

Pursuit of pollutants

Environmental sleuthing

An industrial waste spill in Regina points up the need for further research on the migration of pollutants through soil.



The ecological career of PCB's, or polychlorinated biphenyls, and other industrial wastes is causing increasing concern among scientists in industry and government agencies. Because they are pervasive in the environment and resistant to degradation, chlorinated hydrocarbons, including PCB's, have emerged as a special problem. Unlike many of the recently-developed industrial chemicals under scrutiny today, this chemical family has a long and distinguished history going back to the end of the last century. They were a godsend to the fledgling electrical industry as a fireproof insulating oil with high dielectric strength capable of operating safely at high temperatures. PCB's also found widespread use in such diverse products as paints and typist's copy paper. But the very characteristic that made them so valuable, their durability, proved to be a mixed blessing when the time came to dispose of used materials. Research into the effects of PCB's on the environment revealed that many years of use had left the environment permeated with low levels of the chlorinated hydrocarbons. PCB's have been detected in a wide variety of animal life, from polar bears and birds to lake trout and coho salmon.

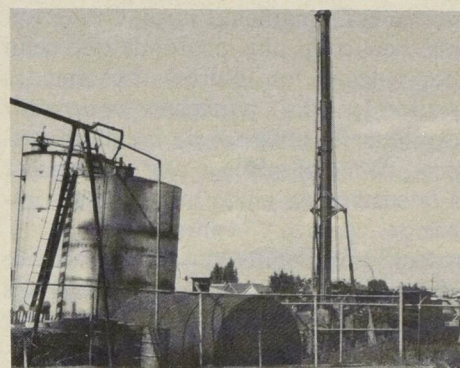
Although NRC's Environmental Secretariat and its Associate Subcommittees have surveyed and assessed the pollution caused by PCB's and other

chemicals for several years, not until two years ago was there an occasion to deal with the problem as an NRC field exercise.

In 1976, a Regina electrical equipment factory discovered a broken pipe had spilled PCB-bearing transformer oil into the ground. When people became aware of the spill, a public debate developed in the media over possible contamination of the ground water, a major source of Regina's domestic water supply. The Saskatchewan government asked NRC to help in determining the extent of the spill and the effect it might have on the city's drinking water and environment. An *Ad Hoc* Panel of scientists was convened under the chairmanship of Dr. Gordon Butler, retired director of the Division of Biological Sciences. "Such special investigations are not new to NRC," he says. "In the past, the Council has investigated 'incidents' involving aircraft accidents and building failures. Procedures exist to establish these operations. The Panel was picked to include a cross-section of scientists whose combined experiences would enable them to make the investigation and certain recommendations in a very short time."

Only the vaguest picture of the geologic structure and water movement patterns under the factory existed. Thus, an analysis of the area's geology and hydrology was one of the first priorities. Drilling rigs were used to bring up samples of soils, silts and clays overlying the bedrock and the scientists began to put together a picture of the flow of waters within the substructure. Immediately below the porous fill supporting the factory site was a layer of Regina clay. "Ordinarily, clays are good barriers to the movement of PCB's," says Dr. J.R. Roberts, a scientist in NRC's Division of Biological Sciences handling the field operations, "but we found evidence of numerous fractures in the clay bed which could permit downward migration of the pollutants."

As the flow patterns of the area were determined, the level of PCB's in the affected area was established. Determining pollutant levels accurately requires clean surroundings and careful handling. "It meant," notes Roberts,



A drilling rig operates adjacent to storage tanks on the factory site. Once containing PCB-based oils, they now hold harmless mineral oil currently in use. (Photo: J.R. Roberts, Div. of Biological Sciences)

Une installation de forage côtoie, sur l'emplacement de l'usine, des réservoirs ayant déjà contenu des huiles à base de PCB et servant maintenant à l'entreposage d'huile minérale, produit inoffensif dont on se sert actuellement. (Photo: J.R. Roberts, Division des sciences biologiques)

"maintaining the hygienic standards of a well-equipped laboratory at a field site, and commercial drilling rigs hardly fit this definition; even some of the lubricating oils used in the rigs



Drilling for soil samples on the Regina factory site reached depths of 27 m to evaluate pollutant migration. (Photo: J.R. Roberts, Div. of Biological Sciences)

À l'usine de Regina, des échantillons de sol ont été prélevés jusqu'à la profondeur de 27 m afin de déterminer la migration des polluants dans le sol. (Photo: J.R. Roberts, Division des sciences biologiques)