Transportation Committee. Both committees have jurisdiction over the superfund.

Breaux said that the liability provisions in the superfund "should be interpreted narrowly" to cover only third party damages for economic loss, not for medical injuries. Breaux said that he agreed with the Administration's proposal not to award third party damages to victims of abandoned hazardous waste sites because such claims would drain the superfund.

Fee Not A Penalty

Regarding industry assertions that the fee assessed against the petroleum and chemical industries to finance the superfund is unfair and is a "penalty" for past disposal practices, Breaux said that he does not regard the fee as a penalty, but rather as a fee on a product. He said that industry can add the fee onto the cost of its products, ultimately passing the added cost on to the consumer.

In addition, Breaux said he did not agree with industry assertions that the liability concept in the superfund is an ex post facto denial of due process.

Litigation

U.S. SUPREME COURT TO HEAR BENZENE ARGUMENTS OCTOBER 10

The U.S. Supreme Court will hear oral arguments October 10 on the validity of the Occupational Safety and Health Administration's standard governing worker exposure to benzene.

The arguments before the Court will come more than a year after the U.S. Court of Appeals for the Fifth Circuit struck down the standard on the ground that OSHA failed to show that the standard's benefits bear a "reasonable relationship" to its costs.

OSHA and the AFL-CIO, both of which are seeking to have the appeals court decision overruled, attacked the concept of balancing costs against benefits in setting an exposure level for toxic substances.

Oil producers and users who successfully challenged the standard in the Fifth Circuit Court accused OSHA of exaggerating the appeals court ruling. The producers and users insist that the court did not require OSHA to conduct an elaborate cost-benefit analysis but only that it consider a "rough but educated estimate" of benefits expected from reducing the permissible exposure level from 10 parts per million to one ppm.

The Court scheduled one and a half hours for argument of the benzene case.

Litigation

OCCIDENTAL EMPLOYEE CLAIMS DBCP CAUSED CHILD'S DEFORMITIES

An employee of the California plant which manufactured the pesticide dibromochloropropane (DBCP) filed suit against the company charging that his exposure to the chemical caused his child's deformities.

The action, filed August 28 by attorneys for Frank Arnett, an employee of Occidental Chemical Company, Lathrop, Calif., charged Occidental with "carelessly, negligently, and recklessly" failing to prevent employees' contact with DBCP, allowing Arnett to become seriously injured.

The suit asks more than $6 million in punitive damages and $2 million in compensatory damages.

According to attorney Duane Miller, the suit is the first one filed by an Occidental employee against the company itself. Worker's compensation laws prohibit a worker from suing his or her employer for work-related injuries or illnesses.

But the attorneys for Arnett said that recent evidence, which indicates Occidental knew DBCP was in the drinking water supply of the plant, but did nothing about it, provides cause for action against the firm for intentional and willful injury.

A high rate of sterility among workers at the Lathrop plant was first discovered in September 1977 and resulted in the issuance of an emergency temporary standard by the Occupational Safety and Health Administration (Current Report, September 16, 1977, p. 893).

Arnett charged in his suit that his DBCP exposure caused his sterility, which was reversed when the plant ceased manufacturing the pesticide.

The complaint was filed as an amendment to an earlier suit against several chemical companies and researchers which alleged the defendants failed to publicize their research on the harmful effects of DBCP.

Spokesmen for Occidental Chemical said they had not yet been informed of the suit, and therefore had no comment.

Hazardous Substances

CHLORINATED AROMATIC COMPOUNDS SOURCE OF DIOXINS, FURANS IN COMBUSTION PRODUCTS

Highly toxic polychlorinated dioxins and furans, found in combustion products from municipal and industrial incinerators, come primarily from burning of certain chlorinated aromatic compounds, according to European researchers.

This finding was reported by Christoffer Rappe, of the University of Umea, Sweden, and Hans-Rudolf Buser, of the Swiss Federal Research Station, Waedenswil, Switzerland, during the American Chemical Society meeting held in Washington, D.C., September 9-14.

The researchers identified chlorinated phenols, polychlorinated biphenyls (PCBs), chlorinated diphenyl ethers, and chlorinated benzenes as the major precursors of the toxic dioxins and furans.

Their findings draw attention to the possible environmental hazard from polychlorinated dibenzofurans. The furans are similar in chemical structure and toxic effects to the dioxins, but are somewhat less toxic and have received less attention from environmentalists and the public.

However, Rappe told Chemical Regulation Reporter he considers the furans to be more worrisome than the dioxins. He said the dioxins found in combustion products consist largely of the less toxic members of the dioxin family. The most toxic furan isomers, however, are major constituents of the furans found in fly ash and flue gas, Rappe said.

Rappe said one study indicates that 2,3,7,8-tetrachlorodibenzofuran (TCDF) is about one-fifth as toxic as 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), the most toxic of the dioxins.

Rappe and Buser recommended that the burning of PCBs and of chlorinated phenols, benzenes, and diphenyl ethers be carefully controlled by monitoring chlorinated dioxins and furans in fly ash and flue gases.

PCBs

The researchers said burning of commercial PCBs was found to produce a variety of chlorinated furans, with yields of between 3 and 25 percent. They said the most toxic furan,

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TCDF, was a main constituent of furans produced from PCBs.

Rappe said the pattern of isomers formed from burning PCBs showed a close match with the pattern found in fly ash samples. He concluded that uncontrolled burning of materials containing PCBs may be an important source of hazardous furans in the environment.

Chlorophenols

The researchers also said burning wood shavings impregnated with chlorophenols produced significant quantities of dioxins. They said their results suggest that chlorophenols are important precursors to dioxins found in fly ash.

This finding may have serious implications for the future status of pentachlorophenol, a common wood preservative which is currently being reviewed by the Environmental Protection Agency for possible regulatory restrictions (Current Report, May 18, p. 230).

Polychlorinated Diphenyl Ethers

The scientists also said chlorinated furans are produced from combustion of any of the various chlorinated diphenyl ethers. In addition, they said, some of the ethers also yield varying amounts of dioxins, including TCDD.

They said chlorinated benzenes were found to yield both dioxins and furans when burned, but at lower yields than the PCBs and diphenyl ethers.

Wood Preservatives

Rappe and Buser reported experiments with a variety of fire retardant chemicals. They said a number of the chemicals tested yielded dioxins or furans. One flame retardant, hexabromobiphenyl, yielded 3 to 5 percent of the most toxic furan isomer.

They recommended that halogenated phenols, biphenyls, and diphenyl ethers should not be used as flame retardants.

Chlorinated Furans Found in Fish

In a related development, David L. Stalling, of the U.S. Fish and Wildlife Service's National Fisheries Research Laboratory, reported the discovery of chlorinated dibenzofurans in fresh water fish in the central and northeastern United States.

Speaking at an ACS press conference September 10, Stalling said the furans have been detected at levels of about one part per billion in carp, catfish, coho salmon, and lake trout taken from the Connecticut, Hudson, and Ohio rivers, and from Lake Michigan.

Stalling related the finding of furans in fish to Rappe and Buser's discovery that furans are created by combustion of PCBs.

He said the furans are as much as 500 times as toxic as their PCB precursors.

Transformer fires, in locomotive or in electrical generation equipment, could cause the conversion of PCBs to the highly toxic furans, Stalling said. Use of PCBs in hydraulic systems also could cause the conversion, he added, as could low temperature incineration of PCB-contaminated industrial wastes by municipal incineration plants.

He cautioned that careful analysis and investigation should be done before any heating or incineration of PCBs is permitted.

Hudson River Lowest

Stalling said furan levels in fish taken from the Hudson River were lower than the levels found in fish from the other waterways. He said much of the PCB found in the Hudson, which is believed to contain more PCBs than any other U.S. waterway, can[illegible]om original production of the chemical rather than from its use in industrial processes.

Stalling said the level of furans in manufactured PCBs is less than one part per million.

PCBs and Dioxin

Initial interpretation of the new data showed that there is little relationship between PCBs and dioxin formation, Stalling said.

Dioxin, for example, was found in the only body of water where no furan contamination of fish was found, Stalling said.

The data presented by Stalling was found by testing 16 fish samples collected at five sites between 1970 and 1979. He said 25 to 50 more sites will be tested for furans in the coming year.

He and co-workers also hope to identify which of 135 furan isomers are present in waterways and whether they are harmful to aquatic life, Stallings said.

He said that, for the time being, people can protect themselves against consumption of furans by following advisories against consumption of fish taken from waters contaminated by PCBs.

No Dioxins From Coal-Fired Power Plant

The amount of dioxin in particulate emissions from coal-fired power plants "is so small as to escape detection with the finest scientific equipment available, U.S. researchers said at a September 13 ACS press conference.

Brenda Kimble, of the Department of Energy's Radiobiology Laboratory, and Michael L. Gross, director of the Midwest Center for Mass Spectrometry, at the University of Nebraska, described their analysis of fly ash particles collected from the stack of "a typical power plant burning low-sulfur, high-ash coal."

They said they found no dioxin at the lowest level of detection, corresponding to one millionth of a gram of TCDD from the burning of 200 tons of coal.

They contrasted their findings with results reported by the Dow Chemical Company. Dow researchers found dioxins in emissions from a wide variety of common combustion sources, including fossil-fueled power plants (August 31, p. 889). Kimble and Gross suggested that Dow's conclusions cannot be applied to all fossil-fueled power plants.

Donald Townsend of Dow, who was also present at the press conference, said the power plant tested by Dow had burned primarily fuel oil, with a small amount of coal. He said Dow had found dioxins all over the Midwest. Townsend said dioxins, including TCDD, were even found in a U.S. Bureau of Standards standardized sample of urban particulate matter.

Gross said he would not want to extrapolate his findings to all power plants, including those not burning western coal.

Buser said the European researchers had not studied emissions from coal-burning power plants, since coal is not used to generate electricity in Switzerland.

Sterility Linked by Researcher to PCBs

Functional sterility significantly correlates with the level of PCBs found in human males, according to Ralph C. Dougherty, a Florida State University (FSU) research chemist.

He said 23 percent of the males he tested were functionally sterile because their seminal fluids contained low numbers of sperm.

The lowest sperm densities were found in men with the highest levels of PCBs in their bodies, Dougherty said at a September 10 ACS session.

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Since 1974, there has been a gre... than 100 percent increase in the number of males with low sperm densities, indicating functional sterility, Dougherty said.

His research shows that PCB contamination accounts for about 25 percent of the shift toward lower sperm counts, he said, adding that he believes other toxic substances eventually will be implicated in the decline.

Dougherty said his study of 132 men at FSU showed that 23 percent were functionally sterile because they had sperm densities of less than 20 million per milliliter.

In a 1929 study, only about 7 percent of the men tested were functionally sterile, while, in 1974, about 10 percent were, Dougherty's statistics showed.

Dougherty said several identified toxic substances were found in the seminal plasma of his volunteers, but that only PCBs correlated with low sperm densities.

Among the substances found, but not tied by Dougherty to sperm density, were pentachlorophenol, hexachlorobenzene, and various metabolites of DDT.

He said some other chemicals found correlated with the low sperm densities, but that he and his coworkers were unable to identify the substances.

None of them, however, seemed to have the significant correlation which PCB had, Dougherty said.

Fertility Declining

Dougherty said median sperm density has declined from 90 million per milliliter in 1929, to 65 million per milliliter in 1974, and to 60 million per milliliter in 1979.

The most common sperm density found in volunteers, however, illustrates the steep decline in the fertility rate, Dougherty said.

Plotting the sperm densities on a graph shows that the largest number of men in the 1929 study had sperm densities of 100 million per milliliter, according to Dougherty.

In 1974, the largest number of men had a density of 60 million per milliliter, while in the 1979 study, the most common density had fallen to 20 million per milliliter, Dougherty said.

The researcher said he believes college students may have lower than normal sperm densities because of such factors as stress and sexual activity.

He added, however, that the lower densities found in his study could not be accounted for by the makeup of the study group alone.

To validate his study, he has recruited a number of workers in an electrical plant. Because these workers have been exposed to PCBs on a regular basis in their jobs, their sperm counts should confirm his findings with college students, he said.

PCBs Degrading Health

Dougherty said there is "a strong presumption" that PCBs are "responsible for degrading the health parameters of people in the United States."

Further study will show, he said, that PCBs and all of the polychlorinated aromatics are too dangerous to be used or manufactured.

Significance to Cancer Study

Dougherty said his study has major significance for detecting hazardous substances and for carcinogen detection programs.

Because it takes eight cell divisions to create a sperm, a lowered sperm count shows that something is inhibiting cell division, Dougherty said.

Most substances that slow cell division are found to be carcinogenic or mutagenic, he said.

For that reaso..., ...valuation of sperm count and seminal plasma could provide a method of correlating impeded cell division with the amounts of toxic substances in the donor, he said.

Those substances which seem to be lowering sperm count should be considered too hazardous for use and should be banned, he said.

PCBs Increasing in Great Lakes

The contamination of the Great Lakes by PCBs may continue to increase in spite of the EPA ban on further production or use of the chemicals, researchers told ACS September 11.

The researchers said the atmosphere is the major source of PCBs presently entering the lake, and therefore, the contamination cannot be prevented by eliminating municipal and industrial discharges of PCBs into the lakes.

Thomas J. Murphy, of DePaul University, Chicago, said levels of PCBs found in Great Lakes fish have declined only slightly since the early 1970s, despite a great reduction in PCB use. He contrasted this with earlier experience with DDT. He said DDT levels in fish declined rapidly after the pesticide was banned.

Present concentrations of PCBs in many fish exceed the Food and Drug Administration limit of two parts per million, Murphy said (June 29, p. 471). FDA recently stayed the new two ppm action level (August 31, p. 890).

Murphy said known pollution from municipal, industrial, and tributary sources do not seem to account for the present PCB levels in the Great Lakes. He said he and other researchers set out to determine whether fallout from the atmosphere could be an important source of PCB contamination.

They measured rates ranging from 15 to 75 grams per square kilometer per year at various points in Lake Michigan and Lake Huron. Assuming an average rate of 25 grams per square kilometer, Murphy said, the contribution of PCBs from the atmosphere would be about 3,300 pounds per year in each of the two lakes. This is greater than the contribution from all other known sources, he said.

Murphy said the PCBs in the atmosphere probably come from such sources as municipal incinerators and evaporation from landfills, from PCBs discarded in the past, and from PCBs used in paints and as preservatives.

Lake Superior

S. J. Eisenreich of the University of Minnesota reported research on PCB contamination of Lake Superior. He said atmospheric deposition from rain, particles, and PCB vapor account for over 88 percent of the total PCBs presently entering the lake.

Eisenreich estimated that 20 thousand to 23 thousand pounds of PCBs enter Lake Superior each year, while only 2,200 to 3,500 pounds are removed by outflow and sedimentation. Consequently, 16 thousand to 21 thousand pounds apparently accumulate in the lake each year, he said.

Level Has Not Peaked

Eisenreich said he believes the atmospheric contamination of Lake Superior has not yet reached its peak, although PCB production has been dropping since 1969. He said PCB-containing materials and products such as electrical equipment are being disposed of continuously. He said there is a substantial time lag between the disposal of PCBs and their appearance in the Great Lakes.

Eisenreich said the importance of atmospheric deposition as a source of PCB contamination is demonstrated by the

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presence of PCBs in small lake islands isolated from any source of direct PCB contamination.

He said fish caught in the island lakes had PCB levels as much as 100 times higher than those caught in the Great Lakes. He attributed the higher contamination levels in the island fish to the shallowness of the island lakes, which makes them more sensitive to atmospheric contamination.

Eisenreich said the Great Lakes have low sedimentation rates. PCBs which settle out of the lake water remain close to the surface of the bottom where they are available to bottom-feeding marine life, he said. He estimated that it would take about 175 years for PCBs to be buried in sediments so deeply that they cannot reenter the lake.

Chemicals and Bacteria

The presence of bacteria in drinking water increases its ability to carry pesticides and PCBs by up to 100 percent, according to John Duck, a research chemist with NUS Corporation, Pittsburgh, Pa..

While the findings mean bacteria in drinking water may pose a greater health hazard than originally thought, they also mean that bacteria could be used to remove hazardous substances from ambient water systems, the researcher said.

Duck said his research shows that the presence of bacteria in water increases the amounts of pesticides and PCBs that the water can hold.

The chemicals seem to attach themselves to the cell membranes of the bacteria and are resistant to removal, Duck said.

The implications of the study are that pesticides, PCBs, and possibly other toxic substances could be removed from drinking and ambient water supplies by passing bacteria coated plates through the water, Duck said.

The researcher said he found that bacteria form a major mode of transport for PCBs and pesticides in water environments.

Without the bacteria, the PCBs and pesticides tend to settle out of water or tend to be adsorbed, Duck said.

Bacteria, along with the attached hazardous substances, tend to remain suspended in the water and are difficult to filter out, Duck said.

He said that he found destruction of the bacteria cell had little effect on its ability to hold the hazardous substances.

The chemicals tested, aldrin and PCBs, seem to attach to the cell membrane or possibly to combine with the lipoproteins in the membrane and thus are resistant to destruction, he said.

For that reason, chlorination or other means of sterilization do "not necessarily eliminate" the potential hazard that finished drinking water supplies might contain PCBs or pesticides, Duck said.

Duck said that filtering the water may remove some of the bacteria and consequently the hazardous substances, but that more testing needs to be done before a definite judgment can be made on the efficiency of filtering.

He said further work will be done to determine the exact method by which the bacteria carry the hazardous substances and to find out the feasibility of using bacteria-laden plates or membranes to remove hazardous substances from water.

He said his study has significance because treated drinking water contains between 100 and one million microorganisms per milliliter. Those microorganisms, which are resistant to normal treatment processes, serve as convenient carriers for hazardous substances, he said.

Litigation

COURT PARTIALLY BARS CLAIM AGAINST ALLIED CHEMICAL IN KEPONE SUIT

A former officer and director of a Virginia firm which manufactured the pesticide kepone was partially barred in his attempt to collect damages for emotional distress and defamation from Allied Chemical Company, which contracted to buy the pesticide.

The U.S. District Court for the Eastern District of Virginia, in *William P. Moore v. Allied Chemical Corporation, The Travelers Indemnity Company, and Hooker Chemicals & Plastic Corporation,* determined that Moore was barred in the emotional distress claim but could proceed in his defamation suit to recover damages.

Moore's former company, Life Science Products, produced kepone purchased by Allied. At issue was whether Moore had an opportunity to litigate the matter fully during Occupational Safety and Health Review Commission proceedings following an inspection of the Life Science Products, Hopewell, Va., plant August 11 to 18, 1975.

Allied contended that admissions in the former litigation prohibited Moore from alleging that he was unaware of the full dangers of kepone and thereby pursuing his claims against Allied. Moore contended that Allied knew of the devastating physiological effects which kepone could have on his workers, but that the firm deliberately failed to warn him of these dangers, and that, consequently, he suffered severe emotional distress.

In determining that Moore was estopped on the emotional distress count, the court adopted Allied's argument. However, as to the defamation claim, the court found that the facts and issues determined in the OSAHRC proceedings were not substantively the same.

Writing for the court, Judge Calvitt Clarke, Jr., said that the truth of Allied's statements and their defamatory nature were matters to be determined at trial.

Pesticides

ROHM & HAAS ASKS EPA TO CANCEL REGISTRATIONS OF VACOR RODENTICIDE

The Rohm & Haas Company voluntarily requested that the Environmental Protection Agency cancel U.S.registrations of its rat and mouse pesticides containing the active ingredient Vacor (N-3-pyridylmethyl-N-*p*-nitrophenylurea), the agency announced September 12.

The company said it stopped sale of the rodenticides worldwide and has begun a recall of the products, according to the agency.

EPA was already in the process of reviewing the registrations of Vacor because of concerns expressed by the California Department of Food and Agriculture, which banned the rodenticide for home use March 1, the agency said.

Vacor has been the cause of several human deaths in South Korea, most classified as suicides, EPA said. California reported nine adult poisoning cases, two of which resulted in death, the agency said. California was also concerned that the packaging of Vacor products appeared to be attractive to children, according to EPA.

The products involved were sold to consumers under the name "Vacor Rat Killer" and "Vacor Rat and Mouse Killer," and to pest control operators as "DLP-787 House Mouse Killer" and "DLP 787," the agency said.

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