/rinse with detergent) for PCB contaminated oil spills. As industry's understanding of alternative technologies increases and the performance of innovative technologies such as soil washing becomes better understood, detailed method specification can indeed be developed and implemented for almost any type of project, provided the specifying engineers understand the mechanics of implementation. These more refined standards of practice, coupled with ever increasing stringency in worker protection guidelines on these types of projects, should result in a more refined U.S. and worldwide approach to PCB spill cleanup in years to come.

REFERENCES

1. Allen, Toni K. "Update on PCB Regulations." Presented at the 1987 EPRI PCB Seminar, Kansas City, Missouri. October 1987.
2. Ashby, K. "PCB Issues in Natural Gas Distribution Systems". Presented at the EPRI PCB Seminar, San Diego, October 3-6, 1989.
3. Bohnen, B. "PCB Spill Cleanup From Non-Earthen Surfaces". Presented at the EPRI PCB Seminar, San Diego, October 3-6, 1989.
4. Woodyard, J. P., et al. "PCB Management Technologies for Natural Gas Transmission and Distribution Systems." Gas Research Report (Draft) No. GRI-90/0103. May 1990.