

CPR Research

File - PCBs - Background

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CLIENT REPORT

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FEDERAL POLLUTION POLICY ON POLYCHLORINATED BIPHENYLS

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- 3) Proposed legislation that would empower the federal government to control PCB's via restrictions on its use or distribution.

A variety of research efforts have been initiated that deal with PCB's. These have been or are being performed by the following:

- 1) Monsanto
- 2) Bureau of Foods, Food and Drug Administration
- 3) Office of Pesticides, Environmental Protection Agency
- 4) Division of Health Effects Research, Bureau of Air Pollution Sciences, Environmental Protection Agency
- 5) Division of Applied Technology, Environmental Protection Agency
- 6) Bureau of Wildlife and Sports Fisheries, Department of Interior
- 7) Office of Science and Technology, Executive Office of the President

Other offices are looking into PCB's but the above efforts represent the major federal and industrial involvement.

PCB's also constitute a threat to factory and plant workers exposed to various levels of PCB concentrations in their work environment. The Department of Labor (DOL) Occupational Safety and Health Administration (OSHA) is responsible for setting and enforcing health and safety standards. It has published (May 29 Federal Register) a long list of recommended Threshold Limit Values (TLV's) including values for PCB's as follows:

Chlorodiphenyl (42% Chlorine)- Skin 1 mg/M³*

Chlorodiphenyl (54% Chlorine)- Skin 0.5 mg/M³*

(*Approximate milligrams of particulate per cubic meter of air.)

" FEDERAL POLLUTION POLICY ON POLYCHLORINATED BIPHENYLS

I. Summary

Background

Polychlorinated biphenyls (PCB's) are rapidly becoming as well known and as widely publicized as DDT. These toxic, highly persistent chemical compounds have been shown to have effects similar to DDT in birds and fish, and hence pose a potential food-chain threat to humans. However, the fact that PCB's exist in the environment largely unintentionally and often by accident limits effective control of these substances by established routes. PCB's have been used in a number of industrial applications such as plastics production, transformers, capacitors, heat transfer systems, and hydraulic systems. They enter the environment via leakage, accidents, and upon disposal.

Status

Since PCB's are found in all parts of the environment, regulation of these substances has occurred in the following manner:

- 1) Voluntary restrictions on distribution of the substance by Monsanto, sole U.S. supplier of PCB's, trade-named Araclor.
- 2) Prohibition on the use of PCB's in pesticides by the Office of Pesticides, Environmental Protection Agency (EPA).

Additional controls on PCB's may come about through the following:

- 1) Potential control of PCB's as hazardous substances via existing air and water control authority.
- 2) Regulation of particulates and other emissions from incinerators, which will affect burning of materials containing PCB's.

Outlook

PCB's will probably be designated as "hazardous" air and water pollutants, with regulations on their emissions proposed by the Environmental Protection Agency within the next 12-21 months. However, this will only control intentional emissions of PCB's which, with the exception of incinerators and other disposal methods, have already been brought under voluntary control in most instances. PCB's, if found to be emitted as particulates from incinerators, will be regulated by EPA as of November, 1971 through a new source performance standard on incinerators. More specific PCB emission regulations on incinerators will be issued, pending toxicity studies.

It is possible that some form of legislation will be passed this Congress dealing specifically with hazardous (toxic) substances, either as specific pollutants or as parts of consumer products. Both the Administration and Senator Muskie have proposed legislation in this area. It is unlikely, however, that pending legislation to restrict PCB's specifically (H.R. 8576) will receive any action.

PCB's will continue to attract attention of environmentalists, and federal funds will probably be made available for investigating proper techniques for disposal of PCB's for increasing their degradability, for investigating appropriate industrial substitutes and for measuring and analyzing the levels of PCB's in the environment. Monsanto will face increasing public concern with PCB's as will secondary distributors of the compounds; and all industries involved in marketing PCB's will be asked to justify their activities. Additional voluntary restrictions on the distribution and use of PCB's may be made by Monsanto and its PCB customers, and more product substitutes will be introduced.

It is too early to predict complaints of "imminent danger" emanating from unions with workers exposed to PCB's in in-plant situations. One major stumbling block, apparently, is lack of adequate information and

measuring techniques in order to substantiate a complaint. However a spokesman for the Oil, Chemical and Atomic Workers, Steve Wodka, has not ruled out the possibility of union complaints to the Department of Labor on PCB's during this year.

II. Regulatory Status

Existing Controls

Monsanto: In response to discoveries of PCB's in birds, Monsanto announced in the summer of 1970 that it would "restrict sales of PCB's only to those applications where their unique fire resistance properties are important and where it is possible to control collection and regeneration or incineration of spent material." They therefore announced the following actions:

- 1) Discontinue sales of PCB's for all general plasticizer applications. - August 30th, 1970.
- 2) Phase out the PCB's as components of industrial and hydraulic fluids where control of spillage and collection of spent material is not possible--the major part of this program will be completed within six months.
- 3) Continue sales of PCB's as dielectric fluids for transformers and capacitors, cooperating with customers collecting spent and arced fluid for regeneration and/or incineration.
- 4) Continue sales of PCB's as fire resistant heat transfer fluids ensuring modification to systems designed to make provision for collection of spills and leakage. Collect spent fluid for regeneration and/or incineration.
- 5) Continue research effort to develop alternatives to the PCB's and modify PCB's to make them biodegradable in conventional secondary waste treatment facilities.

Since that time, Monsanto reports that all sales of PCB's to applications where the disposal of the end product cannot be controlled have been discontinued, and that the complete range of fire-resistant hydraulic fluids has been reformulated to exclude PCB's. Furthermore, Monsanto, though it is continuing to sell PCB's for use in closed systems applications (e.g. transformers, capacitors, and heat transfer fluids), has agreed to cooperate with its customers in control of possible emissions from these applications. They are establishing a service to collect spent fluids for return to Monsanto to be regenerated or destroyed in a specially designed, high-temperature incinerator. This service will be in operation July 1, 1971.

Office of Pesticides - Environmental Protection Agency: In 1970, partly in response to complaints raised by Congressman Ryan (D-N.Y.), the Secretary of Agriculture agreed to ban the use of PCB's in pesticides and to cancel registration for pesticides containing PCB's. However, at the time of this agreement, the use of PCB's in pesticides had been limited, and Monsanto had already agreed not to market them for these applications. No cancellations were ever issued, since the concerned pesticide (insecticide) manufacturers changed the composition of their end-product voluntarily. (Pesticide control has been transferred from the Department of Agriculture, Pesticide Research Division, to the Office of Pesticides, EPA.)

Occupational Safety and Health Administration (OSHA)-DOL: In 1970 Congress enacted the Occupational Safety and Health Act, which became effective on April 28 of this year and is jointly administered by the Department of Labor (DOL) and the Department of Health, Education and Welfare (HEW). Labor's responsibilities, now carried out by the newly organized Occupational Safety and Health Administration (OSHA) include:

- "1) Promulgation of "national consensus standards" for occupational safety and health;
- 2) Inspection of employers' establishments and records for compliance with job safety standards;
- 3) Enforcement of standards, issuance of citations and imposition of penalties where applicable;
- 4) Establishment of a system of collecting, compiling and analyzing safety and health statistics, in consultation with HEW.

In compliance with their standard setting responsibility, OSHA published (May 29) a long list of recommended Threshold Limit Values (TLV's), including limits for PCB's as follows:

Chlorodiphenyl (42% Chlorine)- Skin 1 mg/M³*

Chlorodiphenyl (54% Chlorine)- Skin 0.5 mg/M³*

(*Approximate milligrams of particulate per cubic meter of air.)

These standards become effective on February 15, 1972, though the DOL can respond to complaints threatening "imminent danger" to health or safety prior to the effective date.

HEW's function, through the new organizational unit established by the act, the National Institute for Occupational Safety and Health (NIOSH) includes authority to:

- 1) Develop plans and provide grants and contracts for research, experiments, and demonstration projects dealing with current and prospective job safety problems;
- 2) Provide criteria for identifying toxic substances for Labor's standard setting responsibilities (including annual publication of criteria);

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- "3) Set regulations for employers' measuring and recording exposure levels and establish programs for medical examinations and tests;
- 4) Provide annual lists of toxic substances; and
- 5) Provide annual reports (at least by April 1973) on industry-wide studies on the effects of exposure on employees.

As part of their duties (4), NIOSH must publish, before June 29, 1971, a generic listing of all known toxic substances. The basis for the toxic substances list is the current "Threshold Limit Values of Airborne Contaminants" list adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) for 1970. The toxicity list will probably include PCB's at the level quoted above, since the source, the ACGIH, is identical. According to Dr. Herbert Stokinger, chief of HEW's Laboratory of Toxicology and Pathology for occupational health, there is no current concern with changing the toxicity standard for PCB's. NIOSH has been testing them to establish a drinking water standard for PCB's but have decided to "shelve" the issue for the time being. NIOSH scientists consider the compounds not very toxic by mouth.

Control Options

Office of Air Programs (OAP) - EPA. The Office of Air Programs is considering the inclusion of PCB's on a list of hazardous air pollutants, which they have authority to control according to the Clean Air Act Amendments of 1970 (42 USC 1857, Sec. 112). Asbestos, beryllium and mercury were placed on the list March 31, 1971, and other pollutants such as cadmium, nickel, and PCB's will probably be designated in mid-1972, or as soon as EPA assesses their health effects. The Office of Science and Technology of OAP has convened a panel to study cadmium, arsenic and PCB's in order to determine the next hazardous substances to be designated. If PCB's are designated in 1972, EPA must propose emission standards within six months after listing. Within another six months after proposing standards, EPA must promulgate final standards. These become effective

upon promulgation for new sources and modifications of existing plants. Existing sources are not bound until 90 days after promulgation. Therefore, airborne emission standards for PCB's may be in effect by mid-1973, according to this maximum timetable.

Since PCB's are used as plasticizers, they may be released when certain plastics and other products are incinerated. Therefore, they will be controlled by EPA insofar as they are an emission from a stationary incinerator. On March 31, 1971, incinerators of more than 2,000 pounds per hour charging rate (municipal-type) were designated as a stationary source subject to standards of performance under Sec. 111 of the new Clean Air Act Amendments of 1970 (PL-604). Particulates and visible emissions will be the first incinerator pollutants to be regulated. PCB's do not burn but are vaporized and collect on particulate matter, possibly in incinerator stacks. Therefore, they will probably be regulated by EPA by the end of this year if current research shows them to be a particulate emission. By July 29, 1971, EPA must propose the particulate standard of performance for incinerators, and by October 27, 1971, the standard must be promulgated. It will then become unlawful for any owner or operator of a new source to operate in violation of the performance standard. Under the same new Clean Air Amendments (Sec. 111[d][1]) existing incinerators become liable under the new legislation to similar controls by states once the federal government establishes a new source performance standard.

By these avenues, any existing air emissions of PCB's will soon be regulated by the federal government, both as a hazardous pollutant and as an incinerator emission. However, with the exception of regulating the contents of incinerators, the continuous air emissions of PCB's probably will be voluntarily controlled before emission levels are promulgated.

Office of Water Programs (OWP)/EPA: The Oil and Hazardous Materials Division of the Office of Water Programs will probably designate PCB's as hazardous water pollutants before the end of 1971. This office has primary responsibility under Sec. 12 of the Water Pollution Control Act (33 USC 446 et seq.) for control of water-borne hazardous substances, and is charged with promulgating regulations dealing with the prevention, control and cleanup of hazardous substances discharged into navigable waterways and other waters. The hazardous substance list is long overdue, but the final draft now under review establishes three categories of hazardous substances: inherently dangerous substances, such as heavy metals and Class A and B poisons; circumstantially hazardous substances, where the amount and circumstances of the discharge will be weighed, relative to danger; and any substance that violates water quality criteria. Most likely, PCB's will be designated as inherently dangerous substances, and any discharge of PCB's into waterways will be prohibited.

Once designated, the OWP has three legal options for control of the pollutants: (1) Applying emission regulations on hazardous substances to industries requesting discharge permits from the U.S. Army Corps of Engineers, as required by the 1899 Refuse Act; (2) Using Sec. 10 of the Water Pollution Control Act, which calls for compliance with water quality standards and provides for the issuance of 180-day notices and (long) multi-sessioned conferences for abatement; and (3) Using Sec. 12 of the same act, whereby regulations and contingency plans for the prevention and removal of discharges of hazardous materials would be developed by the OWP and enforced by the U.S. Coast Guard.

It is likely that EPA will exercise both options (1) and (3), since they require less time than option (2). Some form of effluent guideline or standard for PCB's will be established by EPA for use by the Corps of Engineers, and it is likely that no PCB effluents from any industry will be allowed when the discharge permit system goes into effective operation, i.e., by mid-1972.

"A regulation and contingency plan for the prevention and removal of PCB's will be developed by the OWP and enforced by the Coast Guard. The Coast Guard has already submitted a report to Congress on the responsibility for the cost of removing such substances and on methods and measures for the prevention of such discharges. A National Contingency Plan for dealing with these discharges was originally promulgated by the Council on Environmental Quality in June, 1970. The Plan, now being revised by the CEQ, sought to establish and coordinate a national and regional network of contingency teams and plans to control and remove discharges of oil and hazardous substances. It included provisions for nuclear pollution and required articles to be prepared on "concentrations of potentially hazardous trace materials, including lead, chromium, zinc, arsenic, mercury, nickel, copper and chlorinated hydrocarbons," and a description of the analytical methods used to determine such concentrations.

Proposals for Additional Regulatory Authority

Administration Proposals: In order to regulate hazardous pollutants such as DDT and PCB's that are found in a variety of environments emanating from a variety of sources, a number of bills have been introduced for passage during this Congress.

In February 1971, the President submitted to Congress a bill called the Toxic Substances Control Act of 1971 (HR 5930). It would create the following new authorities.

The Administrator of the Environmental Protection Agency would be empowered to restrict or prohibit the use or distribution of a chemical substance if such restriction were necessary to protect health or the environment. In imposing such a restriction, the Administrator would be required to consider not only the adverse effects of the substance but also the benefits to be derived from its use.

"If the Administrator believed that a substance were creating an imminent hazard, he could ask the courts to restrain use or distribution of the substance immediately.

The Administrator would be authorized to issue standards for tests to be performed and for results to be achieved from such tests for various classes and uses of new substances. A new substance (excluding products covered by other regulatory authority) could be marketed only after it met these standards.

The Administrator could require information from the manufacturers on potentially toxic substances--names, chemical composition, production level, uses, and results of tests conducted on their effects.

The Council on Environmental Quality would be charged with coordinating efforts to establish a uniform system for classifying and handling information on chemical substances.

The Administrator of the Environmental Protection Agency would be empowered to carry on needed research on toxic substances and to develop an information system and prediction capability to deal effectively with these materials.

A Toxic Substances Board would be established in EPA to advise the administrator on action taken under the act. Civil and criminal penalties up to \$25,000 and one year imprisonment could be assessed for violations.

Hearings on this bill have been scheduled for late June by Senator Philip Hart's (D-Mich.) Subcommittee on the Environment, Senate

Commerce Committee. If passed, a new authority would be created to focus on particular toxic pollutants such as PCB's affecting a variety of environments.

Congressional Proposals: Senator Muskie (D-Me.) has introduced a Products Testing Bill (S 573) which would control hazardous substances such as PCB's when incorporated into consumer products. The significant provisions of the bill are as follows:

- 1) The EPA Administrator is to designate substances which may be present in manufactured products and which may cause a violation of any air or water quality standards.
- 2) Before new substances or substances in new uses are introduced into commerce, manufacturers are required to submit information on the composition and potential public health and environmental effects of the substance. The Administrator may require testing to establish such effects.
- 3) The Administrator is authorized to prescribe standards for the use in manufactured products of any designated substance whose use in substantial quantities may cause discharges which violate air or water quality standards. Standards may include testing procedures and record-keeping and reporting requirements.

Hearings on this bill will probably be scheduled for this year by the Air and Water Pollution Subcommittee, Senate Public Works Committee. If passed, PCB's used in the variety of applications which Monsanto deems "controllable" or acceptable would come under considerable scrutiny by EPA and could possibly be further restricted.

Quite recently (May 19) Congressman Ryan (D-N.Y.) introduced a bill (H.R. 8576) which would deal specifically with PCB's. It calls

for a full and exhaustive investigation to begin immediately into the extent of PCB contamination of our environment in all food products. It also calls for an immediate temporary administrative ban on the manufacture, shipment, and sale of all PCB's and all products containing PCB's pending the results of the investigation. The bill would also ban the distribution of PCB's in interstate commerce and the importation of PCB's into the U.S., with a possible exemption from this ban of PCB's manufactured for use as a dielectric fluid in capacitors, as the coolant in transformers, or as a fire resistant in heat transfer media, provided that such uses do not adversely affect the public health and welfare.

This bill represents the culmination of a year's activity by Congressman Ryan as part of a personal crusade to place restrictions on PCB's. As fully described by the Congressman when introducing the bill (see Appendix A), letters were sent out by his office in the spring of 1970 to various federal agencies, urging control over PCB's. He urged the Food and Drug Administration to set food tolerance levels for PCB's and to require labelling of all products containing these compounds. The Secretary of the Interior was urged to act to protect fish and wildlife from this hazard. The Commission on Product Safety was urged to determine the nature and extent of the threat of PCB's to the environment, and the Council on Environmental Quality was asked to coordinate all these efforts so that the public would know the sources and the seriousness of the PCB danger. He also urged the Department of Agriculture to ban PCB's in pesticides, which they have since done. The FDA, however, has not yet set food tolerance levels. Most of the agencies report that they are looking into the problem but are not yet ready to take further steps.

It is unlikely that Congressman Ryan's bill will receive any action, but it is more likely that either the Administration's bill or Senator Muskie's bill will be passed in this Congress.

" In the general area of environmental control, Congress is currently placing emphasis on water pollution legislation. A variety of proposals have been offered, including administration bills S 1012, 1013, 1014, and one by Senator Muskie, S 523. It is expected that Congress will enact a strong water pollution bill this session, and it is likely that jurisdiction of federal standards will be extended to all navigable waters, their tributaries, the contiguous zone, and ground water sources. Both Congress and the Administration apparently agree that standards must contain effluent requirements and enforcement schedules. The fact that ground waters will probably come under control will affect various methods of PCB disposal. If PCB's in waste water are sent to settling ponds, or are eliminated via ground water disposal, or are even placed in sanitary landfills, they may contaminate well waters and other water supplies. Thus, ground water restrictions may eventually lead to restrictions on PCB's disposed of in these ways.

III. Research Status

Monsanto

Monsanto has been involved in a number of studies dealing with PCB's, most of which will be completed by the end of this summer. Two research efforts deal with the biodegradability of PCB's. One involves a Wales shake-flask study to determine which of the isomers in PCB's are persistent and which will break down. In their St. Louis laboratories they have been conducting semi-continuous activated sludge studies, adding nutrients to the compounds to determine the persistent and degradable isomers. According to William B. Papageorge, Manager of Environmental Control, Monsanto also has in progress a continuing program to improve analytical methodology in order to better deal with the wide variety of PCB's and their various properties. Monsanto is also experimenting with animals to gauge the toxicity of PCB's. A two-year chronic feeding experiment was initiated for Monsanto by the Industrial Bio-test laboratory in Chicago, whereby dogs, rats and chickens have been fed 1, 10 and

100 ppm (parts per million) of one of three types of Araclors (PCB's), namely, 1242, 1254, and 1260. Monsanto is sharing the information gathered from this with government toxicologists. This two-year study will be completed this year, and Dr. Papageorge has indicated that Monsanto is most willing to share all the information they have found. Some results were presented at a meeting of the Society of Toxicology (Medical College of Virginia, Richmond, Va. 23219), and more information on the results of their work will be coming out in a paper later this year.

Food and Drug Administration-HEN

The Bureau of Foods of the Food and Drug Administration is currently involved in research on analytical methods to determine the PCB content in various foods, both quantitatively and qualitatively (i.e., which PCB and what effect). They are admittedly not doing much toxicological work on PCB's, since Monsanto is rather heavily involved in this. According to J. William Cook, Director of the Division of Chemical Technology, it is too early for the FDA to formulate a policy on PCB's, such as setting food tolerance levels or labelling requirements, since not enough is known about their toxicity.

Office of Pesticides/Environmental Protection Agency

At their Gulf Breeze Laboratory in Escambia Bay, Florida, EPA scientists have just completed nearly a year's work on Araclor 1254, which was discharged into Escambia Bay via an accidental spill in 1968 from a Monsanto nylon plant. The PCB's, used as a heat exchange fluid in this instance, escaped from a cooling water ditch. Since then, the fluid used by the plant has been changed. According to Dr. Nelson Cooley of the lab, a wide variety of animals were tested for toxicity, including protozoa, shrimp, oysters and some fish. None of the levels of PCB's in these animals were found to be high enough to be noticeably toxic.

Two articles have been published, reporting on these tests: one by Dr. Del Nimmo et al., "PCB's in Sediments," in a British journal, Nature; and a paper on "Araclor 1254 in Water Sediments and Biota of Escambia Bay, Florida," by Messers Duke, Lowe and Wilson, in the Bulletin of Environmental Contamination and Toxicology, 1970.

Office of Air Programs--EPA

Under a \$19,078 contract to the Office of Air Programs, the South Carolina State Board of Health in Columbia, S. C. has undertaken an assay of human tissues for trace metals and PCB's. This contract is still in progress and is an effort to measure the quantities of the above substances absorbed by humans.

The Division of Applied Technology, in cooperation with other OAP offices and research services, is currently sampling and testing emissions from six incinerators to compile emission data in order to set new source emission standards on particulates and visible emissions from incinerators. The six incinerators being sampled are incinerators in Dade County, Fla., Braintree, Mass., Paris, Dusseldorf and two in New York City. (The tests cost roughly \$15,000 per incinerator.) Some samples have been received for analysis, and all testing and sampling must be completed before the end of July, 1971, when EPA must propose emission standards. At this stage, the air pollution people are mostly concerned with gathering data on the PCB content of incinerator effluent. Information on the toxicity of these compounds is not yet sufficient to justify setting permissible levels of emission. It is not yet known if we have an air pollution problem with PCB's, according to Tom Hauser, Division of Effects Research. It is suspected that PCB's from incinerators enter the atmosphere as an aerosol, that is, begin as a vapor but end as a solid.

Bureau of Wildlife and Sports Fisheries--Department of Interior

At the Bureau's Patuxent Wildlife Research Center in Laurel, Maryland, PCB's in birds have been analyzed routinely for several years. Two publications are available on their research, one of which deals with the identification of structural formulas for 18 PCB's found in eagle tissues. They have also been conducting several two-year studies on the effects of PCB's on reproduction of game birds. They have tested for all combinations of PCB's and have attempted to measure the toxicity of PCB on four species of game birds.

According to Dr. Lucille Stickel, Pesticide Research Coordinator at the Center, PCB's were identified in 1966 and they have been aware of them for several years. Several papers have been published on their research activities, but she emphasizes that their evaluation is not yet complete. So far, however, they have discovered no reproductive effects of PCB's, though some evidence of this has been found in chickens.

The Bureau's Pesticide Research Laboratory in Columbia, Mo., has investigated acute toxicities of PCB's on trout and bluegills, where Dr. Richard Schoettger has reported that PCB's have a relatively low acute toxicity. Dr. David Stallings of the same lab has been working on analytical procedures for PCB's and will do more work on game fish in this area.

Office of Science and Technology--Executive Office of the President

The Office of Science and Technology is actively engaged in a number of case studies concerning a variety of toxic organic and inorganic substances, including PCB's. Their general purpose is to evaluate the information available on PCB's in order to give advice and assistance to the President with respect to developing policies and programs dealing with these substances. Dr. Edward Burger is especially concerned with PCB's and related substances, but has stressed that at this time they

are grappling with an information problem; that is, with the problem of not knowing where PCB's are found, and what their effect is. It is not likely that their work in this area will become available to the public.

In addition to the above, significant research has been previously performed on PCB's by the Kettering Laboratory at the University of Cincinnati (Dr. J. F. Treon), and by Professor E. L. McCune and his co-workers at the University of Missouri. Dr. Treon's group investigated acute toxicities of PCB's on animals, and Prof. McCune discovered the toxic effect of PCB's on chickens. According to Monsanto, between 100 and 150 laboratories have requested material from them on PCB's. A great deal of existing research activities are still focusing on analytical methods for determination and identification of PCB's in the biosphere.