

# CONTROL OF PESTICIDES

*A SURVEY  
OF EXISTING LEGISLATION*



WORLD HEALTH ORGANIZATION  
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*This survey of existing legislation on the control of pesticides is based on such source material as was available, for each of the countries concerned, at the Headquarters of the World Health Organization up to the end of August 1969. As with all such surveys, it is not intended to provide an exhaustive coverage of world legislation in the field in question, but to give typical examples of the form that such legislation has taken.*

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## Introduction

What may be called the "pesticide revolution" dates back to 1942 when DDT was first placed on the market. Since that time, an ever-increasing number of synthetic organic chemicals, in innumerable formulations, have appeared and have been widely used as pesticides all over the world. At first, it was the obvious advantages of these products, both in preserving valuable crops from attack by pests and in the destruction of the vectors of communicable disease, that attracted most attention. More recently, however, the hazards arising from the large-scale use of pesticides, both to the environment and to human health, have been the subject of numerous reports and have increasingly come into prominence. At the present time, environmental pollution by pesticides and the other potential hazards associated with their use have become of serious concern to public health authorities, and there has been a corresponding increase in the scope and complexity of the legislation for the control of pesticides in many countries.

The question of the health hazards arising from the use of pesticides has a number of different aspects. The most obvious hazards result from the fact that many pesticides are toxic to man as well as to the pests they are intended to destroy. There is thus a direct danger of poisoning, particularly in the case of workers manufacturing and applying such products. The magnitude of this danger, as expressed in the number of cases of poisoning, whether fatal or otherwise, is difficult to assess precisely, although it is evident that, in making such an assessment, the manner in which the product is likely to be used must be given at least as much weight as its inherent toxicity.

A WHO report, published in 1962, states that "parathion ... has caused hundreds of deaths under a variety of circumstances".<sup>13</sup> A monograph on the toxic hazards of certain pesticides to man (accompanied by a select bibliography on the toxicology of pesticides in man and mammals) was published by WHO in 1953.<sup>1</sup> More recently, Klučik<sup>8</sup> has reviewed the literature on poisoning by organophosphorus compounds, while Hayes<sup>5</sup> has examined the whole question of pesticide toxicity. One of the difficulties in determining the extent of poisoning by pesticides is that, as pointed out by Reddy,<sup>11</sup> in a country such as India, records are not kept systematically, so that the small number of cases reported are merely indicative of the true situation.

Somewhat different from the hazards mentioned above are those resulting, e.g. from the accidental contamination of foodstuffs or clothing by pesticides during transport. Such contamination can result in serious large-scale poisoning, examples being the serious outbreaks of endrin food-poisoning in 1967 in Qatar and Saudi Arabia, reported by Weeks.<sup>12</sup>

In principle, such obvious hazards should be preventable by suitable legislation, provided that it is actively enforced. This would make it compulsory for the labels on pesticide containers and packages to give appropriate instructions for safe use and the other precautions to be

taken, as well as information on the symptoms of poisoning, the first-aid measures to be taken, and sometimes also advice to physicians on the treatment to be given if poisoning occurs. Other legal provisions can require those responsible for applying pesticides to undergo suitable training, to be provided with the necessary personal protective equipment and clothing, and to undergo medical examinations. Regulations can be introduced to prevent the accidental contamination of foodstuffs and clothing during transport. A system of registration can be established in order to ensure that excessively toxic pesticides are not used at all. Clearly, such legislation can never be completely effective, since workers may not read labels or obey instructions, and employers may fail to provide adequate training, but much can nevertheless be done to improve the situation.<sup>3</sup>

The most alarming aspect of the situation is obviously associated with the widespread contamination of the environment, including human tissues, with pesticides belonging to the organochlorine group, which are of high chemical stability. DDT in particular has become widely dispersed throughout the world, even in areas, such as Antarctica, where it has never been used. In spite of the fact that, from the human point of view, the safety record of DDT is very good, e.g. workers who have been employed in the formulation of DDT since 1945 or even earlier have remained healthy, according to Hayes,<sup>5</sup> the extent of the environmental contamination with this chemical and the uncertainty as to its ecological consequences have aroused so much concern that drastic legislative action has been taken in certain countries. Thus, in March 1969, a two-year moratorium on the use of DDT, aldrin and dieldrin was ordered in Sweden,<sup>9</sup> while the production and use of DDT were banned in Denmark from 1 November 1969.<sup>4</sup> This action has been followed, in the United States of America, by an announcement that the Administration intend to curtail the use of DDT progressively over a period of two years until it is available only for "essential" uses.

This trend towards the prohibition of DDT and the other persistent pesticides, of course, confronts the developing countries with a serious problem. The Sixteenth Report of the WHO Expert Committee on Insecticides states that "The concern that has been expressed in recent years about contamination of the environment by this very stable and persistent insecticide (DDT) should not, in the opinion of the Committee, be considered sufficient reason for substituting other insecticides for indoor residual spraying against mosquitos. The safety record of DDT remains outstanding. . . those pesticides so far developed as indoor residual sprays are likely to present a greater hazard in use than DDT. . . The Committee urges health authorities to take a realistic view of the hazards presented by these new insecticides. In many public health programmes, the possibility that a few individuals might be adversely affected has to be accepted in order to effect a substantial improvement in the health of the country as a whole." <sup>16</sup>

Because of the world-wide application of pesticides and the fact that contamination with persistent compounds can spread to countries

in which they have never been used, it is not surprising that numerous international bodies should be concerned with the problem. Miller has listed 28 such bodies having a specific interest in pesticides, in an article published in 1967.<sup>10</sup>

WHO has, of course, among the international organizations an obvious interest in the effects of pesticides on human health, dating back to 1951, when, as a result of resolutions adopted by the Fourth World Health Assembly and the WHO Executive Board at its eighth session, the Organization undertook to study the effects on human health that might arise from the widespread and increasing use of pesticides in public health and agriculture.

The monograph<sup>1</sup> referred to above was in fact prepared as a direct consequence of these Resolutions (Annex 2 of the monograph consists of a brief résumé of the then existing arrangements for the control of agricultural pesticides in ten countries). Since then, a number of Technical Reports and other publications on the subject have appeared. Reference may be made, in particular, to the Twelfth Report of the Expert Committee on Insecticides, since this deals, *inter alia*, with legislative control in the prevention of accidents arising from exposure to such products.

In this connexion, the Report states that "The design of legislation relating to the control of poisons should take into account new developments and the increasing numbers of poisonous substances, while at the same time recognizing the value of the controlled use of these substances. Legislation must include practical and realistic measures which protect the public in general and children in particular. It should prevent dangerous levels occurring residually in food supplies and provide proper standards for the protection of those who use these materials." Furthermore, "The Committee saw considerable merit in the registration of pesticides and reaffirmed the view previously expressed that adequate labelling through some form of registration of all pesticides was necessary."<sup>14</sup> The Report also describes in detail the minimum information to appear on the labels used for pesticide containers and packages.

It should be noted that, in the WHO publication *Specifications for pesticides used in public health*, each specification contains a section on packing and marking of packages.<sup>17</sup> This includes, *inter alia*, the recommended minimum cautionary notice.

WHO has co-operated with the other international organizations concerned with the control of pesticides and, in particular, with the Food and Agriculture Organization of the United Nations in the specific field of pesticide residues in foodstuffs. WHO and FAO have collaborated, for example, in the preparation of the *Codex Alimentarius*, the first meeting of the *Codex* committee on pesticide residues having been held in 1966.

In addition, a Joint Meeting of the FAO Panel of Experts on the Use of Pesticides in Agriculture and the WHO Expert Committee on Pesticide Residues was held in 1961, and recommended that studies should be undertaken to evaluate the consumer hazard arising from the use of

pesticides. Subsequent joint meetings of various expert bodies of both organizations have recommended tolerances for different pesticides in foodstuffs.

WHO has also collaborated with FAO, and in this case with the International Labour Office as well, in the preparation of the publication *Guidelines for legislation concerning the registration for sale and marketing of pesticides*,<sup>2</sup> a subject with which this survey is, of course, directly concerned. This document cannot be considered in detail here, but certain points of particular interest will be mentioned. Thus the *Guidelines* define "pesticide" but only as a product used for controlling a "pest". The fundamental definition is therefore that of "pest". A definition is also given of the term "pesticide formulation". The basic requirement is that a pesticide must be registered before it can be distributed, sold, offered for sale, delivered or imported. The *Guidelines* then prescribe in detail the procedure to be followed when an application for registration is submitted. The information accompanying the application should include, *inter alia*, adequate toxicological data on the active ingredients, and the instructions for use, the precautions to be taken and instructions as to first-aid which are proposed for the labelling, as well as methods for the determination of residues. Registration, if granted, should be for a specific period.

Requirements as to the information to be given on the label are also specified. These include the composition and the identity of the active ingredients, warning and cautionary statements, including the symptoms of poisoning, instructions as to the decontamination and/or safe disposal of used containers, etc. Any accompanying written, printed or graphic material should include the substance of the label statements.

The *Guidelines* also recommend that pesticide legislation should contain special provisions with regard to substances or operations which present a high or unusual degree of hazard. These provisions may, in particular, impose conditions as to the field evaluation of experimental compounds, prohibit the sale and marketing of such compounds, even if registered, restrict the sale of such compounds so that they are used only by authorized organizations or persons, etc.

In addition to the above, FAO regularly publishes information on legislation on food additives, including pesticides, under the title *Current Food Additives Legislation*, and is publishing a series of monographs entitled *Food Additives Control*, which also deal with pesticides.

The collaboration of the ILO in the preparation of the *Guidelines* was mentioned above. Another instance of ILO/WHO collaboration is their Joint Committee on Occupational Health; Section 2 of the Fourth Report of this Committee (1962) is devoted to a discussion of the protection of agricultural workers against toxic chemicals.<sup>15</sup> The ILO has also produced a Code of Practice entitled *Safety and Health in Agricultural Work*, Chapter XV of which is concerned with dangerous substances.<sup>6</sup> A large part of this Chapter deals with toxic substances, including pesticides. It is recommended that toxic substances should not be entrusted to "persons who, because of immaturity, mental illnesses, weak intelligence,

drunkenness, or infirmities, might cause danger to themselves or other persons". In addition, the Code recommends that pregnant women should not be employed on work with toxic substances, and that all persons engaged in such work should have pre-employment and periodical medical examinations by "a physician who is aware of the risks to which they are exposed". Special recommendations of the Code deal with transport, the use of organic mercurial fungicides for seed treatment, personal protective equipment, personal hygiene, and the disposal of unwanted material. Recommendations similar to those described above but applicable to forestry work are contained in another ILO code.<sup>7</sup> At the present time, the ILO is planning the preparation of further codes of practice concerning safety and health in the manufacture and use of pesticides.

Reference was made above to the risks of contamination of food-stuffs by pesticides during shipment. This matter falls within the jurisdiction of the Inter-Governmental Maritime Consultative Organization (IMCO) and was in fact the subject of discussion at several sessions convened by the latter body in 1968 and 1969, at which WHO took an active part. As a consequence, certain amendments to the International Maritime Dangerous Goods Code were agreed upon, relating, *inter alia*, to the classification of pesticides for shipment purposes and the arrangements for their stowage. It was moreover agreed that further investigation should be made into the problems of classification of highly toxic substances according to their hazards, and that the matter be drawn to the attention of the United Nations Committee of Experts on the Transport of Dangerous Goods.

The co-operation of WHO and IMCO during and after the endrin food-poisoning outbreaks of 1967 mentioned on p. 4 constitutes a practical illustration of their joint interests and collaboration in this field.

Other international bodies concerned with the control of pesticides include the Council of Europe, which has sub-committees on poisonous substances in agriculture, and on industrial safety and health. The European Economic Community is trying to develop a common system for controlling the sale and use of pesticides amongst its member countries.

### General Survey of Legislation

Legislation on the control of pesticides is inevitably complex. This is the consequence of the multiplicity of the ways in which pesticides can affect human health and well-being which, in turn, results in pesticide control being the responsibility, not of a single authority, but of a number of authorities. Those principally concerned are usually the authorities responsible for public health, labour and agriculture, but others may be concerned, e.g. with the transportation of pesticides, and aerial spraying. In addition, various boards or committees may be set up to advise the authorities or to perform certain duties in the field of pesticide control, thus further complicating the situation. As a result,



one of the few generalizations possible in respect of pesticide control legislation is that it invariably consists of a number of different items, each concerned with some particular aspect of the problem, such as the registration of pesticides, the licensing of manufacture, supply and application, occupational health, aerial application, or residues in foodstuffs; there may also be legislation on such specialized subjects as fumigation or the dressing of seeds, or restrictions on the use of particular pesticides. All that can be attempted here, therefore, is to pick out what appear to be the most important features of pesticide control legislation and to discuss the way in which they have been dealt with in the countries included in this survey.

### *Definitions*

It might be thought that the most fundamental feature of pesticide control legislation would be a definition of the term "pesticide". In fact, for various reasons, the term "pesticide" does not appear at all in the legislation of certain countries, while in others it is only one of a number of different terms used in the legislation. The United States is an example of a country belonging to the first group. The Federal Insecticide, Fungicide, and Rodenticide Act of 1947 speaks only of "economic poisons", where an economic poison is defined to mean: "(1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any insects, rodents, nematodes, fungi, weeds, and other forms of plant or animal life or viruses, except viruses on or in living man or other animals, which the Secretary (of Agriculture) shall declare to be a pest, and (2) any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant".

The USSR is another country where the term "pesticide" has not been used in the legislation (the term is however employed in a 1969 enactment); it is replaced in the bulk of the legislation by the more general term "poisonous chemical".

In contrast to the above, New Zealand legislation uses, and defines, the terms "agricultural chemical", which refers solely to products applied to plants (including plant growth regulators) together with rodenticides, "animal remedy", which covers products for the control of animal parasites, "toxic substance", which covers pesticides, but excludes narcotics and radioactive substances, and finally "systemic pesticide" and "pesticide" itself, the last-named appearing in the legislation on food hygiene. In addition, the terms "poison", "poisonous substance", and "controlled deadly poison", are used, though these are not explicitly defined.

In the Netherlands, Sweden and Denmark, a single term, literally meaning "control product", is used to cover pesticides and related products, namely "bestrijdingsmiddel", "bekämpningsmedel" and "bekæmpelsesmiddel", respectively.

The question of definitions is also linked with another fundamental problem of pesticide control legislation. The need to control pesticides is a consequence, of course, of the fact that most of them are poisonous, to a varying extent, to man as well as to the pests they are intended to

destroy. Many countries have poisons legislation, often dating back to a period before the large-scale introduction of pesticides in agriculture, and this legislation has sometimes been extended so as to cover pesticides; this can usually be done simply by including pesticides in the lists of poisons annexed to the legislation. In such countries, therefore, the term "pesticide" will not appear in the legislation, and the question of defining it will not arise. This is the case in Czechoslovakia, where the Decree of 10 April 1967 defines, instead, the terms "poisons" and "specially dangerous poisons".

### *Competent authorities*

As already mentioned, in none of the countries covered by this survey is the control of pesticides the responsibility of a single authority. The United Kingdom occupies a special position in this connexion at the present time, since pesticide control is to a large extent a voluntary matter under the Pesticides Safety Precautions Scheme. It is expected, however, that legislation will be introduced to replace this voluntary scheme in the near future, and that, under this legislation, the competent authorities will comprise the Minister of Agriculture, Fisheries and Food, the Secretary of State for Scotland, the Minister of Health, and appropriate Ministers in Northern Ireland.

An interesting division of authority exists in the federal legislation of the United States, where the Pesticides Regulation Division of the Agricultural Research Service of the United States Department of Agriculture is responsible for the implementation of the provisions dealing with the registration of pesticides. The control of pesticide residues, however, is the responsibility of the Secretary of Health, Education, and Welfare, through the intermediary of the Food and Drug Administration. In practice, the Department of Agriculture will not register any new pesticide unless the Food and Drug Administration has established a tolerance for this pesticide, or it has been shown that it leaves no residues. In addition to the above-mentioned agencies, the Federal Aviation Administration is responsible for the control of the spraying of pesticides from aircraft, and the Department of Transportation for the transport of pesticides. It should also be noted that control of the application of pesticides on the ground comes within the competence of the individual states, as do all questions of occupational health.

A different type of division of authority is found in Sweden, where the National Poisons and Pesticides Board is responsible for the registration of pesticides, and their classification according to toxicity and labelling. As far as the licensing of persons wishing to use Class I pesticides is concerned (these are products liable to cause serious poisoning if the prescribed precautions are not taken), the licence is granted by the Royal Agricultural Board to persons engaged in agriculture, forestry or horticulture, and by the National Board of Health and Social Welfare in all other cases. In contrast, the licence to manufacture poisons, including pesticides, is granted by the local police authorities after they have con-

sulted the county medical officer and the labour inspector. Finally, the Board of Commerce is responsible for determining the maximum permissible amounts of pesticide residues in foodstuffs.

In Germany (Federal Republic), the federal legislation on plant protection products is implemented by the Federal Health Department and the Federal Biological Institute for Agriculture and Forestry. The latter, in particular, is responsible for granting the licence without which no such product may be imported or marketed. Nevertheless, an expert committee at the Institute, appointed by the Federal Minister of Food, Agriculture and Forestry, must be consulted before the licence is granted. Joint directives on the precautions to be taken in the use of pesticides and plant protection products were issued in 1958 by the Federal Health Department and the Institute. As far as pesticide residues are concerned, the laying down of maximum permissible amounts is the joint responsibility of the Federal Minister of the Interior and the Federal Minister of Food, Agriculture and Forestry. Legislation on the control of trade in poisons comes within the competence of the Länder, and in Hesse, for example, it may be necessary to apply for a licence for the purchase of such substances, this licence being granted by the municipal authorities.

Finally, in Venezuela, the Regulations of 1968 lay down that the control of pesticides, in all matters affecting health, is the responsibility of the Ministry of Health and Social Welfare, without prejudice to those functions which are the responsibility of the Ministry of Agriculture and Livestock Breeding. In particular, pesticides are subject to licensing by the Ministry of Health and Social Welfare, but in the case of those intended for use in agriculture or forestry, the approval of the Ministry of Agriculture and Livestock Breeding must first have been obtained.

It is clear from the foregoing that the definition of the responsibilities of the various authorities concerned is an important aspect of pesticide control legislation, and also that, once these responsibilities have been defined, it is equally important for the legislation to make provision for the co-ordination of their activities.

### *Systems of approval or registration of pesticides*

One obvious method of bringing pesticides under legislative control (exemplified in the preceding section in the case of the Federal Republic of Germany, Sweden, the USA and Venezuela) is to require each new product to be registered with or approved or licensed by some suitable body. In Denmark, pursuant to Law No. 113 of 13 April 1954, the Poisons Board of the Ministry of Agriculture is responsible for the "classification" of pesticides, where such classification constitutes an authorization for the sale of the pesticide by the manufacturer concerned. The Poisons Board is entitled to request the manufacturer to provide all the necessary information as to the chemical composition and toxicity of the product; it may also ask for samples of the product and of its package.

In France, the Law of 2 November 1943 prohibits the sale of any agricultural pesticide unless it has been approved or a provisional sales licence granted. For purposes of approval, every product is required

to undergo an examination, which may include physical, chemical or biological tests in official laboratories. If, after a product has been approved, any change is made in its physical, chemical or biological composition, a new application for approval must be submitted. No product may be advertised unless it has been approved or a provisional sales licence granted.

The sale, holding or use of pesticides which have not been approved are prohibited in the Netherlands, pursuant to the Law of 12 July 1962. No pesticide may be approved unless, *inter alia*, it may be supposed that, if used correctly, it will not cause : (a) any harm to public health; (b) any harm to the health or safety of any person who uses it in the prescribed manner; (c) any deterioration in the quality of foodstuffs; (d) any adverse effect on the productivity of the soil, or on plants or parts of plants, or on useful animals. Approval is granted for a period not exceeding ten years, and may be made subject to conditions as to the application of the pesticide, the packages used, the warning notices, etc. The application form for the approval of a pesticide, which must be sent to the Phytopharmacy Committee, contains 15 questions covering matters such as the composition of the product, the analytical methods, the residues, the toxicity of the product or its active ingredients, etc.

Under the Federal Insecticide, Fungicide, and Rodenticide Act of the United States, interstate commerce in, or the import or export of, an "economic poison" which has not been registered by the Secretary of Agriculture is unlawful. The Interpretations of the Regulations made under the Act make clear the principles on which registration is based, and that it is essentially a device to bring economic poisons to the attention of the Department of Agriculture and to give the Department an opportunity to correct obvious faults in the labelling. Every application for registration must be accompanied by two data sheets for the product concerned. Registration is valid for a period of five years. It should be noted that federal registration of a given product does not make state registration unnecessary where this is required by state legislation.

#### *Control of manufacture, supply and application*

Apart from the registration of pesticides as such, the manufacture, supply and application of pesticides may also be subject to legislative control. In Czechoslovakia, for example, where the general control of pesticides forms part of the legislation on poisons, the Decree of 10 April 1967 provides that no undertaking may manufacture, prepare, import, export, supply, sell or store "specially dangerous poisons", or use or handle them in any other way, unless it holds a licence issued by the competent health authority. These provisions are supplemented by others laying down that no specially dangerous poison may be supplied, sold or transferred in any way to a person not holding the appropriate licence or authorization. The applicant for a licence to handle such poisons must, pursuant to the Order of 1 June 1967, describe the measures to be taken to protect human beings and the environment, or for ensuring the wholesomeness of foodstuffs and consumer goods, etc.

In Germany (Federal Republic), the Federal Health Department and the Federal Biological Institute for Agriculture and Forestry published, in 1958, Directives on the precautions to be taken in the use of pesticides and plant protection products. In contrast to the situation in other countries, these Directives appear to constitute recommendations only, and not to be obligatory.<sup>a</sup> They cover a wide range of aspects of the application of these products, and recommend in particular that systemic products and those containing arsenic, lead or mercury should be used on food plants only when absolutely necessary. The Directives also cover certain aspects of occupational health (see below), as well as the destruction of empty packages and unused residues.

The Poisons Regulations 1964 of New Zealand specify that "restricted poisons", a term covering, *inter alia*, a number of pesticides, may be sold only to farmers, agricultural contractors, pest control operators and users of land for recreational purposes. Under the Deadly Poisons Regulations 1960, as amended, what are called "controlled deadly poisons" (these comprise the sodium salt of monofluoroacetic acid and a few other products) may be sold only by a holder of a wholesaler's poison licence, authorized to this effect by a Medical Officer of Health, and no person may pack, repack, prepare or apply any such poison unless he is an "approved operator", the granting of approval being again the responsibility of the Medical Officer of Health. In addition, the application of any controlled deadly poison is subject to the prior consent of both the local authority concerned and the Medical Officer of Health. Other provisions of the Regulations prohibit the application of controlled deadly poisons to water used for domestic supply purposes, and make their aerial application subject to the approval of the Medical Officer of Health, etc. The extreme strictness of the Regulations is, of course, the consequence of the highly toxic nature of the substances in question.

In the United Kingdom, the active ingredients of certain pesticides are covered by the Pharmacy and Poisons Act 1933 and the Poisons Rules made under this Act. These Rules contain detailed provisions regarding restrictions on the sale, and the manufacture, of poisons. The various poisons are listed in a number of Schedules to the Rules, the provisions applicable to a given pesticide depending on the particular Schedule in which it has been listed. Thus, in the case of a pesticide listed in the first Schedule, the purchaser must either be known to the seller as a person to whom it may properly be sold, or present a certificate in the prescribed form. Particularly severe restrictions are imposed on the sale of strychnine and monofluoroacetic acid. Part B of Schedule 5 lists poisons which may be sold by authorized sellers only to persons engaged in agriculture or horticulture and for use only in their professional activities. It is of interest that certain products are exempted from the provisions of the Act and the Rules, including mercury compounds for use as seed dressings.

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<sup>a</sup> Ordinances for the implementation of the Plant Protection Law of 10 May 1968 will probably alter this situation.

As a consequence of its federal structure, as already mentioned, the control of the application of pesticides in the United States falls within the competence of the individual states, and the relevant legislation is therefore somewhat complex, although a model law was drawn up in 1949 and has been followed to a certain extent. An example of state legislation in this field is the Pest Control Act of 1955 of Tennessee, which provides for the licensing of all persons wishing to engage in pest control operations. A pest control licensing board issues certificates to persons who are to be in charge of such operations, such certificates being issued in two separate grades depending on the degree of responsibility to be involved. In addition, the Act specifies the experience and training required for an applicant to be eligible for a certificate, and the subjects in which applicants may be examined before a certificate is awarded.

In the USSR, the use of what are referred to as "poisonous chemicals" in agriculture is covered by the provisions of the Health Regulations No. 531-65 of 10 June 1965, which are very detailed in character. It is laid down, for example, that no person may work with poisonous chemicals unless he has undergone, each year, a suitable course of instruction and holds the corresponding certificate. In addition, poisonous chemicals are supplied from store only on the basis of a written order from the chairman of the collective farm, the director of the state farm, or other person of similar status. The safety measures to be taken in the application of poisonous chemicals are specified in detail, and cover, e.g. the putting up of warning notices in all areas in which work with such chemicals is being carried out, the maximum wind velocity above which dusting and spraying, the dressing of seeds in the open air, and other similar types of work may not be carried out, the precautions to be taken in the preparation of solutions of poisonous chemicals, the action to be taken if accidental spillage occurs, etc. As far as the manufacture of pesticides is concerned, the Health Regulations of 3 July 1962 contain detailed provisions as to the requirements to be satisfied by the premises used for the production of DDT.

### *Labelling*

The provision of adequate information on the labels of the packages or containers used for pesticides is, of course, a necessary precaution to be taken in the attempt to prevent the incorrect use of such products and consequent accidental poisoning. Provisions governing the content of these labels are therefore generally included in pesticide control legislation.

In Denmark, under the Order of 25 September 1961, pesticides are divided into four classes (X, A, B, and C) according to their toxicity, those belonging to Class X being the most highly toxic; the labelling requirements differ for the different classes, as might be expected. In particular, in the case of Class X products, the labels must describe the dangers associated with their use and the measures to be taken to avoid them, as well as the early symptoms of poisoning, and must indicate the

antidote, if any. In addition, every label for a Class X product must bear the words "In case of poisoning, consult a physician immediately". The legislation on poisons, and in particular, Order No. 305 of 9 October 1961, may also apply to pesticides under certain conditions; the detailed provisions as to the labelling of poisons contained in this Order will then have to be observed.

Section 12 of the Plant Protection Law of 1968 of the Federal Republic of Germany is concerned with the labelling of plant protection products, and specifies the information to be shown on the containers and sales wrappings of such products. This includes, *inter alia*, the nature and quantity of the active ingredients, the method and time of application, the quantity to be applied, the minimum period that must be allowed to elapse before the crop which has been treated may be harvested, and the hazards associated with the use of the product concerned. As in the case of Denmark, pesticides are also covered by the legislation on poisons which, in the Federal Republic of Germany, falls within the competence of the individual Länder. In Hesse, for example, the Police Ordinance of 1961 contains, *inter alia*, provisions as to the labelling of containers used for dressed seeds. Sections 17 and 18 of the Ordinance are specifically concerned with pesticides and wood preservatives; all such products must be accompanied by detailed instructions for use and information on the hazards associated with incorrect use. A minimum warning notice is specified, and statements to the effect that the product is harmless to man or animals are prohibited.

Detailed requirements as to the labelling of pesticides are laid down, in the Netherlands, in the Order of 4 August 1964. With certain products, the label must give instructions as to first-aid in cases of poisoning, and also contain information for the physician as to the treatment to be applied in such cases. No package may bear any information that could give an incorrect or misleading impression as to the nature, composition, possible methods of use or toxicity of the pesticide concerned.

In the United States, under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, an economic poison is regarded as "misbranded", so that its shipment in interstate commerce is unlawful, if its "labeling" (a term which includes not only the labels as such, but also all other written, printed or graphic matter accompanying the economic poison) does not contain, *inter alia*, the necessary directions for use, which must be adequate for the protection of the public, as well as the necessary warning or cautionary statements, which must be adequate to prevent injury to man. The Regulations made under the Act, and in particular the Interpretations of these Regulations, contain extremely detailed information as to the warning, cautionary and antidote statements required to appear on the labels of economic poisons. For this purpose, these products are divided into four categories from the point of view of toxicity, the labelling requirements, of course, varying with the toxicity. These requirements are concerned primarily with the avoidance of hazards to persons handling, applying or exposed to the economic poison in question, but also with the precautions necessary if contamina-

tion of foodstuffs with harmful residues is to be avoided. The Interpretations also give acceptable forms of wording for the various statements mentioned above, but it is not compulsory for manufacturers to adopt them word for word provided that the substance of these statements is retained. There are special requirements as to the labelling of household insecticides.

### *Occupational health*

Legislation covering the occupational health aspects of the manufacture and/or application of pesticides is found in all of the countries covered by this survey, though the nature of such legislation varies from country to country. The USSR undoubtedly possesses the most comprehensive legislation in this field of all the countries considered.

In Czechoslovakia, Instruction No. 49 of 16 December 1967 provides for an assessment of medical fitness, by means of pre-employment, periodic, emergency and post-employment medical examinations, in the case of workers employed in work-places where they are exposed to particularly adverse effects of the working environment ("hazardous work-places"). Such work-places include those in which there is an increased risk of poisoning, so that the term "hazardous work-place" would include one in which a poisonous pesticide is manufactured or used. In fact, Annex 2 to the Instruction includes the manufacture and use of organophosphorus compounds and insecticides based on halogenated hydrocarbons among the activities involving exposure to particularly adverse effects of the working environment.

In addition to the foregoing, the standard ČSN 48 2701, which is concerned with the protection of forests against harmful insects and fungi, prescribes that pregnant women, nursing mothers and adolescents less than 16 years of age may not be employed in the protection of forests by means of chemicals. In addition, no person suffering from bronchitis or from inflammation of the skin or mucous membranes, or who has had a previous attack of tuberculosis, may work with insecticidal dusts. Persons less than 20 years of age may work with such dusts, but not for more than four hours per day or eight days per year. Workers with poisonous chemicals must be provided with the appropriate protective clothing and equipment.

The Order of 25 September 1965 makes it compulsory, in France, for every person handling any one of some 30 poisonous pesticides to wear protective clothing, avoid inhaling vapours, contact with the skin, and ingestion, abstain from applying the product against the wind and from smoking. Workers must not be engaged for more than half of any given day in applying such pesticides.

The Directives of 1958 of the German Federal Health Department and the Federal Biological Institute for Agriculture and Forestry are largely concerned with the occupational health aspects of pesticide control. They cover, for example, protective clothing and equipment, and the precautions necessary in work out of doors and in enclosed premises.



As far as the application of pesticides is concerned, they merely specify that every person who undertakes such work must be physically and mentally fit to do so. The age limit for engagement in work involving toxic products is put at 17, as compared with 16 in Czechoslovakia; as in Czechoslovakia, however, pregnant women and nursing mothers are forbidden to engage in such work. It is also specified that every person who handles pesticides over a long period must be medically examined at regular intervals, and that any person who, during or immediately after work shows certain symptoms of poisoning, must immediately cease work, remove his soiled clothing and consult a physician.

Apart from the foregoing, the German Research Association, through its Commission for the Control of Harmful Substances in Work-places, has prepared a list of maximum permissible concentrations of such substances in the atmosphere of work-places, and periodically brings this list up to date. The 1966 version included a large number of pesticides.

In New Zealand, the Noxious Substances Regulations 1954, as reprinted in 1967, lay down provisions as to occupational health in the handling of these substances, which are defined as comprising a certain number of pesticides, including the organophosphorus compounds. The Regulations cover, as is usual in this field, protective clothing, the provision of washing facilities, restrictions on smoking, eating and drinking, medical examinations, restrictions on the employment of persons whose health is affected, etc. In addition, the Second Schedule to the Health Act 1956 includes poisoning by pesticides among the diseases which must be notified to the Medical Officer of Health.

The Agriculture (Poisonous Substances) Regulations 1966 to 1967 of the United Kingdom deal in detail with the safety measures to be adopted in a number of agricultural and horticultural operations involving certain specified active ingredients of pesticides. In addition to providing for the use of protective clothing, etc., they require the employer to enter in a register the name and address of every worker engaged in operations covered by the Regulations, the number of hours worked, and the substances used (subject to certain exemptions as to minimum area covered). Limits are placed on the number of hours that may be worked. Furthermore, the employer must notify an inspector if he believes that a worker has been poisoned, or if a worker has been absent for more than three days and was previously engaged in the application of pesticides covered by the Regulations. No person less than 18 years old may carry out any operation covered by the Regulations or be employed in operations involving the agricultural use of smoke generators.

In the USSR, occupational health in the application of pesticides is covered by the Health Regulations No. 531-65 of 10 June 1965, which prohibit work with poisonous chemicals in the case of persons less than 18 years of age, pregnant women, nursing mothers and persons in a state of inebriation. The Regulations also provide that no person may work more than six hours per day with poisonous chemicals, or more than four hours per day with highly active poisonous preparations. In no case may the concentrations of poisonous chemicals in the air of work-

places exceed the maximum permissible values laid down in Annex 1 of the Regulations. Pre-employment and periodic medical examinations are compulsory for those working with poisonous chemicals, and one of the most striking features of the Regulations is the list of contraindications to such work. There are 14 general contraindications, together with certain specific contraindications to work with: (a) organic mercury compounds; (b) arsenic compounds; (c) organochlorine compounds; (d) organophosphorus compounds; (e) carbon disulfide; (f) nicotine sulfate and anabasine sulfate. In addition, certain provisions deal specifically with the tests to be carried out as part of the periodic medical examinations of persons working with mercury compounds and organophosphorus and carbamate pesticides. In the latter case, cholinesterase levels in the blood must be checked before work is begun and then not less than once a week. If the level falls by more than 25 %, the person concerned must cease work with such pesticides.

In addition to the above, Health Regulations No. 534-65 of 24 June 1965 are concerned with occupational health in stores for highly active poisonous substances, a term covering a number of pesticides. The Regulations contain provisions on personal protective devices, the pharmaceutical products needed for first-aid purposes, etc. Pre-employment medical examinations and periodic medical examinations at intervals not exceeding six months are made compulsory.

The Health Regulations of 3 July 1962 lay down detailed provisions as to the hygienic requirements to be satisfied by the premises and processes used in the manufacture of DDT. Here again, pre-employment and periodic medical examinations of workers are compulsory. The medical board set up for this purpose must include an internist and a neuropathologist and, if necessary, an otorhinolaryngologist and a gynaecologist. The periodic medical examinations must include a blood test and a chest X-ray. A list is given of 17 contraindications to employment in the manufacture of DDT.

Finally, Instructions issued in 1962 deal with the use of personal protective devices in work with poisonous chemicals in collective and state farms, and specify, e.g. the type of respirator to be used with particular chemicals, the types of protective clothing to be used, etc.

### *Aerial application of pesticides*

Because of its special features and associated hazards, the aerial application of pesticides is sometimes the subject of special provisions, though it may also be covered by the general legislation on the control of the application of pesticides.

In Czechoslovakia, the aerial application of pesticides to crops is covered in detail by the standard ČSN 46 5810, which makes the "organizer" of such application responsible for providing all the necessary washing, decontamination and first-aid facilities, as well as for the marking of the area to be treated. Maximum permissible wind velocities, depending on factors such as the type of aircraft used, are given in Annex 4 to

the standard. Special requirements are imposed in respect of organophosphorus compounds, which may not be applied by means of aircraft under certain conditions, e.g. if the wind velocity exceeds 2 m/sec. In addition, the cabin of the aircraft must be protected in such a way that the product cannot enter it. In general, the fact that crops are to be treated with pesticides by means of aerial application must be notified by the organizer not less than 24 hours in advance to the competent people's council, as well as to the people's councils of adjacent localities.

Under the Order of 5 March 1954, aerial spraying undertakings in France are responsible for the conspicuous marking of landing strips and the zones being sprayed. Animals and persons not connected with the operations must be prevented from entering such strips and zones.

In New Zealand, the Civil Aviation Regulations 1953, as amended, permit the aerial application of certain pesticides, provided that the pilot in command holds what is called a "chemical rating". To obtain this rating, pilots must pass an examination covering such subjects as the clinical effects of pesticides, and the legislation applicable to them and to their use.

The system in the United Kingdom is that, under the Air Navigation Order 1960, as amended, the Rules of the Air and the Air Traffic Control Regulations, both the aerial application of pesticides and the low flying which is necessary for such application are both effectively prohibited. In practice, however, the Minister of Agriculture grants exemptions from the relevant provisions, so that aerial application is, in fact, possible. Each exemption granted is, however, valid only for the particular operator and aircraft concerned. In addition, the spraying of a certain number of pesticides is prohibited, unless they are in the form of granules. The issue of an agricultural exemption is conditional on the production of a satisfactory operations manual by the operator.

A similar system of exemptions, known as certificates of waiver or authorization, was in use in the United States up to 1965, the certificates being issued by the Federal Aviation Agency (now the Federal Aviation Administration). A new Part 137 of the Federal Aviation Regulations was then adopted, dealing with agricultural aircraft operations. This made it necessary for a test to be passed by the person responsible for conducting such operations, covering subjects such as the safe handling of economic poisons, the general effects of such poisons, the symptoms of poisoning, emergency measures and the location of poison control centres. A certificate is issued to every person who passes this test, and no person may conduct agricultural aircraft operations unless he holds this certificate. Even so, this does not relieve an agricultural operator from the need to comply with any state or local laws on the aerial application of pesticides that may be applicable.

In the USSR, aerial application is covered by the Health Regulations of 10 June 1965, and in fact is treated together with spraying from ground equipment. The maximum permissible wind velocities for aerial dusting, fine spraying and coarse spraying are laid down. Mechanical warning signals must be used when aerial dusting or spraying is carried out.

*Residues in foodstuffs*

The question of pesticide residues in foodstuffs is rather a special one and is therefore sometimes dealt with in a special manner or in separate legislation. The attitude is adopted in Denmark, for example, that pesticides, when used in the correct manner, should either leave no residues in foodstuffs, or the residues should be so small as to be harmless. Thus Section 2 of the Law on foodstuffs, in the version of 9 February 1968, merely prohibits the offer for sale or supply of foodstuffs liable to cause poisoning when consumed in the normal manner. In addition, the Poisons Board either prohibits the use of pesticides on certain crops or specifies the period to be allowed to elapse between treatment and harvesting. It appears, in fact, that this system gives satisfactory results, since Danish foodstuffs have a very low pesticides content. Similar arrangements are in operation in France, but in that country enabling legislation is in preparation to make it possible to establish tolerances for pesticide residues.

In contrast, the procedure whereby the maximum permissible quantities of pesticide residues are specified in the legislation has been adopted in Germany (Federal Republic). This was introduced by the Ordinance of 30 November 1966, issued pursuant to the Law on foodstuffs, in the version of 21 December 1958. Apart from listing, in Annex 1, the maximum permissible residues, the Ordinance also prohibits the sale, etc., of plants or parts of plants as foodstuffs if they have been treated with and contain residues of certain specific pesticides. In the case of pesticides not covered by the Ordinance, their residues may not be present in foodstuffs, unless the consumption of such foodstuffs cannot give rise to any danger to health. In the Netherlands also, pursuant to the Order of 15 March 1965, as amended, maximum permissible amounts of the active ingredients of pesticides and their toxic metabolites in certain categories of foodstuffs, are laid down.

The legislation of New Zealand on pesticide residues is somewhat more complex. The Food and Drug Regulations 1946, in the version of 1963, list 26 pesticides together with the maximum permitted residues in various foodstuffs. In addition, the Pesticide Regulations 1959 provide that pesticides may not be applied to food crops if such application would result in a residue at the time of sale greater than that specified in the Food and Drug Regulations. Residues in meat and game, however, are dealt with separately in the Stock (Insecticides and Oestrogens) Regulations 1961, as amended in 1963, and the Game (Packing and Export) Regulations 1967, respectively. Finally, a 1962 amendment to the Dairy Produce Regulations 1938 prohibits the delivery to a manufacturing dairy of milk or cream containing insecticides.

In Sweden, Crown Order No. 706 of 14 December 1962 made the Board of Commerce responsible for determining maximum permissible amounts of pesticide residues in foodstuffs. Since the entry into force of this Order on 1 January 1964, the Board has issued various lists of such maximum permissible amounts for certain pesticides.

As previously mentioned, the Food and Drug Administration is responsible, in the United States, for the control of pesticide residues

on raw agricultural commodities, pursuant to an amendment made in 1954 to the Federal Food, Drug, and Cosmetic Act. Under this amendment, such a commodity may be condemned as adulterated if it bears or contains an "unsafe" pesticide chemical; for condemnation of the commodity to be avoided, the amount of pesticide chemical present must be within the specified tolerance, or the chemical must have been exempted from the requirement for a tolerance. Values of the tolerances for a number of pesticide chemicals are laid down in the Regulations made under the Act.

The question of residues of poisonous chemicals in foodstuffs is the subject of numerous items of legislation in the USSR. Thus, Health Regulations No. 531-65 of 10 June 1965 lay down the maximum permissible amounts of poisonous chemicals in foodstuffs. The Instructions of 27 June 1963 deal with the obtaining of samples of foodstuffs derived from crops treated with new pesticides in agricultural research establishments, for the purpose of investigation at hygiene establishments. The Circular of 25 May 1960 is concerned with the control of the use of poisonous chemicals in agriculture from the point of view of ensuring the production of good quality foodstuffs. The Circular describes the precautions to be taken in applying poisonous chemicals, and also lists the crops that, when treated correctly, can be used without prior laboratory investigation. If the instructions on the use of such chemicals are not obeyed, the agencies responsible for sanitary surveillance decide as to the possibility of using products derived from the crops concerned solely on the basis of the determination of the residues of poisonous chemicals in them. Finally, there are also a large number of circulars dealing with methods of determining the residues of various pesticides in foodstuffs.

#### *Other aspects of pesticide control*

Various other aspects of the control of pesticides are dealt with in the legislation of the countries covered in this survey. One of the most important of these is the question of the transport of pesticides, although this is not usually the subject of detailed provisions. Typical provisions are laid down, for example, in Denmark, in the Order of 25 September 1961, which simply provides that no pesticide may be transported in such a way as to come into direct contact with foodstuffs or animal feeding stuffs, and that all the necessary safety precautions must be taken during transport. In the Federal Republic of Germany, the Ordinance on rail transport contains similar provisions, but also lays down that if a package containing a poisonous substance (a term which includes pesticides) has been damaged, no foodstuff transported in the same truck may be supplied until it has been examined for possible contamination. The Poisons Act 1960 of New Zealand prescribes that, when ships or aircraft arrive in that country with certain poisons on board, the competent Collector of Customs must be informed to this effect. The corresponding containers may not be removed until they have been inspected. If they have not been stowed apart from foodstuffs or feeding stuffs, and if there is any risk that the latter may have been contaminated, the foodstuffs,

etc., concerned may not be landed, or may be landed only for reshipment, destruction or disposal. In Sweden, the Pesticides Ordinance of 1962 requires only that pesticides must be transported under conditions such as to ensure complete safety. The National Poisons and Pesticides Board has, however, issued a circular giving more detailed instructions in this connexion. These specify, in particular, that if a pesticide is found to have leaked out, it is often necessary to take measures rapidly to prevent, not only poisoning, but also the pollution of the soil or water.

Pesticide control legislation, in some countries, also deals with the prevention of the pollution of the environment by these products. Thus, in Denmark, the Order of 25 September 1961 specifies the precautions to be taken in destroying or disposing of containers, packages, etc., that have been used for pesticides, or in cleaning spray equipment, etc., so as to prevent water pollution. In addition, the Law of 1949 on watercourses, as amended in 1963, prohibits the discharge of pesticides and similar products into watercourses, or so close to them that they could become polluted. The provisions of the Order of 5 March 1954, in the case of France, are intended to protect the environment during the application of pesticides. The minimum distances from sources of water likely to be used as water supplies for man and animals at which such operations may be carried out are specified in this Order. After the operations have been completed, all material left over and empty packages must be collected and destroyed.

In contrast, legislation on domestic insecticides is practically non-existent. Of the countries covered by this survey, only the United States has certain legal provisions in this field, under the Regulations for the enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act, and these are concerned solely with the statements that may appear on the labels of such insecticides.

Legislation on fumigation exists in a number of countries. In the Netherlands, for example, the Decree of 25 July 1964 provides that places where treatment is being carried out with certain gaseous pesticides must be suitably marked. Such pesticides may not be used unless a person is present who holds the appropriate certificate granted by the Minister of Social Affairs and Public Health. Similar provisions are laid down, in New Zealand, under the Fumigation Regulations 1967 and, in the United Kingdom, under the Hydrogen Cyanide (Fumigation) Act 1937 and Regulations, though for this one substance alone. In the USSR, fumigation is covered by Health Regulations No. 531-65 of 10 June 1965, which lay down that the fumigation of buildings is subject to the approval of the agencies of the sanitary and epidemiological services. Fumigation may be carried out only by specially trained teams.

The above-mentioned Regulations of the USSR also deal with seed dressing. The provisions of the Regulations in this connexion are quite detailed in character, and cover safety precautions during the operations, protective clothing and equipment for the workers, etc.

A feature of the legislation of certain countries is that it contains provisions dealing with specific pesticides. This is particularly the case

in France, where numerous Orders have been made pursuant to Law No. 525 of 2 November 1943 relating to the organization of the control of pest control products for agricultural use. Of these, the Order of 25 February 1947, as amended, is concerned with DDT, and is therefore of particular interest at the present time. In addition, the Circular of 22 March 1957 deals specifically with systemic pesticides. They must be denatured in some manner so as to prevent confusion with other products, and may not be applied during the month preceding harvesting.

Pertinent legislation in the following countries is reviewed separately below : Czechoslovakia, Denmark, France, Germany (Federal Republic), Netherlands, New Zealand, Sweden, Union of Soviet Socialist Republics, United Kingdom, United States of America, and Venezuela.

### Legislation of various countries

#### CZECHOSLOVAKIA

In Czechoslovakia, the general control of pesticides is regulated by the legislation concerning poisons and other substances harmful to health. This legislation was completely revised in 1967 as part of the general revision of health legislation which began with the promulgation, in 1966, of the Law concerning the protection of public health. There is also legislation on occupational health which contains provisions of interest from the point of view of pesticides, and legislation under the jurisdiction of the Agricultural Ministry.<sup>a</sup> In addition, there are a number of national standards of importance.

#### *General legislation on poisons and other substances harmful to health*

General provisions governing poisons and dangerous substances were promulgated in a Government Decree dated 10 April 1967 and an Order for its implementation, dated 1 June 1967. The latter enactment contains a division dealing specifically with pest control products (i.e. Division 5 entitled "Destruction of animal pests and weeds"); a series of annexes prescribing, *inter alia*, lists of "specially dangerous poisons" and "other poisons" (each of which contains a certain number of pesticides), are appended to the Order.

#### *Government Decree No. 56 of 10 April 1967*

Various terms are defined in the basic provisions of this Decree, including "poisons" (substances causing poisoning even in small, or repeated small, doses, and included in the lists of specially dangerous poisons and other poisons). "Specially dangerous poisons" are those which, because of their properties, may be dangerous if errors or confusion occur during handling or which may be dangerous if used incor-

<sup>a</sup> As will be seen from the text, this Ministry has undergone several changes of name over the years.

rectly. Such substances are subject to a series of restrictions of which the most important are as follows; substances being manufactured or imported for the first time must be submitted to the Ministry of Health for examination, prior to marketing; poisons must be handled in such a way as to avoid any damage to human health and any danger to the wholesomeness or biological value of foodstuffs and consumer goods, or to other healthy living and working conditions (in particular, the air, water and soil), and any damage to the health of domestic animals, game or birds of economic importance, or to agriculture and forestry; any undertaking wishing to engage in the manufacture, preparation, importation, export, supply (or sale) or storage of specially dangerous poisons, or to use or handle them in any other way, must hold a licence issued by the competent health authority; no specially dangerous poison may be supplied (or sold), given away free of charge or transferred in any other way to any person not holding the statutory licence or authorization; records must be kept of all transactions involving specially dangerous poisons; every undertaking which treats foodstuffs, feeding stuffs or agricultural products or their packages with poisons must be in possession of the necessary documents; if necessary for the protection of health, the agency of the hygiene services (or, where appropriate, of the veterinary services) must be informed that such treatment has been carried out and the products in question must be notified in the manner prescribed (these provisions are of obvious applicability to pesticides); work with specially dangerous poisons must not be carried out by persons under 18 years of age or by persons who do not have the physical and mental aptitude or the professional competence required; the agencies of the hygiene services are empowered to order certain measures (e.g. the prohibition of the use of certain poisons or of products treated with them, the cancellation of licences, the examination of the professional competence of persons handling specially dangerous poisons, etc.).

In its concluding provisions, the Decree indicates that the maximum permissible levels of certain poisons in foodstuffs are to be dealt with in special legislation.<sup>a</sup>

*Order No. 57 of 1 June 1967*

This Order, made to implement the above-mentioned Decree, contains detailed provisions on the following main aspects: examination of poisons (applications for such examinations must be accompanied by details of the technical characteristics of the product and the main purposes for which it is intended, the type of activity envisaged, the results of toxicological tests, etc.); the procedure for applying for a licence to handle specially dangerous poisons (applications must be accompanied by information as to the measures to be taken for the protection of human beings, the measures envisaged for the protection of the environment

<sup>a</sup> Residue tolerances for pesticides in crops are fixed by the Chief Hygienist under the powers conferred by Sections 24 and 25 of Order No. 45 of 13 June 1966 of the Ministry of Health concerning the establishment and protection of healthy living conditions (see *Int. Dig. Hlth Leg.*, 1967, 18, 327).



or for ensuring the wholesomeness of foodstuffs and consumer goods, etc.); the rules governing the supply (or sale) of poisons (specially poisonous substances may not be supplied or sold to persons under 18 years of age, or other poisons to persons less than 15 years of age; poisons may not be sold in shops for foodstuffs or toys, while specially dangerous poisons may not also be sold in shops for articles for domestic use; etc.); keeping of records in respect of specially dangerous poisons and notification of the handling of other poisons; rules for the packaging and marking of poisons; professional qualifications required of workers (responsible members of the management staff must be familiar with the legal provisions dealing with poisons, have the necessary knowledge concerning the toxicity and other harmful effects on health of the substances being used and have completed higher studies in medicine, veterinary medicine, pharmacy or chemistry or have equivalent technical qualifications; workers engaged in pest and weed destruction, and not having the qualifications required of responsible management staff or of heads of units, and workers in the field of protective disinfection, disinsection and deratization, are required to take a specialized course, and pass an examination at intervals not exceeding three years); operations at the work-place (the precautions to be taken are indicated, i.e. measurement of the concentration of poisons in the atmosphere and in waters, decontamination of packages and disposal of unwanted leftovers, prohibition of access to poisons by unauthorized persons, etc.).

As mentioned above, this Order contains a special division (Division 5, entitled "Destruction of animal pests and weeds") dealing specifically with pest control operations. It provides however only for the prior notification of such operations to the competent authorities. It is laid down, *inter alia*, that the use of poisons for the destruction of animal pests in enclosed installations must be notified, not less than 48 hours beforehand, to the competent hygienist. The notification must state :

(a) the precise designation of the installation in which the operations are to be carried out;

(b) the dimensions of the installation and the nature of the goods stored, if any;

(c) the types, approximate amounts and concentrations of the poisons to be used; the use of hydrogen cyanide must be specially emphasized;

(d) the preparatory work required and the time needed for this purpose;

(e) the date and time of the commencement of the operations as such;

(f) the period of actual work, and that necessary for carrying out the operations as a whole;

(g) the safety measures to be taken;

(h) the name and address of the worker in charge and the name of the organization carrying out the operations.

The use of poisons for the destruction of animal pests and weeds, other than in enclosed installations, must be notified not less than 48 hours beforehand to the district hygienist and the local (or municipal) people's council in whose area such substances are to be used. The notification must state :

- (a) the precise designation of the place in which the operations are to be carried out, and the methods to be used;
- (b) the types, approximate amounts and concentrations of the preparations to be used;
- (c) the pests against which the preparations are to be used;
- (d) the date and time at which the operations are to be begun;
- (e) the time which it is assumed that the operations will require;
- (f) the safety measures to be taken;
- (g) the name and address of the worker in charge and the name of the organization carrying out the operations.

The use of poisons for the destruction of animal pests and weeds in any place intended for animals, foodstuffs and raw materials of animal origin, or animal feeding stuffs, must also be notified to the district veterinarian.

The operations mentioned above may be begun only if there is no decision to the contrary on the part of the agency of the hygiene services; any such decision must be made not less than 24 hours before the operations are commenced. The agency of the hygiene services is also empowered to make the carrying out of the work subject to certain special conditions. The operations must, in any case, be carried out by means of methods of work, or in conformity with technological directions, developed by the competent economic agencies and approved by the competent agencies of the hygiene services.

Lists of specially dangerous poisons, other poisons, and narcotics are embodied in the annexes appended to this Order. Most of the products contained in the list of specially dangerous poisons are in fact pesticides (phosphoric and thiophosphoric esters, arsenic compounds, certain organochlorine compounds such as aldrin, dieldrin, etc., certain gases used for the fumigation of plant products, etc.). The list of other poisons comprises, *inter alia*, various organochlorine compounds in common use as pesticides (DDT, HCH, lindane, etc.), organic compounds of tin and mercury, dinitrophenols, and products such as metaldehydes and nicotine, which are widely used in horticulture.

#### *Legislation on occupational health*

Instruction No. 49 of 16 December 1967 on the assessment of medical fitness for work contains certain provisions of importance from the point of view of the control of pesticides. Thus, Section 9 of this Instruction calls for such an assessment, by means of prophylactic pre-employment, periodic, emergency and post-employment medical examinations, *inter*

*alia*, in the case of workers employed in work-places where they are exposed to particularly adverse effects of the working environment; such work-places are referred to as "hazardous work-places" [riziková pracoviště]. This term is also defined, in Section 12, to mean a work-place in which there is an increased risk of accidents, occupational disease, poisoning, danger to mental health, or other damage to health; the inclusion of "poisoning" in this list means that a work-place in which a poisonous pesticide is used would be considered as a hazardous work-place.

The Instruction prescribes that every person, before beginning work in a hazardous work-place, must undergo a pre-employment medical examination, even if he has already undergone such an examination before beginning work at some other work-place. He must then undergo periodic medical examinations annually. The organization concerned must send the list of workers in hazardous work-places, within three weeks of their designation as such, to the competent medical officer, and keep him informed of any changes in this list.

Annex 2 to the Instruction contains a list, which is not intended to be exhaustive, of the activities in which workers are exposed to particularly adverse effects of the working environment. These include, *inter alia*, the manufacture of organophosphorus compounds and their use for plant protection purposes, and the manufacture and use of insecticides based on halogenated hydrocarbons.

### *Agricultural legislation*

The most important item of agricultural legislation is Law No. 61 of 25 March 1964 on the development of plant production, which is implemented by the Ministry responsible for agriculture. This Law provides that no plant protection product or machine used for their application may be manufactured or imported unless it has first been tested, and its marketing licensed by the Ministry of Agriculture, acting in agreement with the Ministry of Health. The Ministry of Agriculture may cancel the licence if the product is used or marketed in a way which is not in accordance with the conditions under which the licence was granted.

The Ministry of Agriculture also establishes the measures to be taken for the protection of water and economically useful animals, notably bees and fish, during the utilization of plant protection products. The Law also contains provisions dealing with the testing of plant protection products, the verification of pest control methods, and the inspection of plant protection products and the conditions under which they are stored.

An Order for the implementation of the above Law was issued on 31 March 1964; this points out that the principles upon which the testing and licensing of chemical plant protection products are based are contained in Czechoslovak State Standard ČSN 46 5890 (see below) and that manufacturers of chemical products are required to verify the properties of every production batch, to the extent laid down. The manufacturer must permit the agents of the institute of control to inspect the manufacturing, packaging, storage and testing operations undertaken.

The inspection of chemical products in storage is carried out by the institute of control with the collaboration, where necessary, of the agencies of the Ministry of Health and the Ministry of the Interior. The testing of mechanical devices comprises, on the one hand, technical trials and, on the other hand, tests of biological efficiency and agrochemical suitability; the licence is granted by the Ministry of Agriculture on the basis of the results. The above-mentioned Order also lays down conditions for the use of plant protection products; thus, the appropriate pre-harvest interval must be observed after the final treatment, and agricultural organizations must register treated fields and crops in accordance with special instructions issued by the Ministry of Agriculture in agreement with the Ministry of Health and the Ministry of the Interior. In addition, the Ministry of Agriculture, in collaboration with the Ministry of Health, is to issue instructions concerning the safety measures to be taken in work with plant protection products. Finally, the Order makes it obligatory to destroy used packages but prohibits the discharge of such packages and left-over chemicals into water or their destruction in the vicinity of bodies of water.

The protection of bees, fish and water during the utilization of plant protection products is governed by the provisions of Order No. 37 of 5 May 1963.

The Instructions of 1967 of the Ministry of Agriculture and Food lay down the principles for the aerial application of chemicals in agriculture and forestry. In the organization of such activities, every worker must conform to the requirements of Czechoslovak State Standards ČSN 46 5810 and ČSN 42 2702 (see p. 31).

### *Standards*

The Czechoslovak Standard of probably the greatest importance in connexion with the control of pesticides is ČSN 46 5890, issued in 1961, which is concerned with the testing and licensing of new plant protection products. This defines the expression "chemicals for the protection of plants and plant products against harmful agents" to mean chemicals used in agriculture and forestry for the destruction of harmful insects, the cure of plant diseases of fungal or bacterial origin, the destruction of weeds, the regulation of growth, the treatment of lesions of trees and shrubs, as baits or repellents for pests, for the destruction of rodents, the disinfection and disinsection of the soil and the destruction of pests of stored products.

Every manufacturer who wishes to market a new plant protection product must submit a written application to this effect to the Ministry of Agriculture, Forestry and Water Resources. The application must be accompanied by the following information and documents :

- (a) the designation or name of the product;
- (b) the precise chemical composition of the product (including all the adjuvants) and information as to the possibility of mixing it with other products;

- (c) the name of the pest against which the product may be used;
- (d) the draft text of the labels, with the directions for use, the storage requirements, and the proposed safety measures in application and storage;
- (e) the draft technical conditions, or other standards and the catalogue page, or the corresponding drafts, in so far as these are available;
- (f) the results so far obtained in laboratory and other tests, whether in Czechoslovakia or abroad, or other relevant documents;
- (g) data from the literature and, as far as possible, information on the toxicity of the product to warm-blooded animals (domesticated animals, game animals), fish and bees, and on the residues remaining after use, the methods for determining such residues, and the appropriate safety measures to be taken during use;
- (h) a preliminary opinion from the Ministry of Health as to the fundamental acceptability of the product for the purpose suggested; the application for such an opinion must be submitted to the Chief Hygienist, together with the information required by items (a) to (e) above and, in addition, evidence or data from the literature as to the toxicity of the product to man, and the residues remaining after use;
- (i) a preliminary estimate of the cost of the product, and an economic assessment of the product as compared with other similar products;
- (j) information as to when production may be begun, and on what scale.

A copy of the application, together with all the documents and the necessary samples, must be sent by the applicant to the Department of Plant Quarantine and Protection of the Central Institute for Agricultural Control and Testing at Brno. Testing may be refused if there are objections to the product on health, veterinary or safety grounds. The testing procedure is divided up into preliminary testing and the testing proper, and is mainly concerned, of course, with the agricultural effectiveness of the product; nevertheless, agencies and institutions authorized to this effect by the Ministry of Health may participate, where necessary, in the testing proper, as far as questions of hygiene are concerned. The results of the testing proper and the proposed decision as to the acceptance or rejection of the product are sent simultaneously to the Ministry of Agriculture, Forestry and Water Resources, and the Ministry of Health.

The licence to market a product is granted by the Ministry of Agriculture, Forestry and Water Resources, with the agreement of the Ministry of Health (on the basis of a favourable opinion on the part of the Chief Hygienist) and of the Ministry of the Chemical Industry and the Ministry of the Interior, on the basis of the proposals of the institute responsible for testing and of a meeting called to discuss the question by the Ministry of Agriculture, Forestry and Water Resources. The list of licensed plant protection products is published annually by this last-mentioned Ministry.

A licence may be withdrawn, *inter alia*, if the manufacturer so re-

quests, or if he does not conform to the conditions subject to which it was issued, or if the product is found to be harmful. A licence may be withdrawn with immediate effect, if this is necessary. Every change in the formulation of a licensed product is subject to the prior approval of the Ministry of Agriculture, Forestry and Water Resources and the Chief Hygienist. If such a change is made, the product must in fact be tested again. The decision as to the licensing of imported products is taken by the above-mentioned Ministry, in agreement with the Chief Hygienist.

A number of Czechoslovak standards are concerned with the application or other aspects of the use of pesticides, and contain instructions of importance from the point of view of occupational health. Some of these standards are concerned only with particular crops and are therefore of limited interest, such as those on the agricultural technology of sugar beet or winter rape, and will not be considered here.

Standard ČSN 46 5891, issued in 1961, deals with the storage of plant protection products, this expression being defined in essentially the same way as in the standard previously considered.

The premises used for storage must be reserved exclusively for this purpose, and must have good ventilation and lighting. Instructions must be hung up, in a suitable place, as to the provision of first aid and the methods of decontamination to be used. Protective devices for at least two persons, a portable first-aid kit, and equipment for decontamination must be provided. The first-aid kit must contain antidotes to the chemicals kept in store, decontaminants for the eyes, skin and mucous membranes, bandages, etc. The floor of the premises must be impermeable, easy to wash, etc.

No preparation may be stored unless it is included in the list of licensed preparations, issued each year by the Ministry of Agriculture, Forestry and Water Resources. The preparations must be stored in their original, undamaged packages, and in such a manner that accidental damage to these packages cannot occur. They may not be stored together with foodstuffs, beverages or feeding stuffs, nor in premises intended for the storage of foodstuffs or feeding stuffs. A record must be kept of the poisonous preparations, for which purpose a special register must be used. The person responsible for the storage of the preparations must be familiar with the properties of the preparations stored, and with the methods to be used for first-aid and decontamination purposes. He must undergo periodic medical examinations.

Another standard of interest is ČSN 48 2701, issued in 1962, which is concerned with the protection of forests against harmful insects and fungi. This prescribes that every worker engaged in the protection of forests by means of chemicals must be familiar with the contents of the standard and with the relevant legislation as to occupational safety and hygiene. Such work may not be carried out by pregnant women, nursing mothers, or adolescents less than 16 years of age. No person suffering from bronchitis, who has had a previous attack of tuberculosis, or is suffering from inflammation of the skin or mucous membranes, may work

with insecticides in the form of dusts. Persons less than 20 years of age are permitted to work with insecticide dusts, but not for more than four hours per day, or for more than eight days per calendar year. Workers with poisonous chemicals must be provided with protective clothing, goggles and gloves, and also with a respirator or mask, if they work with dusts or Bordeaux mixture. Eating, drinking and smoking during work are prohibited, and washing, after work, is compulsory.

All large-scale application of chemicals to forests must be notified to the district agency of the Ministry of the Interior and to the district people's council. The notification must state the location of the forest area which it is proposed to treat and a list of the communities within a radius of 3 km of it. With the agreement of the district people's council, warning notices to the effect that entry is prohibited are put up on all roads leading into the area. If aircraft are used for dusting or spraying purposes, medical services must be available, and a motor vehicle must be kept in the treated area for the transport of any person accidentally poisoned to a physician, or for bringing a physician to the site. A first-aid kit must also be available in the area.

No insecticide may be used in the immediate vicinity of waters used for the breeding of fish. Forest less than 200 m from waters and streams may not be treated by means of aircraft; in the case of treatment applied on the ground, the corresponding limit is 100 m. The collection of wild fruits in forests which have been treated with chemicals is forbidden for a period of not less than one week after such treatment has been carried out. Poultry and livestock must not be allowed into areas in which chemicals have been used or dressings applied to seeds.

Two standards cover the aerial application of pesticides, namely ČSN 46 5810, which is concerned with agricultural crops, and ČSN 48 2702, which is concerned with forests. Of these, the first defines "pesticides" to mean insecticides, fungicides, herbicides and other "protective substances". The "organizer" of the aerial application is responsible for providing suitable water for washing purposes, equipment for producing hot water, a wash-stand, soap, towels and brushes, clothing and footwear, equipment for decontamination and first aid, and facilities for every worker with poisons or substances harmful to health, to clean himself on the completion of the work. He must also make arrangements for the marking of the area to be treated. It is recommended that aerial application should be carried out in the morning or evening, in calm, cool weather, when there is little horizontal or vertical air movement. The maximum permissible wind velocities for aerial application, depending on the type of aircraft used, the nature of the work being carried out, etc., are given in Annex 4 to the standard.

The standard contains special requirements, applicable to the use of organophosphorus compounds, additional to those laid down in the Directives of 1960 of the Ministry of Agriculture previously mentioned. These compounds may be applied by means of aircraft, in the morning or evening, provided that the wind velocity does not exceed 2 m/sec and that the area treated is not less than 10 ha. The pilot must not prepare

the spray or fill the tank by himself. The cabin of the aircraft must be protected in such a manner that it is impossible for the preparation to get into it, either in the course of filling the tank or in flight. No pilot may undertake the aerial application of organophosphorus compounds unless he has undergone the prescribed medical examination. Other requirements apply to the marking of the area to be treated, the closing of roads, etc. Before the work is begun, the organizer must present to the pilot the authorization of the competent hygienist and of the competent agency of the security services.

As far as occupational safety and hygiene are concerned, the standard requires all the equipment used for aerial application to satisfy the technical conditions prescribed by the Chief Hygienist and the competent agency of the Revolutionary Trade Union Movement. The organizer must be familiar with the requirements of the standard and with the relevant legal provisions. The workers must be provided with the necessary protective equipment and must be familiar with the legal provisions applicable to the type of work which they are to carry out. During the operations, a motor vehicle, with driver, must be present at the airfield for use in emergencies, and the driver must be instructed as to the medical officer on duty. The aerial application, to crops, of poisons or other substances harmful to health, must be notified by the organizer not less than 24 hours beforehand to the competent people's council, as well as to the people's councils of adjacent localities.

Standard ČSN 48 2702, on the aerial and ground treatment of forests against pests, merely states that, in carrying out such work, the relevant legal provisions must be observed.

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#### DENMARK

The handling of phytopharmaceutical products, herbicides, insecticides, rodenticides, plant growth regulators, etc., in all its various aspects such as manufacture, storage, packaging, supply, use, inspection, etc., is regulated at present in Denmark by Law No. 118 of 3 May 1961. This Law was the outcome of the work of a special committee appointed on 5 May 1959 by the Ministry of Agriculture for the purpose of revising the 1948 and 1954 legislation on this subject.<sup>1</sup> The scope of the Law is however restricted to the uses specified in it and thus a given product employed for other purposes (e.g. the control of crows, pigeons or seagulls, the killing of fur-bearing animals, or the protection of wood and textiles against rotting and moulding) would be covered instead by the provisions of Law No. 119 of 3 May 1961 on poisons and substances harmful to health.

The Poisons Board [giftnævnet] of the Ministry of Agriculture, which was set up by Law No. 113 of 13 April 1954, is responsible for classifying the above-mentioned products (subsequently referred to collec-



tively as pesticides) according to their toxicity to man and domesticated animals. Classification of a product signifies authorization for its sale by the manufacturer who submitted the corresponding application (but not by other companies), on condition that it is labelled in the manner prescribed in each individual case (the form, the size of lettering, the colour of the paper and lettering, etc., must be approved). The Poisons Board also gives instructions regarding the conditions of sale, storage and use of pesticides, such as the maximum concentrations which may be applied and the pre-harvest interval to be observed, in order to ensure that residues in foodstuffs are kept to a minimum.<sup>2</sup>

The control of the manufacture and industrial use of poisons is the responsibility of the Labour Inspectorate [arbejdstilsynet]. The Service for the Control of Chemicals [kemikaliekontrollen] is responsible for the control of trade in poisons and for ensuring the observance of those provisions of Laws No. 118 and 119 of 3 May 1961 not within the jurisdiction of the Labour Inspectorate, the pharmacy inspection service or the Pharmaceutical Specialities Control Board [specialitetsnævnet].

*Specific legislation governing pesticides, etc.*

Law No. 118 of 3 May 1961 on products for the control of plant diseases, weeds, and certain animal pests and for plant growth regulation (subsequently referred to as the Law on pesticides) defines the term "pesticides" [bekæmpelsesmidler] to mean substances and mixtures of substances intended for the control of : (a) plant diseases; (b) weeds; (c) the following lower animals : (1) animals considered as harmful to useful and cultivated plants; (2) the parasites of domesticated animals; (3) the animal pests of grain, feeding stuffs and seeds; (4) animals harmful to textiles; (5) animals harmful to wood; (6) flies, mosquitos, bugs, cockroaches and ants; and (7) other harmful animals (snails, insects, clothes-moths, etc.) found in dwellings and stores; (d) the following warm-blooded animals : rabbits, voles, moles, mice and rats. The Ministry of Agriculture may decide that the provisions of the Law be applicable to other warm-blooded animals as well as to products (other than plant nutrients) having an effect on plant growth or development.

The general provisions of the Law (Chapter II) are concerned with the sale and the manufacture or importation of pesticides. The term "manufacture" covers mixing, dilution, impregnation, packaging and repackaging. Except with the authorization of the Poisons Board, no pesticide may be sold other than in the original package of the manufacturer or importer. No substance or preparation sold as a pesticide may contain any ingredient which reduces the activity of the product, or makes it more poisonous or more dangerous than is stated on the label. The manufacturer or importer is responsible for the quality of the pesticides which he markets. No advertisement, brochure, circular, label, price-list, etc., concerning pesticides may contain information, names, illustrations or textual matter which is incorrect or misleading. No pesticide may be sold other than in a package bearing the following

information : (a) the name of the product; (b) the weight or volume; (c) the proportion and nature of the active ingredients; (d) the proportion of other ingredients, water or other solvents; (e) the name or company name of the manufacturer or importer; (f) the date of manufacture, import or repackaging. The Ministry of Agriculture may prohibit the sale of a pesticide if it considers that it is only of low activity or if its name is misleading.

Chapter III contains general provisions concerning the prevention of poisoning. The Ministry of Agriculture may prohibit the sale, as a pesticide, of any substance or preparation which, in its opinion, is particularly dangerous to man or domesticated animals. It may also prohibit the use of any name previously used for a preparation having a different effect. No pesticide may be sold or used professionally before the Poisons Board has laid down provisions as to its packaging, marking, transport, marketing, storage and use.

Chapter IV is concerned with the control of pesticides. Every person who markets any substance of preparation as a pesticide must inform the Service for the Control of Chemicals to this effect, in writing, and provide the information mentioned under items (a) to (e) above; he must also keep a record of his activities. The checking of the identity of pesticides is carried out by the Service for the Control of Chemicals. The representatives of this Service have the right of access to any undertaking in which pesticides are imported, manufactured, sold, stored or used, and are entitled to take samples for purposes of analysis.

The approval of pesticides is dealt with in Chapter V. Every person who manufactures or imports a pesticide may apply to the Plant Research Service of the Ministry of Agriculture (or to the Ministry of the Interior, in the case of a raticide) for such pesticide to be approved as effective. Any person who obtains such approval is entitled to advertise the pesticide concerned, under the prescribed conditions. He must not mention in such advertising, however, without the authorization of the Service for the Control of Chemicals, that the product has been examined or approved, nor may he, without such authorization, change the composition of a product once it has been approved, or its name, or market another product under the same name.

The Order for the implementation of this Law was promulgated on 25 September 1961 and has since been amended on a number of occasions; it contains detailed provisions on certain matters covered by the Law. It is laid down that the packages in which pesticides are sold or supplied must be leak-proof, resistant to damage, and sealed in such a way that all danger is avoided. They must, in addition, satisfy all the requirements imposed by the Poisons Board. The warning notices, etc., must be given on the inner wrappings and, if possible, be printed directly on to them. The information given must be in Danish, but international names may nevertheless be used for the active ingredients. Section 20 contains recommendations and instructions for the Poisons Board. This Board may, *inter alia*, order that : (1) pesticides must contain a certain proportion of active ingredients; (2) colouring matters or other substances

must be added to them for identification or warning purposes; (3) they may not be sold in packages of dimensions smaller than those specified; (4) they may be used only for certain purposes; (5) they may not be used later than the date specified each year. The Poisons Board is entitled to require the manufacturer to provide all the necessary information as to the chemical composition of the product concerned and its toxicity. It may also ask for samples of the product and of its package to be provided.

The most important provisions are those whereby pesticides are divided up into four classes (X, A, B and C) according to their toxicity. *Class X* contains products for which the danger of poisoning associated with their use is so great that only authorized persons who have completed a special training course may use them, and only authorized merchants may sell them. Packages used for Class X products must bear the following information : (a) the words "May be used only by persons specially authorized by the Ministry of Agriculture"; (b) a death's head, over the words "POWERFUL POISON" [STÆRK GIFT], in white on a black background; (c) the word "Warning" [Advarsel], followed by a description of the dangers associated with the use of the product and the measures to be taken to avoid them; (d) a description of the early symptoms of poisoning, the antidote, if any, and the words "In case of poisoning, consult a physician immediately".

*Class A* includes those products not belonging to Class X but which may cause serious poisoning, possibly with a fatal outcome. The packages of Class A products must bear the information mentioned in items (b) to (d) above and the words "For professional use only" [Må kun anvendes erhvervsmæssigt].

*Class B* includes those products which, although not belonging to Classes X or A, are poisonous. The packages of such products must bear the word "POISON" [GIFT] in white on a black background and the warning mentioned in item (c) above.

Finally, *Class C* includes all other pesticides considered by the Poisons Board to be less dangerous. Their packages must bear the word "Caution" [Forsigtig], followed by a brief description of the measures to be taken to avoid the hazards associated with their use. There are no restrictions on the sale of Class C products.

Every person who manufactures, imports or sells pesticides belonging to Classes X, A or B must keep his stocks of such pesticides in special cupboards or premises which must be kept locked and be clearly marked with the word "Poison". Such cupboards or premises may not contain any products other than the above-mentioned pesticides or poisons included in lists IA or IB (see p. 37).

Class X pesticides may be sold only by : (a) manufacturers or importers authorized to this effect by the Poisons Board; (b) persons authorized by the Ministry of Agriculture. Such pesticides may be sold only to the persons mentioned in item (b), and to those who have received, from the Ministry of Agriculture, a special licence to use them. A register must be kept of all purchases and sales of Class X pesticides.

Class A pesticides may be sold only by : (a) manufacturers or importers authorized to this effect by the Poisons Board; (b) persons authorized by the Ministry of Agriculture to trade in Class X products; (c) qualified persons and organizations authorized by the Ministry of Agriculture to trade in Class A products. Class A pesticides may be sold only to the above-mentioned persons. They may be used only by : (a) persons authorized by the Ministry of Agriculture to use Class X products; (b) persons who are obliged to use such products in the practice of their profession; (c) persons using pesticides professionally for the benefit of other persons; (d) assistants to the above-mentioned persons. Class A pesticides may not be used in private gardens, or in those parts of public gardens, parks, etc., accessible to the public.

Class B pesticides may be sold only by : (a) manufacturers or importers authorized to this effect by the Poisons Board; (b) persons authorized by the Ministry of Agriculture to trade in products belonging to Classes X or A; (c) qualified persons and organizations authorized by the Ministry of Agriculture to trade in Class B products.

No pesticide belonging to Classes A or B may be sold to any person less than 16 years of age.

No pesticide may be transported in the same package as, or together with, any foodstuffs or other products intended for consumption by man or animals, in such a manner that the various products are in direct contact with one another. All the necessary safety precautions must be taken during transport.

Every person who uses pesticides must carefully follow the instructions given on the packages, so as to avoid all danger, whether direct or indirect, to man or domesticated animals. No such person may store such products with, or near to, foodstuffs or other products intended for consumption, or in dining rooms, medicine cupboards, dairies, etc. All pesticides must be stored in their original packages. All bottles, containers, packages, etc., which have contained poisonous pesticides must be destroyed or rendered harmless in such a manner that they no longer constitute a hazard to man or domesticated animals. Large quantities of pesticides may not be destroyed or disposed of without the agreement of the local health authorities. All the necessary precautions must be taken to avoid water pollution. No poisonous pesticide may be supplied to any person who, by reason of mental disease, mental retardation, drunkenness, etc., would be liable to harm himself or other persons.

The provisions of Chapter VIII of the Order (Sections 47 to 49) make the Service for the Control of Chemicals responsible for the quality control of pesticides, and for ensuring that manufacturers, importers and merchants observe the relevant provisions. Members of the staff of this Service are entitled to inspect the premises used for the manufacture, packaging, sale, etc., of pesticides, and to take samples for purposes of analysis. The persons in charge of such premises must provide all the information requested. Detailed provisions, in this connexion, are contained in the Instructions of the Ministry of Agriculture of 25 September 1961 for the Service for the Control of Chemicals. It is laid down, in

particular, that this Service must take special care to ensure that : (a) the content of active ingredients in pesticides agrees with the value given on the package; (b) pesticides are sold in the prescribed packages and with the prescribed labels; (c) advertising is not misleading, particularly from the point of view of the risk of poisoning; (d) merchants observe the provisions as to the conditions applicable to sale, storage, etc.; (e) persons authorized by the Ministry of Agriculture to use Class X pesticides use only those products specified in the authorization.

The Law on pesticides and the Order for its implementation have been supplemented by two circulars of the Ministry of Agriculture, issued on 25 September 1961. The first circular specifies the conditions applicable to the sale and storage of pesticides belonging to Classes A or B. The second lays down the procedure for the issue of the authorization to trade in such pesticides. This is issued by the Service for the Control of Chemicals and is valid for five years. Applications for the authorization are forwarded by the police authorities, who carry out the necessary enquiries in this connexion.

### *Legislation on poisons*

It has already been pointed out (see p. 32) that the provisions of Law No. 119 of 3 May 1961 on poisons and substances harmful to health apply in those cases where products are used in a manner not provided for by the Law on pesticides. The former Law distinguishes between poisons (substances which, when used in the normal way, give rise to a risk of the poisoning of man or domesticated animals) and substances harmful to health (substances which, when used in the normal way, give rise to a danger to the health of man or domesticated animals). All the substances covered by the Law are divided up into five lists annexed to it : list IA contains powerful poisons, list IB poisons, list II substances harmful to health, list III organic solvents harmful to health, and list IV non-medicinal gases harmful to health. Most of the commonly used pesticides are included in lists IA and IB.

Poisons may be manufactured only by persons authorized to this effect by the Labour Inspectorate. They may not be acquired or imported other than by, *inter alia*: (a) manufacturers; (b) merchants who have applied to the Service for the Control of Chemicals for the authorization to sell such products wholesale; (c) merchants who have obtained from the Ministry of the Interior the authorization to sell such products retail; (d) any person over 18 years of age who produces an order for the supply of a poison for some specific use. The order must be dated and signed by the person concerned, and must state the nature and amount of the poison and the purpose for which it is to be used; the order must be endorsed by the police authorities. No poison may be supplied to any person less than 16 years of age or who, by reason of mental disease, mental retardation, drunkenness, etc., would be liable to harm himself or other persons. A register must be kept in which an entry must be made whenever a poison is supplied.<sup>3</sup>

Poisons must be supplied in sealed packages, resistant to damage, made in one piece, and of a character such that no confusion can arise between poisons and harmless substances. The packages must be labelled in the prescribed manner. In general, poisons must be carefully stored, kept out of reach of unauthorized persons, and separately from foodstuffs, medicaments, cosmetics, animal feeding stuffs, etc.

The transport of poisons and substances harmful to health by railway, ship, aircraft or through the post is subject to the regulations made by the competent authorities in agreement with the Ministry of the Interior. In the case of all other forms of transport on the public highway, the Minister of the Interior, after having consulted the Minister of Justice, the Minister of Agriculture and the Minister of Public Works, may lay down further provisions for the purpose of ensuring public safety.

The provisions concerning the destruction or disposal of empty packages and unused residues of poisons and substances harmful to health are identical to those of the Order on pesticides.

Orders No. 304 and 305 for the implementation of Law No. 119 were promulgated on 9 October 1961. The first of these Orders is concerned with the use of certain poisons and substances harmful to health. It is laid down, *inter alia*, that only products covered by the Law on pesticides may be used as such. The Order also prohibits, for example, the use of cyanides or strychnine for killing fur-bearing animals; in addition, the use of phosphorus for the destruction of crows and that of arsenic or mercury compounds for the treatment of wood are made subject to certain restrictions. The Ministry of the Interior published, on 15 May 1964, a circular on the ordering and use of products of this type.

The second Order contains, *inter alia*, detailed provisions on the labelling of poisons. Both the inner and any outer packaging must bear : (1) a bright yellow label giving the name of the poison and, in the case of preparations, the percentage of the poisonous ingredient, the name or company name of the person or undertaking responsible for the packaging or importation and, in the case of supply to an individual, the name and address of the retailer and the date of supply; (2) the appropriate poisons sign in yellow on a black background as follows : (a) in the case of substances included in list IA, a death's head over the words "POWERFUL POISON" [STÆRK GIFT]; or (b) in the case of substances included in list IB, the word "POISON" [GIFT]. When poisons are supplied to individuals, the labels used must also bear the following warning notice : "Property of . . . Must not be given to any other person. May be used only for. . . To be kept out of the reach of unauthorized persons. Transfer to other containers prohibited. Package to be destroyed after use. Failure to comply is subject to penalty". Labels, poisons signs, etc., must be printed or affixed in such a manner that they will normally remain on the package until all the contents have been used. The use of the above-mentioned poisons signs is restricted to the poisons covered by the Order.

The packages of substances harmful to health (list II) must bear : (1) the words "Caution — dangerous", in white on a black background;

(2) the following words enclosed in a frame : " Storage together with or transfer to objects generally used for beverages, foodstuffs, medicines, or for hygienic purposes, is subject to penalty. To be kept out of the reach of children "; (3) the name of the product; (4) the name and address of the undertaking responsible for packaging or importation; (5) any warning notice that may be prescribed for the substance concerned; (6) any special statement that may be prescribed for the substance concerned by the Ministry of the Interior.

Further directives as to the labelling of poisons and substances harmful to health were issued on 1 January 1963 by the National Health Service.

### *Occupational health*

Occupational health is governed by Laws No. 226, 227 and 228 of 11 June 1954, as amended in 1968. Law No. 226, which is general in character, contains numerous provisions applicable to workers in the chemical industry. It is laid down that employers must take all the measures necessary to prevent industrial accidents and occupational diseases. The Ministry of Labour may, in agreement with the Labour Inspectorate, prohibit the carrying out of certain types of work by persons less than 18 years of age or in poor physical condition, and may order that certain workers shall undergo medical examination. The Labour Inspectorate may also order the regular medical examination of certain types of workers. Section 13 requires that working clothes and personal protective equipment (masks, gloves, goggles, etc.) shall be used. Item 19 of this Section deals specifically with the manufacture, packaging, etc., of poisons and substances harmful to health, and lays down that special measures must be taken for the protection of workers.

Law No. 228 on the protection of workers in agriculture, forestry and horticulture is more directly concerned with users of pesticides. Section 8, for example, prohibits the employment in dangerous work of persons not of adequate physical fitness. Section 19 specifically mentions poisons as giving rise to hazards against which the necessary safety measures must be taken. Section 20 makes obligatory, in the same way as Section 13 of the general Law (see *supra*), the use of personal protective equipment. Order No. 80 of 13 March 1969 of the Ministry of Labour, made pursuant to Law No. 228, prohibits the employment of children under 14 years of age in work with pesticides of Classes X, A and B.

Order No. 318 of 2 November 1964 of the Ministry of Labour, made pursuant to the three Laws mentioned above, is concerned with the notification of cases of occupational disease by physicians. Under this Order, every physician and superintendent of a hospital establishment must notify to the Labour Inspectorate every case of an occupational disease of which he becomes aware. The list of diseases given as an Annex to the Order includes, in item 4, poisoning caused by pesticides, phytopharmaceutical products and herbicides.

*Raticides*

Raticides are covered by the provisions of the Law on pesticides of 1961 (item (d) of Section 1). The professional use of these products, however, is also subject to certain special legislation. Thus Law No. 120 of 3 May 1961 on deratization lays down, in Section 8, that "the Ministry of the Interior may, in accordance with the provisions of Section 16 of the Law on pesticides, approve appropriate raticides for the purpose of guiding the communes in the choice and purchase of such products. Approved raticides may alone be used in the deratization campaigns organized by the communes".

Further details, in this connexion, are given in the Circular of 21 June 1962 of the Ministry of the Interior. Every application for approval must contain the following information : (a) the name of the preparation; (b) the weight or volume of the raticide in question; (c) the proportion and nature of the active ingredients; (d) the proportion of other ingredients, water or other solvents; (e) the name or company name and the address of the manufacturer or importer. The application must be accompanied by a sample of the product in the original package, the label, and the directions for use, and sent to the State Laboratory for Research on Pests [Statens skadedyrlaboratorium]. Raticides must be applied by qualified personnel working under the control of the municipality.

Another circular of the Ministry of the Interior, issued on 30 October 1962, laid down the procedure for the supply of raticides containing coumarin derivatives, such as warfarin and similar products. These products have been included among the Class B pesticides, and may be sold only to qualified persons and organizations authorized by the police to trade in such pesticides. Exemptions may be granted in certain cases, provided that all the necessary measures are taken to ensure the safety of man and domesticated animals.

*Water pollution*

The provisions of Section 30 of the Order of 25 September 1961 for the implementation of the Law on pesticides specify the precautions to be taken in destroying or disposing of containers, packages, etc., of pesticides, or in cleaning spray equipment, etc., for preventing the pollution of waters used for drinking, bathing, irrigation or the watering of domesticated animals. In addition, an amendment introduced on 3 May 1963 into Section 5 of the Law of 1949 on watercourses, prohibits the discharge of phytopharmaceutical products, herbicides, pesticides and plant growth regulators into watercourses (including canals, lakes, ponds, etc.), or so close to watercourses that they could become polluted as a result. Exemptions may nevertheless be granted by the Ministry of Agriculture in the case of the destruction of vegetation in watercourses, provided that fish and the organisms on which they feed cannot be harmed as a result, or for the carrying out of experiments on the chemical destruction of plants in watercourses.



*Residues in foodstuffs*

Section 2 of the Law on foodstuffs, in the version of 9 February 1968, prohibits the offer for sale or the supply to other persons of foodstuffs liable to cause any disease or poisoning, when consumed in the normal manner.

As already mentioned, the use of pesticides is controlled by the Poisons Board, which specifies, *inter alia*, the instructions to appear on the labels of such products. The Board may either prohibit the use of pesticides on certain crops or, for example, specify the period which must be allowed to elapse between treatment and harvesting, so as to ensure that contamination is completely eliminated or at any rate reduced as far as possible.<sup>a</sup> According to Bro-Rasmussen,<sup>2</sup> "if the instructions thus given for the use of pesticides are followed, no residues should be found on foodstuffs or such residues as exist will be so small that they will be harmless to consumers". He adds that "Danish farmers and market gardeners, who are well-informed and conscious of their responsibilities in the use of pesticides, follow this principle. . . and, as a result, Danish foodstuffs have a very low content of pesticides".

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FRANCE

The use of pesticides in agriculture is, at least in principle, strictly regulated in France. This legislation, based on Law No. 525 of 2 November 1943 and the numerous Orders made for its implementation, provides a framework for the control (including the labelling) of pest control products and establishes conditions of use intended to assure the minimum of risk to the user and the least possible residues in foodstuffs. The domestic use of pest control products is not however covered by this legislation and, as Le Moan points out,<sup>4</sup> "the paradoxical situation sometimes occurs in rural areas whereby it is possible to employ products inside inhabited premises while the use of these same products in neighbouring cow-sheds and greenhouses is prohibited". The Minister of Social Affairs made the following reply on 1 December 1967 to a question posed on this subject: "Products sold as domestic insecticides, whether for spraying or in the form of solid strips, do not correspond to the definition of medicament as given in Article 4511 of the Public Health Code. Their marketing is hence not subject to the prior authorization of the Minister of Social Affairs prescribed by Article 4601 of the Code. However, insofar as such insecticides may contain active ingredients included in the poisons schedules, the provisions of Part III of Book V of the Code are applicable to them, notably those provisions dealing with

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<sup>a</sup> It has been announced that the Poisons Board has prohibited, as from 1 November 1969, the manufacture of and trade in DDT in order to limit the chemical pollution of the environment.

the labelling, holding and supply of poisons. Companies which place such insecticides on the market incur full civil and criminal liability for any failure to observe these provisions. The problems liable to result, in the field of public health, from the absence of special provisions concerning domestic insecticides have not escaped the attention of the Minister of Social Affairs. It is not excluded that measures will be adopted, with the agreement of the government departments responsible for agriculture and industry, which would provide for testing the composition of these insecticides, verifying whether statutory provisions are being observed, and imposing, in appropriate cases, such precautions in use as appear necessary."<sup>4</sup>

The above-mentioned legislation has been supplemented by Decree No. 48-1805 of 19 November 1948, as amended, which regulates trade in, and the holding and use of, poisons. Part I of this Decree deals, *inter alia*, with the use of poisons in agriculture. Several Orders have made provision for the insertion of pesticides or their active ingredients in Schedule A (toxic substances) or Schedule B (dangerous substances) of Section I of the poisons list.

A special commission attached to the Ministry of Agriculture, known as the Investigatory Commission on the Use of Toxic Substances in Agriculture [Commission d'étude de l'emploi de toxiques en Agriculture], has been assigned the task of furnishing the information necessary to enable the toxicological assessment of new pest control products to be carried out and to permit the health and legislative authorities to regulate the conditions for use. This Commission was established by an Order dated 30 October 1934. As of 1964, it was made up of 17 members representing, *inter alia*, the Higher Council of Public Hygiene of France, the Faculty of Pharmacy of Paris, the Service for the Prevention of Fraudulent Practices, manufacturers and farmers. Between 1944 and 1964, the Commission held nearly 120 sessions in the course of which the possibilities of making use in France of numerous pesticides made available to agriculture by the chemical industry, were examined. In addition, the Commission gave its views on Orders issued by the Minister of Agriculture to regulate the use of toxic or dangerous substances in agriculture.<sup>9</sup>

Another Commission, also attached to the Ministry of Agriculture, is more particularly responsible for studying the effectiveness of pesticides for agricultural use and for decisions as to approval. It was established by the Law of 2 November 1943 (see p. 43).

The Rural Code (Articles 1144 to 1234) makes provision for compensation for agricultural accidents and occupational diseases, Tables 8 to 13 listing the various diseases and forms of poisoning which may be caused by pest control treatments. Accidents and diseases associated with the manufacture and handling of pesticides fall within the domain of occupational safety and hygiene and hence the provisions of the Labour Code.

The aerial application of pesticides is dealt with in certain provisions of the Order of 5 March 1954 relating to the application of pest control products: this Order embodies various prohibitions the object of which is to prevent the pollution of the surrounding environment.

*Law No. 525 of 2 November 1943 relating to the organization of the control of pest control products for agricultural use (as amended)*

Section 1 of this Law prohibits the sale, placing on sale, or distribution without charge of pest control products for agricultural use which have not been granted approval [homologation] or a provisional sales licence. The products covered include all antiseptic and anticryptogamic substances intended for the protection of crops and plant materials, herbicides, products for use against vertebrates and invertebrates harmful to crops and agricultural products, and adjuvants sold either alone or in mixtures and intended to improve the conditions of use of the products cited. Provision is made for exemptions from the requirement for approval, a list of "simple industrial products" and certain categories of pest control products thus exempt being given by Dehove.<sup>1</sup>

Under the terms of Section 3, approval is granted only to products which have been subject to an examination; the latter may include physical, chemical or biological tests in official laboratories. Approved products are entered in a register kept by the competent department. Section 4 establishes a Commission on Pest Control Products for Agricultural Use [Commission des produits antiparasitaires à usage agricole], the functions of which are : (1) to propose to the Secretaries of State concerned all measures likely to contribute to the standardization of pest control products for agricultural use and, in general, to assure users of all necessary guarantees of the effectiveness of these products; (2) to define methods for testing the composition and effectiveness of products submitted for approval; (3) to give its views on all matters submitted to it by the Secretaries of State concerned. In addition, Section 5 sets up an Investigatory Committee on Pest Control Products for Agricultural Use [Comité d'études des produits antiparasitaires à usage agricole], responsible in particular for arranging for the tests prescribed in Section 3 to be carried out, under the conditions laid down by the above Commission, on products intended to be placed on sale. Under the terms of Section 8, a new application for approval must be submitted in the event of any modification in the physical, chemical or biological composition of a product which has been approved in accordance with the provisions of this enactment. Products authorized for sale must be labelled in accordance with the provisions of the Decree of 11 May 1937; the label must also indicate the dose and method of use, as given in the approval register, as well as the date and number of the entry in the register and the precautions to be taken by the user. Finally it is prohibited to advertise products which have not been approved or granted a provisional sales licence.

*Decree No. 48-1805 of 19 November 1948 embodying public administrative regulations relating to the importation, holding and use of, and trade in, poisons (as amended)*

The provisions of this Decree which concern plant protection products and other pesticides are those of Part I (Provisions governing poisons

where they are to be used for commercial, industrial or agricultural purposes). Sections 2 to 7 deal with trade in toxic substances. Their sale is restricted to pharmacists and to persons who have made the appropriate declaration to the mayor of the commune (or, in the case of Paris, the Prefecture of Police). A special register is kept of these declarations. The conditions for the holding, labelling, and packaging of toxic substances, and the restrictions on trade, are similar to those existing in most countries. Thus, it is specified that these substances may be sold only to persons at least 18 years of age, known to the seller or able to produce proof of identity. They may be supplied only against an acknowledgment of sale (or order voucher), dated and signed by the purchaser and indicating his profession and address. If the buyer's profession does not involve the use of the substances sought, the acknowledgement (or order voucher) must state the purpose for which the substances are intended. The acknowledgment or voucher must be retained for three years by the seller and be made available to the competent authority whenever requested. Sections 8 and 9 deal specifically with agricultural uses. It is laid down that where poisons are intended for the destruction of agricultural pests, they may not be supplied in the pure form but must be mixed with odoriferous and colouring substances, according to the formulas laid down by Order of the Minister of Agriculture. Such mixtures may be supplied only in metallic containers or in hermetically sealed, leak-proof, resistant containers, of a type which has been granted prior approval by the Service for the Prevention of Fraudulent Practices of the Ministry of Agriculture. The use of these substances for the destruction of agricultural pests is prohibited in all crops other than those for which an Order of the Minister of Agriculture has authorized their use. The Order in question establishes, for each type of crop and for each region, the conditions to which authorization is subject and the periods of the year during which the use of the particular substances remains prohibited. An Order of the said Minister, made after consultation with the Higher Council of Public Hygiene of France, prescribes the precautions to be taken by persons using arsenical products, notably lead arsenate. Other than under these conditions, the placing on sale and sale of poisons for use in the destruction of agricultural pests are prohibited.

It is prohibited to use arsenical compounds for the destruction of flies and of agricultural pests, except where these products are used for winter spraying. The supply and use of products containing arsenic, lead or mercury for the disinfection of harvested products intended for human or animal consumption, and for the eradication of weeds in garden alleys, courtyards and sports grounds, are prohibited. Substances covered by Part I of the Decree may not be supplied in pure form where they are intended to be used in the making of poisoned baits for the destruction of insects and animal pests. They must be mixed with at least ten times the amount (by weight) of inert and insoluble substances after which a bright red, black, green or blue colouring matter is added. They may be sold only by pharmacists.

The above-mentioned provisions apply only to poisons placed in Schedule A of Section I of the poisons list. In addition to the products already referred to, this Schedule includes, *inter alia*, phosphorus and certain of its compounds, thallium salts, methyl bromide, chloropicrin, carbon tetrachloride, hydrocyanic acid, phosphine, carbon disulfide, nicotine and strychnine, most of the organophosphorus insecticides, certain organochlorine insecticides such as aldrin and dieldrin, and certain coumarin and pyrimidine derivatives.

The provisions applicable to dangerous substances (listed in Schedule C and likewise containing many pest control products) are laid down in Section 17. In addition to rules concerning the holding, packaging, labelling and supply of these substances, it is laid down that when intended for the destruction of agricultural parasites and pests, by means of painting, spraying, fumigation, or dusting, or in the form of baits, or by other procedures, Schedule C substances and preparations containing them must be mixed (except in cases of incompatibility) with odoriferous or colouring substances, according to the formulas laid down by the Order of the Minister of Agriculture.

Schedules A and C (Section I) were most recently amended by an Order dated 24 September 1965.

#### *Legislation dealing with specific products*

Numerous Orders made pursuant to the above-mentioned Law of 2 November 1943 deal with trade in and agricultural use of specific products. Their general provisions are on the whole similar and, for the purpose of this review, it will be sufficient to cite that dealing with DDT. The Order in question, dated 25 February 1947, was amended in 1948 and 1950. Its principal provisions are as follows: "1. The use of DDT for the destruction of insects and pests which are harmful to agriculture is authorized under the following conditions: (1) for the preparation of powders to be used for dusting. Such powders must not contain more than 10 % of DDT by weight; (2) for the preparation of powders to be diluted for application by atomization, painting or spraying treatments. . . ; (3) for the preparation of solutions or emulsions in organic oils or solvents; (4) for the preparation of poisoned baits (brans, pastes, etc.). The concentration of DDT in the bait when ready for use must not exceed 1 % by weight. . . Powders, solutions or emulsions must be coloured violet and an odoriferous substance must be added to them. 2. Insecticidal treatments by means of products containing DDT are prohibited: (1) on fruit trees: (a) during the period of full blossoming; (b) later than 15 days before harvesting of the fruit; (2) on forest or roadside trees, during the period of exudation of honeydew; (3) on plants visited by bees, during the period of full blossoming; (4) on harvested products, notably cereal and pulse grains intended for human and animal consumption. Treatments which do not involve any direct contact between the harvested products and insecticides are however permitted. . . , as for example the external dusting of closed sacks containing grains or the exposure of grains in proximity to receptacles containing insecticides. . . 3. Disin-

section, by products containing DDT, of premises, stores, empty packages and agricultural equipment is authorized. If however the premises or stores contain products intended for human and animal consumption, these must be kept free of any direct contact with the insecticides in question. 4. Manufacturers of the preparations referred to in Section 1 must obtain approval of their products in accordance with the procedure prescribed by the Law of 2 November 1943. 5. Containers used for these preparations must carry a label. . . Such labels must be green in colour and bear the following information, in black characters : (a) the name and address of the manufacturer; (b) the brand name; (c) the number and date of registration of approval as prescribed by the Law of 2 November 1943; (d) the name of the active ingredient (as given in Schedule C) present in the product; (e) a statement of guarantee as to the composition, given in the form prescribed by the Decree of 11 May 1937; (f) the intended purpose of the product. In addition, the following information must be given on part of the label which need not be green in colour : (a) the doses to be applied and the directions for use, under the conditions laid down by the Law of 2 November 1943; (b) the precautions to be taken for the protection of bees. In addition, a green band bearing the word "dangerous" in conspicuous black characters must encircle such containers. . . 7. Labels, catalogues and advertising material must be submitted, in duplicate, for the approval of the Ministry of Agriculture (Directorate of Prevention of Fraudulent Practices). 8. The products in question must be stored in their original packages. Users must take all precautions to avoid prolonged contact of emulsions, even if diluted, with the skin, and in particular must wash their hands thoroughly after each treatment. . ."

For certain products which present particular dangers in use, the Ministry of Agriculture has also published circulars providing supplementary information. An example is the Circular of 22 March 1957 concerning trade in, and use of, systemic pest control products. The preamble to this Circular points out that, on account of their toxicity and special manner of diffusion through the vascular system of the treated plant, the so-called "systemic" [endothérapiques] pesticides necessitate the taking of certain measures and precautions. Specialities containing these substances may not be traded in or advertised unless they have been granted the sales licence provided for by the Law of 2 November 1943. They must be denatured by means of colouring or odoriferous substances in order to avoid any confusion with other products, particularly beverages. They must be labelled and supplied under the conditions laid down for Schedule A poisons. All crops, other than market garden crops, may be treated with these products. When ready for spraying, the concentration of active ingredient in these products used in agriculture must not exceed 0.1 %. They may not be applied during the month preceding harvesting.

Among the more recent enactments dealing with specific pesticides, mention should be made of an Order dated 25 September 1965 (which repeals the Order of 10 April 1952 concerning diethyl and paranitrophenyl

thiophosphate and all thiophosphoric esters), laying down the conditions for using some 30 poisonous pesticides in agriculture. Partial restrictions on the application of each of these products are specified. In general, treatment is prohibited while plants are in full blossom and during a certain number of days prior to harvesting. The maximum authorized concentration of each substance is indicated. The Order also lays down the following precautionary measures : (a) *while being held prior to use*, the products must be kept in their original package in locked premises, away from any foodstuffs (the premises must be kept cool and ventilated to avoid the accumulation of vapours); (b) *during use*, persons handling the products must, in particular, wear working clothes, impermeable gloves, and protective goggles, avoid the inhalation of vapours, contact with the skin, and ingestion, abstain from applying the products against the wind, and abstain from smoking; a rotational system should be instituted to ensure that workers are not engaged for more than half the day in the application of treatments; (c) *after use*, machinery must be emptied and cleaned at the actual place of work, leftovers must not be thrown into roadside ditches or into pits, ponds or watercourses but must be buried far from springs and wells, empty packages must be destroyed or buried, working clothes must be cleaned, and all workers must wash their face and hands before eating.

With regard to the French approach of prohibiting applications during a specified pre-harvest interval rather than establishing maximum permissible residues in foodstuffs, Truhaut<sup>10</sup> notes that "instructions as to the periods of prohibition of treatment with a whole series of pesticides are given in recent Orders of the Department of Prevention of Fraudulent Practices, drawn up on the advice of the Investigatory Commission on the Use of Toxic Substances in Agriculture and published from time to time in the *Annales de l'Expertise chimique et de la Répression des Fraudes*". He remarks that : "An important limiting factor on the effectiveness of this method is that users do not by any means always comply with legal provisions. Their basic concern is the protection of their crops and they often treat them too close to harvest. . . Moreover, if there is a rapid proliferation of pests just before harvesting, farmers have a tendency to resort to treatments which they know to be effective, in order to protect their crops. In this connection, every farmer should realize that it is his duty to be aware of the dangers of such practices, since he himself may well become a consumer, by eating the produce of other growers. Moreover, in committing this type of contravention, the farmer is, at least in principle, rendering himself liable to penalty. This is of course contingent upon the detection of such contraventions, not always an easy matter in view of the limited number of agents of the Department of Prevention of Fraudulent Practices." On this same subject, it has been stated<sup>8</sup> that "this system, of considerable value *per se*, necessitates very strict control and very numerous verifications, having no relationship with what is actually possible in reality. Moreover, on the basis of current legal provisions, foodstuffs ought not to contain any residues; only lindane, malathion and pyrethrins are regulated, as sub-

stances tolerated in certain food products of plant origin. Taking into account the economic needs of modern agriculture and the impossibility of radically suppressing the use of numerous pesticides, realist policy dictates that a tolerance level for pesticide residues in each foodstuff should henceforth be introduced in France."

As far as the establishment of tolerances for pesticide residues are concerned, an enabling law currently in preparation will enable the health and governmental authorities to follow the directives of the European Economic Community relating to the harmonization of the legislation of Member States in this field.<sup>a</sup>

*Order of 5 March 1954 relating to the application of pest control products*

The provisions of this Order are intended to protect the environment during the aerial spraying of pesticides or when certain methods of land spraying are used. Section 2 prescribes that: "Except in the case of exemptions granted by the Prefect on the advice of the Director of Agricultural Services, pest control treatments may be carried out only in zones located more than 50 m from the points enumerated below, where they are effected by sprayers driven by an engine of more than 20 H.P., or more than 100 m from these points where they are effected from aircraft: (a) dwelling-houses; (b) sources of water likely to be consumed by man and domestic animals; (c) crops which, under the legislation in force, must not be treated with the product employed, during the period in question; (d) rivers and ponds with an abundant fish population; (e) officially reported beehives and apiaries; (f) game-breeding preserves and hunting reserves approved by the Minister of Agriculture."

Sections 3 to 5 specify that only simple industrial products or specialties which have been approved or granted a provisional sales licence and for which the instructions specifically indicate that they are suitable for the purpose may be applied by means of compressed air land sprayers or by aerial equipment. During operations, aerial spraying undertakings must, on their own responsibility, take all appropriate measures to identify landing strips and the zones being sprayed, in a conspicuous manner. Animals and persons not concerned with the treatments must not be allowed access to these strips and zones. Where necessary, operators must be provided with protective clothing and masks. Special provisions concerning the protection of bees are laid down in Sections 6 to 8. Finally, Section 9 prescribes that, after completion of any land or aerial treatment, any powder left over and unsuitable for subsequent use, as well as empty packages, must be collected and destroyed so as not to leave the terrain in a contaminated state.

*Provisions of the Rural Code concerning compensation for occupational diseases in agriculture*

Article 1146 of the Rural Code provides for compensation for occupational diseases in agriculture. It has however been pointed out that

<sup>a</sup> Truhaut, R. (1969) personal communication.



"certain diseases caused by the handling of phytopharmaceutical products are not yet recognized as occupational diseases. The legislation on compensation for occupational diseases in agriculture (Decree of 17 June 1955) made provision for only a very limited number of forms of chemical poisoning for which indemnification is payable (arsenical compounds, carbon disulfide, carbon tetrachloride, mercury compounds, nitrophenol derivatives, parathion). This list needs to be extended, firstly so as to permit compensation to be paid for accidents at work and, secondly, to induce employers and employees to become aware of the hazards associated with substances included in the Schedule of occupational diseases." <sup>3</sup>

*Provisions of the Labour Code dealing with pest control products*

The enactments which make up the Labour Code contain a certain number of provisions (Part II of Book II) applicable to workers in the chemical industry likely to be involved in handling pesticides. These provisions deal, on the one hand, with compensation for occupational diseases and, on the other hand, with their prevention, general protective and hygiene measures being prescribed.

Those occupational diseases subject to indemnification (and compulsory notification) are enumerated in a series of schedules established by decree. Of the 40 or so schedules currently effective, some 15 relate to poisoning or diseases caused by chemical products.

The prevention of occupational diseases requires the taking of several measures (evacuation of fumes, dusts, etc., provision of protective equipment, provision of showers, pre-employment and periodical medical examination, notification, etc.). A detailed summary of these measures and the legislation on which they are based (Decree of 10 July 1913, as amended, Order of 23 July 1947, as amended, Decree of 27 November 1952), has been published by Simonin.<sup>5,6,7</sup>

During the IXth National Meeting on Occupational Medicine, held in Le Havre in May 1966, it was noted that considerable progress has been registered in the last 20 years but also that "while there is a gradual disappearance of the classical occupational diseases, due to the application of the preventive rules which have been formulated, new diseases are appearing in conjunction with technological progress and the use of new chemical products. The necessary measures — often already known in principle — must be prescribed and adopted even before pathological symptoms are manifested. The toxicity of a new substance ought to be studied experimentally before it is manufactured industrially." <sup>2</sup>

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GERMANY

*(Federal Republic of Germany)*

The provisions governing the various safety aspects of the handling of pesticides in the Federal Republic of Germany are contained partly in federal enactments and instruments, such as the Plant Protection Law

of 10 May 1968 and the Ordinance of 4 March 1969 for its implementation, the Directives of the Federal Health Department [Bundesgesundheitsamt] and the Federal Biological Institute for Agriculture and Forestry [Biologische Bundesanstalt für Land- und Forstwirtschaft] concerning the precautions to be taken in the use of pesticides and plant protection products, the Federal Law on communicable diseases, and the Ordinance of 29 January 1919 on the control of pests by means of highly toxic substances, and partly in a large number of laws, ordinances, etc., enacted by the different Länder and concerned mainly with trade in poisons and plant protection products. In addition, various items of legislation govern the use of particular products, while the Law on foodstuffs lays down the maximum permissible amounts of pesticide residues in foodstuffs. Reference should also be made to an Ordinance concerning plant protection products harmful to bees and to certain provisions in the legislation on radiation protection.

### *Federal legislation*

The use of highly toxic substances for the control of animal and plant pests remains subject to the provisions of the above-mentioned Ordinance of 29 January 1919. It is laid down that these substances may be employed only by specially trained personnel attached to a licensed undertaking.<sup>5</sup> The provisions of this Ordinance, which is concerned mainly with prussic acid, phosphine, ethylene oxide and acrylonitrile, must however be considered as out of date to some extent, in view of the introduction of new, highly toxic pesticides not available in 1919.<sup>3</sup>

The Plant Protection Law of 10 May 1968 is a comprehensive enactment providing, *inter alia*, for a compulsory official system for the licensing of agricultural pesticides. The objectives of the Law are stated as follows : (1) the protection of plants against pests and diseases; (2) the protection of plant products against pests; (3) the prevention of damage, particular to the health of man and animals, liable to arise during the application of plant protection products or other measures for the protection of plants or plant products. The following are among the definitions given : (1) *plants* : living plants and plant parts, including fruits and seeds; (2) *pests* [Schadorganismen] : (a) animal pests [tierische Schädlinge]; (b) harmful fungi, bacteria and viruses; (c) harmful algae, mosses and lichens; (d) weeds and parasitic higher plants. (All stages of development are included under items (a) to (d)); (3) *plant protection products* : substances and preparations thereof which are intended to protect plants against pests or diseases or plant products against pests or to prevent the germination of plants. . . ; (4) *substances* : (a) chemical elements, chemical compounds and their mixtures and solutions; (b) processed or unprocessed plants, plant parts and plant constituents; (c) micro-organisms, viruses and their constituents or metabolic products.

Section 3 of the Law empowers the Federal Minister of Food, Agriculture and Forestry to enact ordinances which may, *inter alia*, prescribe or prohibit the use of specific plant protection products. Corresponding

ordinances may be issued by the Land Governments should the above-mentioned Federal Minister fail to use his powers under this Section.

Under Section 6, the Minister mentioned is empowered to enact ordinances, with the consent of the Federal Ministers of Health and Economic Affairs, prohibiting or restricting the use of licensed plant protection products on particular plants to be used for human or animal consumption, where such action is necessary for the protection of health. Similar measures may be imposed in order to prevent other forms of damage, in particular, to the health of animals. These ordinances may specify the objective, method and time of application of the product, the quantity to be applied, and the minimum pre-harvest interval.

Under Section 7, plant protection products may be imported and marketed only if they have been licensed by the Federal Biological Institute for Agriculture and Forestry. Applications for a licence must contain : (1) the name or trade name and the address of the applicant (who may be the manufacturer, the distributor or the importer); (2) a description of the product; (3) the qualitative and quantitative composition of the product, using the common chemical names of the ingredients; (4) the uses envisaged, with an indication of any associated hazards; (5) the directions for use; (6) the texts of any statements to be shown on the container and outer wrapping and the wording of the package insert, if any; (7) information on the type of packaging; and (8) data necessary for evaluation of the product (see p. 52).

After the product has been tested, a licence is granted provided that : (1) the product is sufficiently active; (2) the requirements for the protection of human and animal health in the handling of dangerous substances are satisfied; (3) when used in the prescribed manner, the product has no deleterious effects on the health of man or animals or any other adverse effects. Decisions in regard to the health requirements (items 2 and 3) are taken by the above-mentioned Institute in agreement with the Federal Health Department. An expert committee at the Institute, appointed by the Federal Minister of Food, Agriculture and Forestry, must be consulted before the licence is granted. The licence is normally valid for 10 years and is renewable.

Under Section 10, the above-mentioned Minister is empowered to enact ordinances establishing the procedures for the testing and licensing of plant protection products (see p. 52).

Section 12 prescribes that plant protection products may be marketed only if the following information is shown, in clearly legible script, on the containers and sales wrappings : (1) the name of the product; (2) the licence number; (3) the name or trade name of the manufacturer, importer or distributor (domiciled within the area of validity of this Law); (4) the nature and quantity of the active ingredients; (5) the objective, method and time of application, the quantity to be applied, the minimum pre-harvest interval, and an indication of any hazards which may arise in the use of the product ; (6) the latest date for use, in the case of products of limited storage life; (7) any further information as prescribed by the Federal Biological Institute at the time of licensing.

Section 14 deals with the professional use of plant protection products and prescribes that any person making professional use of such products must inform the competent authority at the time of commencement of operations. Undertakings using plant protection products may carry out operations only under the direction of a reliable person having the necessary technical knowledge and experience. For purposes of protection of human and animal health, the competent authority may issue orders to such undertakings, dealing in particular with the use of plant protection products, equipment or procedures.

Section 18 lays down that the Institute referred to above is an independent federal agency, subordinate to the Federal Minister of Food, Agriculture and Forestry. The following are among its tasks : (1) providing information and advice to the Federal Government in the field of plant protection and the protection of plant products; (2) conducting research in these areas; (3) testing and licensing of plant protection products and supervising licensed products.

The Ordinance of 4 March 1969, made pursuant to the provisions of sub-section 1 of Section 10 of the Law, establishes the procedure for testing and licensing of plant protection products. Applications for a licence are to be made using forms of a type fixed by the Federal Biological Institute. The data necessary for evaluation of the product, which must accompany the application, comprise : (1) experimental reports on the activity of the product in all the uses mentioned in the application; (2) details of its effect on the health of man and animals; (3) details of its behaviour on or in plants or plant products, with particular reference to the degradation and residues of active ingredients; (4) details of its behaviour in soil and water, with particular reference to the degradation and residues of active ingredients; (5) details of the analytical methods used for the determination of active ingredients in the product and for the determination of residues of active ingredients, including their degradation and reaction products. Samples must be labelled in the manner prescribed.

The testing extends to : (1) the chemical composition; (2) the activity of the product; (3) any harmful effects on plants and plant products; (4) the aspects enumerated in items 2 to 4 in the preceding paragraph.

The expert committee referred to in Section 8 of the Law is to have 30 members, appointed for a period of five years.

In 1958, the Federal Health Department and the Federal Biological Institute for Agriculture and Forestry published Directives concerning the precautions to be taken in the use of pesticides and plant protection products.<sup>1</sup> This text defines pesticides and plant protection products as chemical substances and preparations thereof used : (a) *in plant protection*, against animal pests, bacterial, fungal and viral diseases of cultivated plants, and for seed dressing and weed control; *in the protection of plant products*, against animal pests and saprophytes; *in wood protection*, against wood pests (animal and plant); and in the control of animal pests in dwellings and animal housing; and (b) as a means of inhibiting or promoting plant growth.

The Directives point out that the majority of pesticides and plant protection products are poisonous to man and domestic animals, and that even those considered to be harmless can cause poisoning if consumed in large amounts or in repeated small amounts over a long period. The Directives then recommend that the instructions for use should be carefully followed, in particular as far as the concentrations are concerned, and that the precautionary measures specially prescribed should be taken.

Chapter II of the Directives contains general instructions. It is recommended, in the first place, that systemic products, and those containing arsenic, lead or mercury, should be used only when this is absolutely necessary, if the plants concerned are to be used as food by man or animals. Since concentrated pesticides and plant protection products are particularly dangerous, it is recommended that they should be kept in a locked cupboard, chest, etc., and that this should be placed in premises not used for purposes of habitation and also kept locked; the necessary equipment and working clothes should also be kept in these premises. In no circumstances should such premises be used for the storage of food-stuffs, animal feeding stuffs, kitchen utensils, bedding or clothing.

The transfer of pesticides and plant protection products to other containers (bottles, jars, etc.) and the use of the original packages for other purposes are both prohibited. Poisoned baits, and emulsions and dilute solutions of pesticides, etc., may not be prepared or stored in dwellings, kitchens, etc. They must never be left unguarded within the reach of unauthorized persons, and especially of children, or domestic animals. The same requirement applies to containers and apparatus in which such products have been kept.

In the course of the application of the products concerned, especially in the case of spraying and dusting, the wearing of protective clothing, which should fit tightly round the neck, wrists and ankles, and of impervious shoes, gloves and a cap, is essential. With certain products, it is also necessary to wear protective goggles and a mask, even in the open air. Eating, drinking and smoking in the course of work with pesticides and plant protection products are prohibited; the consumption of alcoholic beverages before, during and after such work is particularly dangerous. Washing with soap and water is essential before meals and after work.

It is recommended that all contact between the products and the skin should be avoided and that blocked tubes should not be cleared by blowing down them. Work should never be carried out against the wind. When work is carried out in enclosed premises (dressing of seeds, etc.), adequate ventilation must be provided and, with certain products, it is essential for a mask to be worn.

Empty packages and unused residues constitute a source of danger. They must be destroyed immediately, preferably by burying them at a great depth. Such residues, and wash water from apparatus, must never be thrown into ditches, watercourses, lakes, etc., where they would be capable of poisoning man, domestic animals and fish. If packages are destroyed by burning, the possibility of the formation of toxic smoke must be borne in mind. Crops should not be harvested until the pres-

cribed period following the last treatment with plant protection products has been allowed to elapse (see p. 51).

No person may use pesticides and plant protection products unless he is physically and mentally fit to do so, and has been instructed in the effects of poisons and the precautions to be taken. Work involving toxic products may not be carried out by any person less than 17 years of age. Persons above 16 years of age may be trained in such work under the supervision of an adult. Pregnant women and nursing mothers must also abstain from work with toxic pesticides or plant protection products.

Every person who handles pesticides or plant protection products over a long period must undergo regular medical examinations. Any person who, during or immediately after work, suffers from headache, nausea, vertigo or other disorders, must immediately cease work, remove his soiled clothing and consult a physician.

The general instructions given above are applicable to the substances mentioned in the Directives and for which special provisions have not been laid down elsewhere. In the case of substances not thus mentioned, the manufacturer's instructions should be followed. The substances covered by the Directives are classified according to use, as follows : (A) fungicides, including products used for the dressing of seeds; (B) insecticides and acaricides; (C) products used for soil disinfection; (D) herbicides; (E) slug killers; (F) rodenticides; (G) products for the control of wood pests; (H) products used for the fumigation or spraying of premises. Information is given on the particular hazards associated with each of the substances mentioned, the precautions to be taken in use and, where appropriate, the pre-harvest interval.

Chapter III of the Directives indicates that special precautionary measures are specified in the provisions on trade in poisons and in the various police ordinances concerning trade in toxic plant protection products (see p. 56). The poisons listed in the annexes to these items of legislation are divided up into three classes according to their toxicity. Chapter IV deals with the measures to be taken in case of poisoning.

The Law on foodstuffs, in the version of 21 December 1958, prohibits, in Section 4b, "the offering for sale, the holding for sale, the sale or the marketing in any other manner of foodstuffs containing or bearing pesticides or plant protection products, protective agents for stored plant products, anti-sprouting agents for potatoes, fruit setting compounds, agents for the control of fruit drop, or ripening agents, or their degradation products, in quantities greater than the maximum permissible". The provisions of item 5 of sub-section 1 of Section 5a provide, in addition, that the Federal Minister of the Interior may, in agreement with the Federal Minister of Food, Agriculture and Forestry, lay down, by Ordinance, the maximum permissible quantities of residues of pesticides, plant protection products, etc., in foodstuffs.

Such an Ordinance was, in fact, issued on 30 November 1966. It prohibits the offering or holding for sale, sale or supply in any other manner of the foodstuffs of plant origin listed in Annex 1 of the Ordinance if they contain or bear residues of specified chemicals in amounts

greater than the maximum permissible values laid down. It also prohibits the offering or holding for sale, sale or supply in any other manner, as foodstuffs, of plants or parts of plants which have been treated, directly or indirectly, with the following substances (listed in Annex 2 of the Ordinance) and which contain or bear residues of these substances : aldrin, amitrole, aramite, arsenic compounds, chlordane, dieldrin, endrin, fluoroacetic acid, heptachlor, heptachlor epoxide, isobenzan, isodrin, mercury compounds or selenium compounds. In the case of pesticides or plant protection products not specified in the Annexes to the Ordinance, their residues may not be present, under the provisions of item (a) of Section 3 of the Law on foodstuffs, unless the consumption of the foodstuff in question cannot give rise to any danger to health.<sup>5</sup>

Different provisions are applicable in respect of pesticides used pursuant to the Federal Law on communicable diseases of 18 July 1961. Sections 13 and 39 of this Law require the competent authority to order the necessary disinsection or deratization measures when the presence of animal pests may give rise to the risk of an epidemic. Under the provisions of Section 41, no product or procedure may be used for disinsection unless it has been tested by the Federal Health Department or for deratization unless it has been tested by the Federal Biological Institute. Since 1964, the *Bundesgesundheitsblatt*, the official organ of the Health Department, has published each year a list of pest control products and procedures tested and recognized by the Federal Health Department. This list comprises products for use against harmful arthropods. A list of approved ratidices is published by the Federal Biological Institute.<sup>4</sup>

Trade in poisons is governed by a large number of provisions. Poisons are divided into three groups : (a) those intended for domestic or professional use, or for use in pest control (except plant protection products); (b) those intended specifically for plant protection purposes; (c) highly toxic substances intended for use against plant and animals pests. The provisions applicable to the first two of these groups apply solely to the supply of poisons to users; they are contained in various laws and ordinances promulgated by the Länder. The use of highly toxic substances is restricted to certain particular applications and to persons holding a special licence.

#### *Legislation of the Länder*

The various Länder have promulgated ordinances on trade in poisons. [Giftverordnungen], each of which contains a list of substances and preparations divided into three classes according to toxicity, as follows : (1) highly toxic substances; (2) toxic substances; (3) slightly toxic substances. Since it would be impossible, in a survey of this nature, to mention the provisions of all the legislation in force, and in view of the fact that these provisions vary only slightly from one Land to another, the legislation promulgated in the Land of Hesse will alone be considered, for illustrative purposes.

The Police Ordinance of 16 October 1961 was promulgated pursuant to the provisions of Section 7 of the Law of 17 May 1961 on trade in

poisons, which requires, *inter alia*, that no person may engage in trade in poisons outside a pharmacy unless he holds a licence. The provisions relating to the holding, packaging, storage, labelling, etc., of poisons correspond to those generally adopted in most countries. No persons other than the proprietor of the establishment and such other persons as he may designate may supply poisons. The proprietor may not entrust the supply of poisons other than to trustworthy and competent persons not less than 18 years of age. He must instruct such persons, before they begin their duties and not less than once a year subsequently, as to the procedures to be followed.

No poison may be supplied other than to persons known to the seller who use poisons for professional, commercial or scientific purposes. If the purchaser is unknown to the seller, a licence may be necessary, issued by the competent municipal authority. Unless otherwise indicated, this licence is valid for 14 days only, and must be kept by the seller. No poison may be supplied to any person less than 18 years of age, but in the case of dressed seeds, the limit is 16 years of age. An entry must be made in the Poisons Register [Giftbuch] every time a poison belonging to Classes 1 or 2 is supplied; this register must be kept for ten years after the date of the last entry. A receipt must be made out for every poison belonging to Classes 1 or 2 supplied, and must be retained for ten years.

Every poison must be supplied in a well-sealed, leak-proof container, bearing the following information : (1) the approved name of the product; (2) the name and address of the establishment which supplied it; (3) the appropriate warning notices, e.g. "Poison", "Danger", etc. No poison may be supplied in any container used for foodstuffs or beverages, or which, by its shape or marking, could cause it to be mistaken for a food-stuff. Dressed seeds are not subject to the general provisions on poisons, but every container used for such needs must bear the following information on a card or label : (a) the name and address of the establishment which carried out the dressing or packaging of the seeds; (b) the statement, in red on a white background : "Danger. Poison. Use only as seeds, do not use for feeding animals. Keep out of reach of unauthorized persons and do not store together with foodstuffs or animal feeding stuffs"; (c) the name of the poisonous ingredient.

Sections 17 and 18 deal particularly with pesticides and wood preservatives. No such product may be supplied other than in a container bearing the following information : (1) the name of the product and its manufacturer; (2) in the case of products belonging to Classes 1 and 2, the skull and cross-bones symbol and the word "Poison"; (3) in the case of Class 3 products, the word "Danger"; (4) the nature of the contents, with particular emphasis on that of the poison concerned (preparation containing  $\alpha$ -naphthylthiourea, HCH emulsion, etc.). No such product may be supplied unless accompanied by detailed instructions for use and information on the hazards associated with incorrect use. The Minister of Labour, Social Welfare and Health may specify the text of the above-mentioned instructions and information.

Every pesticide must, as a minimum, bear the following warning



statement : " Danger. Use, as directed in the instructions for use, only for the control of pests. Any misuse is harmful to health. Do not store together with foodstuffs or animal feeding stuffs. Keep out of the reach of children ". It is forbidden to state that the product is harmless to man or animals (although an indication of harmlessness to bees is permitted). The warning notice must be in white on a black background, in the case of Class 1 products or in red on a white background, in the case of those belonging to Classes 2 or 3. Other information may be in black on a white background.

Products belonging to Classes 1 and 2 must have an unpleasant taste, unless they are intended to be eaten by animals, e.g. in poisoned baits. The following pesticides and wood preservatives must be coloured : (1) products containing arsenic (green, although other colours may also be used for wood preservatives); products containing fluorine (blue or violet, or yellow also in the case of wood preservatives); products containing mercury (blue or red); (2) products containing  $\alpha$ -naphthylthiourea or coumarin derivatives, or their compounds, and which are not esters or amides of phosphoric or phosphonic acid used as insecticides, acaricides or fungicides; (3) dressed seeds of all kinds (dark red); (4) preparations giving off phosphine (blue or red); (5) products (other than dressed seeds) containing thallium (blue). No product containing thallium may have a content of soluble thallium salts greater than 3 %.

The Third Police Ordinance of 17 March 1966, which amends the Police Ordinance of 16 October 1961 (see *supra*), gives the list then in force of approved names for the poisons covered by the latter, with an indication of the class to which they belong (1, 2 or 3), accompanied by remarks in certain cases and warning notices.

Another Ordinance of 16 October 1961 (in the version dated 17 March 1966) governs trade in toxic plant protection products. This Ordinance applies to the poisons and preparations listed in the Annex (and other preparations containing these poisons), insofar as they are used for plant protection, and which satisfy the prescribed conditions as to packaging, labelling and coloration (trade in toxic plant protection products which do not satisfy these conditions, as well as wholesale trading, are subject to the provisions of the Police Ordinance on trade in poisons, referred to above). One of the prescribed conditions is that the container must be tightly sealed, robust and leak-proof. It must carry the following information : (1) the name of the product and that of the manufacturer; (2) in the case of plant protection products belonging to classes 1 or 2, the skull and cross-bones symbol and the word " Poison "; (3) in the case of plant protection products belonging to Class 3, the word " Danger "; (4) the nature of the contents, with special emphasis on the poison concerned (e.g. preparation containing nicotine, etc.). Every container must, in addition, be accompanied by detailed instructions for use and information on the hazards associated with incorrect use. The text of the above-mentioned instructions and information may be specified by the competent authority. The above-mentioned items must be in white on a black background, in the case of Class 1 products, and in red on a white

background, in the case of products belonging to Classes 2 or 3. Other information may be in black on a white background. Plant protection products containing lead must be clearly marked with a warning notice to the effect that they must not be used in viticulture. The Ordinance also provides that toxic plant protection products which are not naturally dark in colour, must be coloured as follows : (a) products containing mercury (blue or red); products containing fluorine (blue or violet); (b) products giving off phosphine (blue or red); seeds dressed by means of compounds giving off phosphine and those containing strychnine or certain pyrimidine derivatives (dark red); (c) products intended for use as seed dressings must contain a coloured dyestuff so that dressed seeds can be distinguished from those which have not been so treated. Products belonging to Classes 1 or 2 must have an unpleasant taste, unless they are intended to be eaten by animals, e.g. in poisoned baits.

The provisions as to storage, the persons entitled to supply the products, and the general conditions applicable to such supply, are identical to those for poisons. It is laid down, however, that plant protection products, may not be supplied to any person less than 16 years of age (rather than 18, as in the case of poisons). Whenever a plant protection product belonging to Classes 1 or 2 is supplied, an entry must be made in a register, which must be kept for ten years after the date of the last entry. The list given as an Annex to the Ordinance gives the chemical name and common name, if any, of each preparation, the class (1, 2 or 3) to which it belongs, and, in certain cases, details of any special conditions governing supply and labelling.

#### *Legislation on particular products*

Apart from the general provisions discussed above, certain pesticides are also the subject of special legislation. An example of such legislation is the Ordinance of 6 April 1936 on the use of phosphine for pest control. This Ordinance was promulgated pursuant to the Ordinance of 29 January 1919 already mentioned, and is still in force, as is shown by the Circular of the Federal Minister of Health of 23 June 1965.<sup>2</sup>

This Ordinance lays down that the use of phosphine or preparations which give off phosphine for the control of plant or animal pests is normally prohibited (this prohibition does not apply to the use of compounds or preparations giving off phosphine as poisoned bait for the control of vermin). The competent Land authorities may however grant a licence for the use of these substances under the following conditions : (1) the licence is granted only to persons who are trustworthy, healthy in body and mind, and familiar with the use of hydrogen phosphide; (2) the use of the substance is subject to surveillance by inspectors designated by the competent authority, and every operation must be notified 48 hours in advance (24 hours in the case of the fumigation of a vessel); (3) the person in charge of the fumigation must keep suitable gas-masks available for his staff; (4) the person in charge of the fumigation must, before beginning the operation, ensure that all persons and domestic animals are evacuated, and take the necessary measures to prevent accidents

(entry of unauthorized persons prohibited, all fires extinguished, the electric current disconnected, etc.); (5) after fumigation has been carried out, the premises must be thoroughly aerated; (6) the person in charge of the fumigation must keep a register in which he must enter the place and time of the fumigation, the nature of the premises, the quantity of the product used, the place and method of disposal of all used packages, the name of the product, and the names of the persons who carried out the fumigation; (7) the person in charge of the fumigation must ensure that all containers and any product left over are buried. The products to which the Ordinance applies may not be supplied other than in the original leak-proof packages, to persons holding a user's licence.

The Circular of 23 June 1965 is particularly concerned with the destruction of pests in stored foodstuffs (silos, sacks of wheat, rice, dried vegetables, etc.), by means of sachets containing products which give off phosphine. It contains detailed instructions as to the method of use to be adopted in order to prevent accidents. In addition to the measures prescribed by the Ordinance of 1936, it is laid down that aeration must be carried out for not less than six hours after the operation has been completed; the used sachets must then be destroyed in the manner indicated by the manufacturer. Grain withdrawn from silos may not contain more than 50 mg of phosphine per ton.

The person in charge of the fumigation must hold a licence, as provided for by the Ordinance of 1936. He must show that he is physically and mentally fit, by means of a certificate issued by the Health Department competent for his place of residence. The certificate must confirm that the person concerned is able to detect the presence of phosphine, that he is familiar with the hazards associated with its use, and that he has been trained in the effects of phosphine on the human organism, the signs of poisoning, and the first-aid measures to be taken. He must also have completed a course of training in the use of the product, organized by the manufacturer, and have then passed an examination, arranged by the competent authority of the Land. This examination covers the relevant legislation, the method of action and use of the product, the precautions to be taken in storage and use, the signs of poisoning, and first aid in case of accident.<sup>6</sup> No person less than 18 years of age may be engaged in fumigation with phosphine.

The following products are also the subject of special legislation : arsenic, prussic acid and cyanides, nitriles, Tritox (trichloroacetonitrile), Ventox (acrylonitrile), ethylene oxide, lead-containing compounds and preparations, nicotine, chloropicrin and methyl bromide.

### *Occupational health*

The safety of workers in the manufacture of pesticides and plant protection products is not specifically mentioned in any item of legislation. Nevertheless, regulations and standards for the chemical industry in general are naturally applicable to such workers (e.g. the Ordinance of 4 August 1960 on establishments subject to licensing). The Industrial Code [Reichsgewerbeordnung], as most recently amended on 1 June 1960,

requires employers to take measures to protect the life and health of workers against the dangers to which they are exposed by reason of their work. These measures are specified in detail in the Ordinance made pursuant to the Industrial Code. They are generally concerned with occupational hygiene (e.g. they prohibit the taking of meals in industrial establishments), the wearing of protective clothing, masks, etc., and the prohibition of the employment of women and adolescents in certain types of work. The list of occupational diseases (most recently amended by the Seventh Ordinance of 20 June 1968), recognized for accident insurance purposes, includes some 20 types of poisoning or lesions caused by chemicals.

As far as preventive measures are concerned, the initiative has been taken by a number of professional associations [Berufsgenossenschaften]. The most interesting, in this connexion, is that of the German Research Association [Deutsche Forschungsgemeinschaft] which, in 1955, set up a Commission for the Control of Harmful Substances in Work-places [Kommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe]. This Commission has drawn up, and keeps up to date, a list of maximum permissible concentrations in the work-place ("MAK values") based on the known causes of cases of poisoning by a large number of substances used in industry.<sup>7</sup> The "MAK value" is the maximum permissible average content of atmospheric pollutants at the work-place, measured over an 8-hour working day. It is expressed, in the case of gases and vapours, in cc/m<sup>3</sup> at a temperature of 20° C and a pressure of 760 mm Hg and, in the case of suspended matter, in mg/m<sup>3</sup> of air. The list published in 1966<sup>8</sup> contains a large number of pesticides.

### *Transport*

The transport of poisons is subject to various legislative provisions, depending on the means of transport used. In the case of rail transport, the provisions of the Ordinance on rail transport are applicable. This Ordinance was amended to bring it into line with the International Regulations concerning the Carriage of Dangerous Goods by Rail issued pursuant to the International Convention concerning the Carriage of Goods by Rail, which came into force on 1 January 1959.<sup>9</sup> Pesticides, herbicides, etc., are specifically included in class IVa (poisonous substances). From the health point of view, the most important provisions are those which prohibit the placing of substances belonging to class IVa in the vicinity of foodstuffs or other products used in the food industry. It is also laid down that if a package containing a substance belonging to class IVa has been damaged, no foodstuff transported in the same truck may be supplied until it has been examined for possible contamination. As far as safety is concerned, it is recommended that packages containing such substances should not be placed close to those containing caustic substances or oxidizing agents. Containers and packages must satisfy the requirements laid down.

Corresponding rules governing the transport of dangerous goods by ship were adopted in the Federal Republic on 22 December 1953.<sup>9</sup>

*Other legislation*

Section 7 of the First Ordinance of 24 June 1960 on radiation protection (in the version of 15 October 1965) provides for exemptions from the requirement for a licence to use radioactive substances. Sub-section 2 of this Section lays down, however, that no such exemption may be made in the case of any person who uses "nuclear fuels or other radioactive substances in the preparation or use of plant protection products, pesticides, fertilizers, or soil-conditioning agents, in such a way that the product, when prepared or ready for use, contains a concentration of radioactive substances, other than those of natural origin, of less than 0.002 microcuries per gram". In other words, a licence is necessary even if such products contain less than 0.002 microcuries per gram of radioactive substances.

Another Ordinance, which is not directly concerned with human health but which must be complied with by users of plant protection products, is that of 25 May 1950 on plant protection products harmful to bees. Its provisions prohibit the application of pesticides to fruit trees and bushes, and other plants, visited by bees. When such application is essential, the owners of all hives within a radius of 3 km must be notified in good time.

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#### NETHERLANDS

In the Netherlands, the manufacture, trade in, and use of pesticides are at present regulated by the provisions of the Law of 12 July 1962 on pesticides and the enactments for the implementation of this Law. The pertinent provisions of the legislation on industrial safety, and on insurance against accidents in agriculture, are also applicable. The 1962 legislation repealed the corresponding provisions of the Law of 19 April 1947 on pesticides and fertilizers, which now covers fertilizers alone. The other provisions repealed were item 9 (pesticides used in agriculture, horticulture and forestry) of the Decree of 26 March 1921 laying down the list of articles considered as "commodities" for the purposes of Section 1 of the Law on commodities of 1919, sub-sections 2 and 3 of Section 8 (marking and packaging of poisons) of the General Decree of 11 July 1949 for the implementation of the Law on commodities of 1935, the Decree of 13 August 1948 on pesticides, and the relevant provisions (Sections 71, 72 and 73) of the Decree of 25 March 1950 on safety in agriculture.

The legislation introduced during the period 1947-1948 was mainly concerned with the prevention of fraudulent practices in trade in pesticides. The numerous cases of poisoning associated with the wide range of new products marketed subsequently, resulting largely from a lack of experience and above all of a sense of responsibility, showed the inadequacy of the pesticides legislation. Accordingly, the Minister of Agri-

culture, Fisheries and Food, and the Minister of Social Affairs and Public Health jointly appointed a Phytopharmacy Committee [Commissie voor Fytofarmacie], responsible for the technical and scientific aspects of the use of pesticides. This Committee is interdepartmental in character and is composed of experts in agriculture, biology, pharmacology, toxicology, chemistry and public health. The entry into force, on 1 September 1964, of the new Law on pesticides is the outcome of the work of this Committee.<sup>3</sup>

*Law of 12 July 1962 on pesticides*

For the purposes of this Law, the term "pesticide" [bestrijdings-middel] means any substance or mixture of substances, micro-organism or virus intended to be used for : (a) controlling or repelling animals which may be harmful to plants or parts of plants; (b) controlling the pathogens of plant diseases; (c) controlling weeds; (d) destroying foliage and preventing all undesirable plant growth; (e) controlling or encouraging the growth of plants or parts of plants (fertilizers are, however, excluded); (f) controlling or repelling animal ectoparasites. The term also covers any substance or mixture of substances, micro-organism or virus intended to be used for : (a) controlling or repelling animals which may be harmful to plant products; (b) preventing the decay of plant products; (c) controlling or repelling animals or micro-organisms in dwellings, buildings, vehicles, vessels or aircraft; (d) treating commodities for the purpose of controlling or repelling animals or micro-organisms; (e) treating plants, soil or water for the purpose of controlling or repelling parasites capable of transmitting diseases to man or to useful animals. Products belonging to the first group are considered as agricultural pesticides, and those belonging to the second group as "public health pesticides".

The sale, holding or use of any unapproved pesticide is prohibited. A pesticide is considered as approved, within the meaning of the Law, if it bears on the package the name of an approved product and the number of the clearance. The above-mentioned prohibition does not apply to the use of pesticides in dwellings. No pesticide may be granted clearance unless : (a) the content of active ingredient, the additional composition, the colour, the form, the presentation, the package, the suggested uses and the warning notices are in conformity with the general instructions given by the competent Minister; (b) it may reasonably be supposed that the product is suitable for the purpose for which it is intended and that, if used correctly, it will not cause any harmful side-effect. The term "harmful side-effect" means, in particular : (a) any harm to public health; (b) any harm to the health or safety of any person using the pesticide under the prescribed conditions; (c) any adverse effect on the quality of foodstuffs; (d) any adverse effect on the productivity of the soil, or on plants or parts of plants, or on useful animals.

Every application for clearance must be submitted to the competent Minister (the Minister of Agriculture and Fisheries, or the Minister of Social Affairs and Public Health) by the manufacturer, importer or merchant concerned. It is granted for a period of not more than ten years.

It may be laid down in the clearance that the pesticide may not be used other than for the control of certain specific pests, at specified times and places, under specified meteorological conditions, on particular plants, or by the use of certain technical procedures. Other requirements may also be imposed as to the composition, form, presentation, package, uses and warning notices. The competent Minister is responsible for ensuring that every approved pesticide is entered in a register, each entry being accompanied by information as to the name of the product, the number of the clearance, and the name and address of the manufacturer, importer or merchant, as the case may be. The competent Minister may cancel the clearance if it appears that the product causes harmful side-effects such that, if these had been known at the time, the clearance would not have been granted. Certain pesticides may be approved without any official formalities.

An approved pesticide may not be sold unless it bears on the package, or unless the package is accompanied by, the prescribed instructions for its use, or if its content of active ingredient, additional composition, colour, form, presentation, packaging or marking are not in conformity with the requirements imposed by the clearance. No pesticide may be sold to any person less than 16 years of age if its package bears the poisons symbol (a skull and cross-bones). In addition, no such pesticide may be supplied other than to persons holding a special identity card issued by the competent Minister, unless they are themselves engaged in trade in pesticides; the special identity card shows that its holder uses the pesticides concerned in the practice of his profession. The pesticides belonging to this group may not be used, except in the case of rodenticides for use in dwellings, by any person not holding the above-mentioned identity card.

Provision is made in the Law for regulations to be made governing the sale, holding, transport (other than by a transport undertaking) and use of pesticides, and the storage or destruction of empty packages and unused pesticides. Every person is required to take particular care in order to ensure that pesticides, empty packages and unused pesticides do not constitute a danger to man or animals, and that damage to plants or parts of plants, land, or water used for fishing, belonging to other persons, is no greater in extent than that resulting from the correct use of the product concerned.

In the interests of the safety and health of man and useful animals, the above-mentioned regulations may contain provisions concerning the warning symbols to be employed in connexion with the use of pesticides. Foodstuffs and beverages containing pesticide residues in amounts greater than those specified in the regulations (see p. 67) are to be considered as unsuitable for consumption, within the meaning of the Law on commodities.

Any authorized inspector is entitled to take samples of pesticides and to send them for examination to the Plant Protection Service, in the case of products used in agriculture, or to the Food Inspection Service, in the case of products for public health use.

Any person who, in the course of his activities, becomes aware of the composition of any pesticide, must maintain secrecy as to its formula. Such secrecy does not apply, however, to the nature of the toxic constituents of the product concerned.

A Pesticides Committee [Bestrijdingsmiddelencommissie] is set up, responsible for giving its opinion on proposals for regulations to be made under the Law. This Committee includes representatives of all the interested parties (manufacture and marketing of pesticides, agriculture, forestry, the food industry, hunting, fishing and conservation).

#### *Legislation for the implementation of the Law on pesticides*

The Decree of 25 July 1964 implements in more detail the general provisions of the Law on pesticides. Its most important provisions are the following. No pesticide in a package which, in conformity with the Order of 4 August 1964 made pursuant to the Law (see p. 66), is marked with the poisons symbol, may be sold by any person less than 18 years of age. No such product may be transported by any person less than 16 years of age. Persons responsible for such transport must take particular care to ensure that the packages are not lost or damaged, and that the pesticides do not fall into the hands of any person not concerned with the transport. No pesticide in a package which, in conformity with the above-mentioned Order (see p. 66), is marked with the poisons symbol or the St. Andrew's cross, may be used by any person less than 18 years of age. Other pesticides may not be used by any person less than 16 years of age.

Every person in whose premises pesticides are used must provide the user with adequate washing facilities and, in the case of products associated with a risk of poisoning or of action on the skin, protective clothing, gloves, boots, caps and masks. In this latter case, the user must wear the protective clothing, etc., and the mask. The foregoing provisions also apply to the destruction of empty packages and unused pesticides.

Pesticides must be stored in suitable premises used exclusively for this purpose, which must be kept locked when not in use; such premises must be clearly marked on the outside with the word "PESTICIDES". The premises must be ventilated to the outside air. Suitable equipment kept in or near the premises, must be available for the removal of any pesticides spilled on the ground. The washing facilities and protective equipment mentioned above must also be available in or near the storage premises. A notice bearing instructions, approved by the Labour Inspectorate, as to the safety measures to be taken, must be put up in any premises in which more than 400 kg of pesticides may be stored.

No contaminated empty package may be destroyed other than in a manner such that subsequent use is impossible. No empty package or residue of undiluted pesticide may be disposed of or destroyed in a manner such that there is a risk of water pollution. No residue of diluted pesticide may be disposed of or destroyed in a manner such that there



is a risk of the pollution of : (a) sources of drinking water; (b) surface waters, unless there is continuous water flow and steps are taken to reduce the risk as far as possible.

Every person who treats an enclosed space or the underlying ground with hydrogen cyanide, poisonous cyanides, pesticides capable of giving off poisonous cyanides, ethylene oxide, methyl bromide, chloropicrin, phosphine or pesticides capable of giving off phosphine, must ensure that, throughout the entire period of treatment and the subsequent ventilation, all means of access to the place concerned are clearly and legibly marked with the words : "Poisonous gas. Entry into these premises may result in death". The Minister of Social Affairs and Public Health may make this requirement applicable to pesticides other than those mentioned above. The pesticides in question may not be used other than in the presence of a person holding a certificate granted by the Minister of Social Affairs and Public Health, confirming that the person concerned is familiar with the hazards associated with their use and the methods of avoiding such hazards.

Every person who sells or uses the above-mentioned pesticides on a professional basis must enter the following information in a register : (1) the name and the quantity of the pesticide sold or used; (2) the name and the address of the purchaser or of the person in whose premises the product has been used; (3) the date of sale or use. This register must be kept for a period of not less than one year following the date of the last entry. The Minister of Social Affairs and Public Health may make this requirement applicable to pesticides other than those mentioned above. The requirement as to registration does not apply to powders containing less than 25% of calcium or sodium cyanide.

An Order dated 16 July 1964 contains a list of chemicals in use as pesticides to which the provisions of the Law of 1962 do not apply.

The Order of 4 August 1964 supplements the provisions of the Law on pesticides of 1962 and of the Decree of 25 July 1964. The most important provisions of this Order are the following. The package used for a pesticide must be of a nature such that all danger to man and useful animals is avoided. That part of the package in direct contact with the pesticide must be unbreakable or provided with a protective cover. The package must be sealed in a manner such that it is impossible to open it without damaging it. Certain types of pesticide may be exempted from this last requirement.

The following information must be given on the package : (a) the name of the product, together with that of the manufacturer, importer or merchant who applied for the licence; (b) the name(s) of the active ingredient(s) and the quantity in grams per litre of liquid, or as a percentage by weight, in the case of solids or pastes; (c) the words "clearance number" followed by the actual number and the letter N; (d) the purpose for which the product is intended, possible methods of application and the detailed instructions for use; (e) the weight or volume of the contents of the package, in metric units; (f) the batch number or similar information, making it possible to determine the origin of the

product; (g) where applicable, the expiry date; (h) the pre-harvest interval, which must be long enough to avoid all danger to the health or safety of man and useful animals.

In addition, if the name of the pesticide or group of pesticides, as given in Annex I to the Order, is followed by the letter A or B, the package must be marked with one of the following symbols : (A) a triangle containing a skull and cross-bones, with the word "Poison" underneath; or (B) a triangle containing a St. Andrew's cross, with the words "Harmful substance" underneath. The above-mentioned symbols must be black on a yellow-orange background, or yellow-orange on a black background, and not less than 2 cm in height. Every package marked with these symbols must, in addition, bear the following information : (a) the precise chemical names of all the poisonous constituents; (b) the poisons group or groups to which the poisonous constituents were assigned when the clearance was granted; (c) the instructions as to first aid in case of poisoning, prescribed when the clearance was granted; (d) information for the physician concerning the treatment to be applied in case of poisoning. Every package of any pesticide intended for the control of rodents in the home must be marked with the letter "H", which must not be less than 2 cm in height. All the prescribed information must be clearly legible, indelible and in Dutch. No package may bear any information or statement which could give an incorrect or misleading impression as to the nature, composition, possible methods of use or toxicity of the pesticide concerned. No package bearing the warning symbols described above, nor any label on any such package, may be green in colour.

The Phytopharmacy Committee, which has been referred to previously (see p. 62), consists of : (a) the Inspector-General of Public Health responsible for the supervision of foodstuffs and commodities; (b) the Director of the Plant Protection Service; (c) the Inspector-General of Public Health responsible for the supervision of environmental sanitation; (d) the Chief Medical Inspector-General of Public Health; (e) the medical adviser of the Labour Inspectorate; (f) the Director of Plant Industry; (g) the Director of Horticulture. The duties of the Committee include, *inter alia*, the examination of applications for the approval of pesticides. It may require the applicant to provide samples of the pesticide concerned.

A list is given of the documents which can be used as an identity card, within the meaning of Section 12 of the Law (see p. 63); these include, *inter alia*, cards showing that the holder is a member of an agricultural, horticultural or forestry association, organization, etc., and copies of entries in the commercial register proving that the holder is a florist, gardener, pest control operator [zuiyeraar] or building contractor.

The pesticide samples taken for purposes of analysis must be representative of the batch as a whole. They must be carefully packed so as to prevent any loss of product, or any change in its properties, composition, quality or state. The package must be sealed, either with wax

or lead seals, and marked with information as to its origin. The report drawn up on the sampling must state the place, date and time at which the samples were taken, the name and address of the person concerned, the name or the specification of the product, and such other information as may be necessary.

Annex I of the Order contains : (1) *a list of the pesticides for which an application for clearance is necessary* (see p. 62); pesticides are divided into a number of different classes (fungicides, molluscicides, nematocides, herbicides, defoliants, rodenticides, mole poisons, bird repellents, game repellents and miscellaneous); for each product, the following information is given : the common name and chemical name of the active ingredient, and, where appropriate, the content of active ingredient, the toxicity class (A or B) to which the product belongs (in some cases, the letter K is added to show that the pesticide must be coloured), and the pre-harvest interval;<sup>a</sup> (2) *a list of the pesticides for which an application for clearance is not necessary* (see p. 63); for each product, the following information is given : the name of the pesticide and its composition, whether or not the product must be coloured, whether or not the package must bear a poisons symbol, and the information which must be given on the package (the name of the pesticide, the clearance number, the active ingredient, the warning statement, the precautions to be taken, and the method of use).

Annex II, which will provide details as to treatment in the event of poisoning and is intended for physicians (see item (d) p. 66), has not yet been published.

Annex III gives a model of the form to be used for all applications for the approval of a pesticide; this form must be sent to the Phytopharmacy Committee. This application form contains 15 questions as to : (1) the name and address of the applicant; (2) the trade name of the product; (3) the physical state and form of the product; (4) the full composition of the product; (5) the chemical properties of the active ingredients; (6) the physical properties of the active ingredients; (7) the analytical methods; (8) the residues; (9) the purpose for which the product is intended and the method of use; (10) the biological effects of the product; (11) the specific phytotoxicity; (12) the type of packaging; (13) the storage life of the packaged product; (14) the toxicity of the product or of its active ingredients; (15) any other special characteristics.

Annex IV gives the dates before which samples must be submitted for analysis, in connexion with the granting of approval.

The Order of 15 March 1965, as amended by Orders dated 7 March 1967 and 9 January 1969, lays down the maximum permissible amounts, in certain categories of foodstuffs, of the active ingredients of pesticides and their toxic metabolites. For each of the poisonous substances mentioned (in alphabetical order), a figure is given for the permissible amount of residue, expressed in ppm (mg per kg of foodstuff), either in general or for the vegetables or fruits specified. According to

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<sup>a</sup> A number of changes have been made to this list since its original publication.

Goedkoop, as quoted by Wijnberg,<sup>2</sup> the figures specified by the Phyto-pharmacy Committee give a very wide safety margin to the consumer.

*Law on industrial safety of 1934 and the legislation for its implementation*

The Law of 2 July 1934 on industrial safety [Veiligheidswet], as amended, lays down in Section 7 that the Minister of Social Affairs and Public Health is empowered to make regulations concerning, *inter alia*, the measures to be taken against poisonous or objectionable vapours, gases and dusts, and against occupational poisoning and contamination, and occupational diseases.

The Decree of 19 November 1938, most recently amended on 20 September 1960, implements the provisions of the above-mentioned Law. Section 1 of this Decree lists the industrial establishments considered as dangerous. The chemical industry is included in Class C, which covers, *inter alia*, the handling of pesticides. The general provisions of the Decree are concerned with the dimensions, ventilation and lighting of work-places, fire prevention, accident prevention and sanitary facilities. The provisions governing safety in the chemical industry are contained in Sections 92 to 97, covering the measures necessary to prevent the discharge and dispersion of toxic or objectionable vapours, gases and dusts, Sections 181, 183 and 184 concerning the prevention of occupational poisoning and contamination, and occupational diseases (personal hygiene, marking of containers for poisons, and wearing of protective clothing and masks), and Section 187, on the maximum period for which any person may remain in premises where there is a risk of poisoning.

The Decree of 25 March 1950, as amended, also implements the provisions of the Law on industrial safety, in respect of safety in agriculture [Landbouwveiligheidsbesluit]. As already mentioned (see p. 61), the provisions of this Decree applicable to the use of pesticides have been repealed.

Provision is made, in an Order dated 21 June 1967, for the notification of occupational diseases, including various forms of poisoning by chemical compounds, some of which are used in pest control.

*Law on agricultural accidents*

The Law of 20 May 1922 on accidents in agriculture and horticulture [Land- en Tuinbouwongevallenwet], as most recently amended by the Law of 22 March 1957, provides for the insurance of agricultural workers against accidents resulting from the performance of their duties. Item (a) of Section 95b of Chapter Xa extends the field of application of the Law to occupational diseases; lesions caused by the action of fertilizers and products used to control plant pathogens to destroy weeds, or to control or repel animal pests, are covered, provided that they occur in workers in undertakings in which work is carried out requiring the use of such substances or products.

An investigation carried out during 1963-1964,<sup>1</sup> i.e. before the entry into force of the new Law on pesticides, showed that the number of cases of poisoning due to pesticides was rather high. It also showed that the majority of the persons concerned claimed that they were familiar with the precautions to be taken and that they had read the instructions for use. In fact, however, it was found that there was much ignorance in this field and that precautionary measures were rarely taken. In many cases, masks were not worn, and gloves and protective clothing were inadequate.

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## NEW ZEALAND

The legislative control of pesticides in New Zealand is based on a substantial number of enactments. For the purposes of this survey, it will be convenient to consider these under a number of broad headings, as follows : I. Legislation on agricultural chemicals; II. Legislation on animal remedies; III. Poisons legislation; IV. Legislation on special uses of pesticides; V. Legislation on food hygiene aspects; VI. Legislation on occupational health; VII. Miscellaneous.

### I. *Legislation on agricultural chemicals*

The basic item of legislation in this area is the Agricultural Chemicals Act 1959 (as amended in 1963 and 1967). The definition of "agricultural chemical" given in the Act is as follows : any substance, whether mixed with any other substance or not, sold or used for the purpose of protecting any form of plant life from injury caused by any organism or virus, or for the purpose of curing any such injury or any disorder of plant life of a physiological nature, or for the purpose of destroying, preventing, stimulating, or in any other way influencing, the growth of any form of plant life; and includes any rodenticide and any substance which the Governor-General by Order in Council declares to be an agricultural chemical for the purposes of this Act; but does not include agricultural lime nor any fertiliser not mixed with an agricultural chemical. It will be seen that this definition covers plant growth regulators, for example, in addition to phytopharmaceutical products and pesticides.

It is laid down that the manufacturer or importer of an agricultural chemical may not sell the product in question unless it has been registered in accordance with the provisions of the Act and is contained in a package bearing a label approved by the Agricultural Chemicals Board (established by the Act). Applications for registration are submitted to the Board, and must be accompanied, *inter alia*, by specimen copies of every label to be used in respect of the product and, if required by the Board, by a statement providing certain information concerning the product (i.e. the name and percentage of each active ingredient and the percentage of each solvent, co-solvent, emulsifier, wetting agent or other additive contained in the product, the method or methods of analysis, and such

experimental or other evidence as the Board may require in support of any statement contained in the application or in any copy of a label deposited with the application).

The labels used for agricultural chemicals must be accepted by the Board before a certificate of registration can be issued. The following information, *inter alia*, must be given on labels : (a) the name and address of the manufacturer or importer or the name or proprietary brand of the agricultural chemical; (b) the registration number; (c) such particulars of the chemical composition of the agricultural chemical as may be required by the Board; (d) the preventive or remedial properties claimed in respect of the product, and the directions for its use; (e) such precautionary advice as may be required by the Director-General of Health for the purpose of safeguarding the health of human beings; and (f) such precautionary advice as may be required by the Board for the purpose of safeguarding the health of livestock and beneficial animals (including birds, fish and beneficial insects). The label must also contain the words "Registered pursuant to the Agricultural Chemicals Act 1959 No. . . .",<sup>1</sup> and must indicate the net weight or the net quantity contained in the package. Although not specifically stated, it is evident that, insofar as the agricultural chemical is a poison, the label must also satisfy the pertinent provisions of the Poisons Regulations 1964 (see p. 75).

The Board may refuse to register a product which, in its opinion, is likely to be materially prejudicial to the health or safety of human beings, livestock, or beneficial plants or insects. Similarly, it may revoke registration if it is satisfied that the use of a registered agricultural chemical is likely : (a) to be materially prejudicial to the health or safety of human beings, livestock, beneficial animals (including birds, fish, and beneficial insects) or beneficial plants; or (b) to have a detrimental effect on meat, dairy produce, or other produce intended for human consumption, or to prejudice the sale of any such meat or produce in New Zealand or elsewhere.

Provision is made in the Act for the inspection of agricultural chemicals (inspectors are entitled to impound any such products which are not registered, are incorrectly labelled, or are being sold or used in a manner contrary to the provisions of the Act or the regulations made under it) and for the licensing of persons engaged commercially in the application of agricultural chemicals.

The Governor-General is empowered to make regulations for the detailed implementation of various provisions of the Act. Various regulations were in fact made between 1962 and 1967 but these have now been consolidated (and amended) by the Agricultural Chemicals Regulations 1968. As far as insecticides are concerned, it is prescribed that the insecticides listed in the Second Schedule to the Regulations (aldrin, benzene hexachloride, chlordane, kepone, DDD, DDT, dieldrin, endrin, thiodan, fensulfothion, heptachlor, telodrin, lindane, methoxychlor, and toxaphene) may not be applied to land, pasture and other plant life, except pursuant to a permit issued by the Director-General of Agriculture, or as specified in a notice given by the Director-General of Agriculture (see the Agri-

cultural Chemicals Notice 1968, issued for this purpose). Small amounts of DDD, DDT and lindane may be applied without permit other than to pasture or fodder crops. The consent of the Minister of Agriculture, given on the recommendation of the Agricultural Chemicals Board, is required for the issue of a permit for the application from an aircraft, or by an air-blast sprayer, or spinner top-dressing machine, of any of the 15 insecticides specified above, if in the form of a dust (whether or not mixed with any fertilizer or other substance) or if in the form of an emulsion or wettable powder which may be sprayed. No such consent is however required for the issue of permits by the Director-General of Agriculture to horticultural producers for the application of such insecticides to plants using an air-blast sprayer.

If the use of an insecticide is subject to a permit, it may not be sold to a user unless the user holds the necessary permit.

The Regulations also include provisions dealing with the coloration and transport in bulk of DDT/fertilizer mixtures, the transport of certain pesticides in containers, the packaging and handling of herbicides (i.e. any of the 13 herbicides listed in the First Schedule, which include 2,4-D, MCPA, etc.), the grazing of stock in orchards after the application of certain insecticides, the application of hormone weed-killers near vineyards, the powers of inspectors to take samples of agricultural chemicals and to examine books, documents and permits relating thereto, etc. The aerial spraying of arsenic-containing agricultural chemicals for the purpose of killing or desiccating plants is specifically prohibited; it is also made an offence to permit livestock to have access to any place where any insecticide is stored, even temporarily, or has been spilt. Finally, the Director-General of Agriculture is empowered to specify (on the recommendation of the Board) physical and chemical standards for any agricultural chemical; materials which do not conform to these standards may not be applied except by special permit.

The Apiaries Protection Regulations 1957 contain restrictions on the application of sprays and dusts toxic to bees to crops at times when flowers may attract bees.

## II. *Legislation on animal remedies*

Brief reference must be made to the Animal Remedies Act 1967 since the definition of "animal remedy" covers substances and preparations intended for "destroying or preventing parasites on or in animals". The Act establishes an Animal Remedies Board (this Board takes the place of the Stock Remedies Registration Board constituted by the Stock Remedies Act 1934, now repealed). No animal remedy may be manufactured or imported except on the basis of a licence issued by the Board. A licence may be refused if the remedy is a danger to public health or animal health, if it contains an ingredient which may have a detrimental effect on any animal exposed to it or any product obtained from any animal so exposed, if it contains an ingredient which could prejudice the sale, in New Zealand or a foreign country, of any animal treated or exposed to the remedy or of any part of the carcass or any product

obtained from a treated animal, etc. Licences may be revoked or suspended on the same grounds. It is interesting to point out that, according to Kennedy,<sup>7</sup> the Stock Remedies Registration Board, acting under the powers conferred by the corresponding earlier Act (of 1934), "revoked the registration of stock remedies containing aldrin and dieldrin with consequential effect on the composition of sheep dips, dusts and sprays."

No regulations have as yet been made to implement the Animal Remedies Act 1967 and the Stock Remedies Regulations 1947 (as reprinted in 1962) are still in force. The only provisions of direct relevance to the present survey are those prescribing standards for worm drenches and rotenone-based sheep dips.

Mention should also be made of the Stock (Insecticides and Oestrogens) Regulations 1961, as amended. These prohibit the treatment of stock with insecticides or the use of insecticides in slaughterhouses, meat-packing houses and canneries, except as specified by the Minister of Agriculture by notice in the *Gazette*. Other provisions of these Regulations will be dealt with in Part V.

### III. *Poisons legislation*

The principal items of legislation regulating poisons are the Poisons Act 1960 and the Poisons Regulations 1964, in both cases as amended. The term "poison" is simply defined in the Act as any substance declared to be a poison by regulations made under it, "poisonous substance" being defined in a similar manner. In order to cover substances not explicitly declared to be either poisons or poisonous substance, the 1960 Act introduced a definition not included in earlier poisons legislation, viz. that of "toxic substance", defined as follows: "any substance, . . . poison or poisonous substance, and not being a narcotic. . . or a radioactive substance. . . , which, when swallowed, inhaled, injected into, or otherwise absorbed by the human body, is likely, by reason of its toxic properties, to destroy life or to be injurious to health, and. . . includes any acaricide, insecticide, fungicide, larvicide, nematocide, pesticide, and herbicide."

Insofar as numerous pesticides have been declared to be poisons or poisonous substances, a summary of the principal provisions of the Act concerning possession, sale, packaging, etc., is necessary. Thus it is laid down that no person may sell poisons, or pack or label poisons or poisonous substances for sale, unless he holds the appropriate licence or is otherwise authorized to this effect under the Act. The sale of poisons by wholesale is subject to the possession of a wholesaler's poison licence or a packer's poison licence, except in the case of employees of the Crown or of a local authority (pursuant to an amendment introduced by the Agricultural Pests Destruction Act 1967, the latter term covers the Pest Destruction Board of the particular "pest destruction district" and the Agricultural Pests Destruction Council). The persons entitled to sell poisons by retail include chemists, employees of the Crown or of a local authority, and holders of a retailer's poison licence. Similar provision apply to the packing and labelling of poisonous substances.



Every container used for a poison or poisonous substance must be : (a) impervious to the poison or poisonous substance; (b) so constructed that it can be readily and effectively resealed after any portion of the contents has been used; (c) of the prescribed character or type; and (d) labelled in the prescribed manner.

Records must be kept of the sales of poisons and must be preserved by the seller for a period of not less than three years. Poisons and poisonous substances must not be stored together with articles of food and drink or in any place to which young children or unauthorized persons have ready access. They may not be packed or prepared for use in any room, or any table or bench, used for packing, preparing or consuming food or drink.

As far as toxic substances are concerned, the Act lays down that every person who imports, manufactures or prepares any such substance, not already being imported into, or manufactured or prepared in, New Zealand on 1 April 1961, must notify the Registrar (defined as the " Director of the Division of Public Health for the time being appointed under the Health Act 1956 ") and supply the following information : (a) the nature and toxicity of the substance; (b) the purpose for which it is intended to be used; (c) the method of distribution and use; (d) such other particulars as the Registrar may require. These provisions do not however apply where the toxic substance is being registered with the Agricultural Chemicals Board or the Animal Remedies Board. As pointed out by Kennedy,<sup>2</sup> many importers and manufacturers supplied such information to the Department of Health before the statutory requirement to do so was introduced by the Poisons Act in 1960, but " in some instances this laudable action on the part of sections of the business community left them at a disadvantage commercially when compared with less responsible competitors in the same field so that steps were taken so that all should follow the pattern of procedure developed by responsible firms ".

The Registrar may also at any time require the provision of information as to toxic substances on the market or in use, in the same way as for new substances, or any other relevant information. In addition, the Minister of Health has the power to prohibit the importation, manufacture, sale, possession or use of any toxic substance for a period not exceeding one year.

Other provisions of the Act concern the procuring of samples, and the procedure to be adopted when ships or aircraft arrive in New Zealand with certain poisons on board. The Collector of Customs at the port or place of arrival must be informed as to the fact that such poisons are on board, and the location of the corresponding containers. Such containers may not be removed until they have been inspected, and if they have not been stowed apart from foodstuffs or feeding stuffs, and if, as a result of breakage or leakage, the goods concerned may have been contaminated, such goods may not be landed, or may be landed only for the purpose of reshipment, destruction, or disposal in some other manner.

As far as the notification of cases of poisoning is concerned, the Act requires the medical superintendents of public hospitals to notify

all such cases to the District Registrar (i.e. the Medical Officer of Health); such notification is also the responsibility of Registrars of Births and Deaths. Further provisions as to notification are contained in the Health Act 1956 (see below).

An important provision of the Act is that the Registrar may, for the purpose of protecting the public, publish statements relating to poisons or toxic substances, or to related advertisements, such statements being privileged.

The Governor-General is empowered to make regulations for the implementation of the Act. Thus, the Poison Licences Regulations 1961 (amended in 1963) lay down the procedure to be followed in applying for licences under the Act and the conditions to which such licences are subject. The most important provisions for the implementation of the Act are however contained in the Poisons Regulations 1964 (amended in 1966, 1967 and 1969). The substance to which the Regulations apply are listed in the various Schedules and are subject to various forms of control, depending on the Schedule to which they are assigned. Thus, the substances in the First and Second Schedules and Part I of the Third Schedule are declared to be poisons, those in Part II of the Third Schedule "restricted poisons", and those in the Fourth Schedule poisonous substances. The Fifth Schedule lists substances, compounds, articles, etc., which (apart from certain labelling requirements) are exempt from the provisions of the Regulations. Dressed legume and cereal seeds are also exempted from the provisions of the Regulations, provided the container used for such seeds bears the conspicuously printed statement: "Caution: Chemically treated. Do not eat — Do not feed to animals.". Mixtures of fertilizers and organochlorine insecticides are exempted from certain of the provisions dealing with labelling, as are granulated or pelleted formulations of organochlorine insecticides, provided that the container used is conspicuously labelled with the name of the poison or poisonous substance, the proportion present in the fertilizer or formulation, and the word "POISONOUS".

Special restrictions govern the sale of the restricted poisons listed in Part II of the Second Schedule: these include chloropicrin, endrin, monofluoroacetic acid and its salts and esters, nicotine and its salts, organic mercury compounds, certain organo-phosphorus compounds, and phosphine and preparations generating phosphine. Such products may, in fact, be sold only to "commercial users", a term which covers farmers, agricultural contractors, pest control operators and users of land for recreational purposes. Although classified as restricted poisons, phenyl mercury compounds may however be sold (by a duly licensed or otherwise authorized person) to any person, whether a commercial user or not. It should be pointed out at this juncture that certain restricted poisons are also subject to the provisions of the Deadly Poisons Regulations 1960 (see below).

The Poisons Regulations 1964 lay down detailed provisions regarding the containers to be used for poisons and poisonous substances; thus, collapsible tubes of capacity less than 240 g must not be used for poisons

or poisonous substances intended for use or sale as vermin exterminators. In addition, poisons and poisonous substances may not be stored or kept ready for use other than in a place specially allotted for this purpose, or in such a manner as to contaminate any food, drink or drugs. Containers which have been used for poisons or poisonous substances must be thoroughly washed before being re-used, and empty containers for restricted poisons must be disposed of by burning, where possible, or in some other suitable manner. The contamination of water supplies by the installation or placing of a pipe or hose, connected to such a supply, in any vehicle, tank, etc., used for poisons or poisonous or toxic substances, must be avoided.

General requirements as to labelling are laid down, e.g. that labels must be conspicuously written or printed, firmly affixed, etc., and as to the size of the lettering to be used. Every container must bear a label with the name of the poison or poisonous substance concerned, together with : (i) the word "POISON", in the case of a poison included in the First or Second Schedules, or Part I of the Third Schedule; (ii) the word "POISON" or the words "RESTRICTED POISON", in the case of a restricted poison; (iii) the word "POISONOUS" or "POISON", in the case of a poisonous substance. The label must also bear the name and address of the manufacturer, the seller, or the person or firm by whom the poison or poisonous substance is intended to be sold.

Except in the case of aerosols and smoke generators, details of the appropriate first-aid treatment to be applied must be given on the containers used for certain poisons and poisonous substances intended for sale by retail, including arsenical poisons, dinitrophenol and its homologues, hydrocyanic acid and cyanides, organo-phosphorus compounds, etc. The containers used for solid insecticides must bear the statement "Not to be used in sleeping quarters". Every label used for containers for restricted poisons must be approved in writing by the Registrar, and must contain : (a) the words "RESTRICTED POISON" or, if required by the Registrar, "DEADLY POISON"; (b) the name of the preparation; (c) the directions for use; (d) the precautions to be taken in use; (e) the symptoms of poisoning; (f) the first-aid treatment to be applied; (g) the serial number, if any, allotted to the label by the Registrar; (h) the name and address of the manufacturer or the packer; (i) any other particulars required by the Registrar. The period for which the approval given by the Registrar is valid may not exceed five years.

Special provisions are laid down as to the labelling of the containers used for systemic pesticides, where this term is defined to mean "any poison or poisonous substance or toxic substance used or intended to be used for the prevention or treatment of any viral, bacterial, or fungal infection of, or any insect attack on or infestation of, a plant and which, when applied to or absorbed into one part of the plant is, or is claimed to be, translocated to other parts of the plant". Every label used for the container of such a pesticide must bear the words "SYSTEMIC PESTICIDE" or "SYSTEMIC MATERIAL", followed by one of the statements : (a) "Not to be applied to or near to food crops except as per-

mitted by the directions on this label"; or (b) "Not to be applied on or near to food crops".

Containers used for noxious substances, within the meaning of the Noxious Substances Regulations 1954 (see below), must be provided with labels bearing the words "The use of this material is subject to the Noxious Substances Regulations 1954", or words to that effect.

Finally, labels used on aerosols and smoke generators must bear : (a) the name of the preparation; (b) a quantitative statement of the poisonous substances contained in each package; (c) in place of the word "POISONOUS" the words "Caution : Poisonous. Not to be used where food is exposed"; (d) the directions for use; (e) the name and address of the manufacturer, packer or seller.

Containers used for the transport of poisons or poisonous substances must be marked "POISON", "RESTRICTED POISON" or "POISONOUS", as the case may require. In addition, for the poisons and poisonous substances listed in the Sixth Schedule to the Regulations, which include arsenicals, chloropicrin, cyanides, dinitrophenol and its homologues, fluoroacetamide, etc., such containers must bear the true name or description of the poison or poisonous substance concerned. When a vessel carrying such products first arrives from overseas, a report must be made to the Collector of Customs so that appropriate action can be taken if breakage or leakage has occurred during the voyage and foodstuffs have been contaminated.

Finally, the Regulations contain a number of provisions regarding the keeping of records of sale of poisons (no records are necessary in the case of poisonous substances included in the Fourth Schedule).

Other provisions concerning poisons are contained in the Deadly Poisons Regulations 1960 (as amended in 1963 and 1968). As pointed out by Kennedy,<sup>4</sup> "The practical significance of these regulations is to control the sale, distribution and use of Compound 1080 (the sodium salt of monofluoroacetic acid) used extensively for the destruction of rabbits, opossums, wallaby and deer which are noxious animals in the New Zealand environment. Compound 1080 is a 'restricted poison' under the Poisons Act 1960, available to persons specifically authorized but not available to the public generally. The aim of the Department of Health is to ensure that it is freely available for pest destruction provided it is only handled by experienced operators in a manner that avoids any public outcry against what is very extensively used in New Zealand".

The Schedule to the Regulations lists the following as "controlled deadly poisons": bis (2 fluoroethyl)-formal; fluoroacetamide (also known as 1081); fluorocitric acid and its salts and derivatives; monofluoroacetic acid and its salts and esters (the sodium salt being known as 1080); thallium salts.

In essentials, the Regulations provide that :

(a) controlled deadly poisons may be sold only by a holder of a wholesaler's poison licence who has been authorized to this effect by a Medical Officer of Health; special records must be kept, and all sales must be notified to the Medical Officer of Health;

(b) no person may pack, repack, prepare or apply any controlled deadly poison unless he is an "approved operator"; approval is granted by the Medical Officer of Health when he is satisfied that the applicant is adequately instructed or trained in the use of the controlled deadly poison;

(c) no controlled deadly poison may be applied within any city, borough or town district, or in or on any ship, vessel, vehicle or building in any harbour board area, except with the prior consent in writing of the local authority and the Medical Officer of Health;

(d) no controlled deadly poison may be applied to any source of water under the control of a local authority for supply for use for domestic purposes;

(e) except as provided under the Noxious Animals Act 1956 and the Agricultural Pests Destruction Act 1967, no controlled deadly poison may be applied without the consent of the owner or occupier of the land or buildings concerned;

(f) the aerial application of any controlled deadly poison is subject to the approval of the Medical Officer of Health; the area to be covered must be precisely designated;

(g) where unconsumed baits and carcasses have not been removed, property owners must inform every person entering the property within the three months following the application of a deadly poison, that such poison has been used.

For certain purposes, cyanide or cyanide-containing preparations for the destruction of animal pests are also considered to be controlled deadly poisons (although not, however, in the case of hydrogen cyanide preparations supplied and used for the purposes of the Fumigation Regulations 1967 or for the destruction of rabbits underground, bees in hives or opossums in nesting sites). Item (b), in relation to the application of poison but not otherwise, and items (c) to (g) inclusive, apply to these cyanide preparations.

#### IV. *Legislation on special uses of pesticides*

The Fumigation Regulations 1967, which replace the Cyanide Fumigation Regulations 1952, require fumigation (defined as the use of various preparations of hydrogen or calcium cyanide, methyl bromide, ethylene dibromide, or phosphine gas for the purpose of the destruction of rodents, pests or other undesirable plant or animal organisms) to be carried out by an adequate number of persons (at least 2), under the supervision of an operator who holds a certificate of competence issued by a Medical Officer of Health. All staff must be provided with the protective clothing and equipment prescribed. No person may enter an area where fumigation is being carried out except in the course of duty. Other provisions of the Regulations are concerned

with the storage of fumigants, the disposal of fumigation residues, the keeping of a fumigation register, the notification of intention to fumigate, of the completion of fumigation, and of accidents, etc. Detailed provisions are laid down as to the procedure to be adopted and the safety precautions to be taken in the fumigation of ships and aircraft, buildings, sealed chambers ("fumigation cells"), areas of soil, etc.

With regard to aerial application of pesticides, the Civil Aviation Regulations 1953, as amended in particular by Amendment No. 5 of 1 June 1960, permit the dropping from an aircraft in flight of agricultural chemicals classified as insecticides, fungicides or herbicides, or of animal poisons, provided that the pilot in command holds a "chemical rating". The subjects in the examination to be taken by applicants for the latter include clinical effects of agricultural chemicals, and legislation pertaining to agricultural chemicals and their application. A special course of instruction is arranged for applicants.<sup>5</sup>

#### *V. Legislation on food hygiene aspects*

The Food and Drug Regulations 1946, as reprinted in 1963, contain provisions dealing with pesticide residues. Regulation 49B defines "pesticide", for the purposes of the regulation, as "any insecticide or chemical which is used for the destruction or control of any pests, weeds, or injurious organisms, and which may affect the production or storage of any food". The principle is laid down that fruit, nuts, cereals, vegetables or other stored food may be exposed only to such pesticides as are volatile under ordinary conditions of air temperature and pressure, and then only to such amounts as are generally recognized as sufficient in good fumigation practice. A list of 26 pesticides is given, together with the maximum permitted residues in various foodstuffs. The sale of foodstuffs containing pesticide residues greater than the maximum permitted values is prohibited.

In addition to the above, the Pesticide Regulations 1959 provide that pesticides may not be applied to crops being grown for the production of food, if such application would result in a residue at the time of sale of the product greater than that specified by the Food and Drug Regulations. The application of systemic pesticides to crops is subject to such conditions as may be imposed by the Minister of Health (as in the Systemic Pesticides Notice 1961).

According to Kennedy,<sup>6</sup> the legislation on pesticides residues is of considerable public health significance and of outstanding importance in the proceedings of the Agricultural Chemicals Board and the Stock Remedies Registration Board (now the Animal Remedies Board), who in turn play a major role in the determination of agricultural practice.

Reference should also be made in this context to Amendment No. 2 (23 December 1963) to the Stock (Insecticides and Oestrogens) Regulations 1961; this provides for the condemnation and suitable disposal of any animal carcass if it is found, on inspection, that the fat contains a residue of insecticide greater than that permitted under the above-

mentioned provisions of the Food and Drug Regulations. Under the terms of the Game (Packing and Export) Regulations 1967, those provisions apply to game. The Meat Regulations 1940, Amendment No. 15 (14 October 1964) and the Game (Packing and Export) Regulations 1967 prohibit the post-slaughter application of insecticides, etc., and also empower the Director of the Meat Division of the Department of Agriculture to prohibit the use (in the establishments concerned) of particular germicides, insecticides, or rodenticides.

Finally, the Dairy Produce Regulations 1938, Amendment No. 21 (26 March 1962) prohibit the delivery to a manufacturing dairy of any milk or cream which contains any insecticides.

#### VI. *Legislation on occupational health*

Provisions as to the safety and health of persons engaged in preparing, packing, mixing, spraying or otherwise handling certain "noxious substances" are contained in the Noxious Substances Regulations 1954, as reprinted in 1967. The substances concerned are as follows: dinitrophenolic compounds, organophosphorus compounds, the sodium salt of monofluoroacetic acid, fluoroacetamide, sodium and potassium arsenite, endrin, aldrin and dieldrin in preparations containing more than 1% of these substances, methyl bromide and chloropicrin.

Employees of factories and other establishments must be instructed in the dangers involved and the precautions to be taken in handling noxious substances. Other provisions deal with the provision and wearing of protective clothing, the cleaning of such clothing and of machinery and equipment used in the handling of noxious substances, the storage and disposal of such substances, and the provision and use of washing facilities. Restrictions are placed on smoking, eating and drinking in premises where noxious substances are handled. No person may work more than ten hours a day in handling noxious substances, and all persons employed in such activities must be examined by a medical officer; restrictions may be placed on the employment of persons whose health is affected.

It is also of importance, from the point of view of occupational health, that the Second Schedule to the Health Act 1956 includes among the notifiable diseases (other than notifiable infectious diseases) "Poisoning from any insecticide, weedicide, fungicide, or animal poison met with at work", and "Poisoning from any gas, fumigant, or refrigerant met with at work". Under Section 74 of the Act, medical practitioners are required to notify the Medical Officer of Health of every case of a notifiable disease other than a notifiable infectious disease of which they become aware.

Information on the administrative arrangements whereby the Department of Health receives information concerning cases of poisoning has been given by Kennedy.<sup>3</sup>

The occupational health aspects of fumigation have already been mentioned.

### VII. *Miscellaneous*

The Animals Protection Act 1960 makes it an offence to throw, cast, drop or lay any poison on or near any public place or on another person's land or premises, or to bury poison in any land less than 2 ft from the surface.

Finally, reference should be made to the fact that special provisions governing trade in fertilizers containing agricultural chemicals (as defined in the Agricultural Chemicals Act 1959) are laid down in the Fertilisers Act 1960 (amended in 1962).

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### SWEDEN

At the present time, Swedish legislation on pesticides is contained essentially in the Ordinance of 14 December 1962 on pesticides, and in the Ordinance on poisons and other products dangerous to health issued on the same date. These Ordinances have been supplemented by two Orders made on 28 June 1963. The National Poisons and Pesticides Board is an important agency in this field; its duties and composition were laid down in the Instruction of 3 December 1965. The Board of Commerce, in turn, is responsible for drawing up the lists of maximum permissible residues of pesticides in foodstuffs. Finally, the National Institute of Public Health is the central authority responsible for occupational hygiene and the inspection of foodstuffs.

#### *The National Poisons and Pesticides Board*

The National Poisons and Pesticides Board [Giftnämnden] was established by the Crown Instruction of 31 May 1963; its composition was changed by the Crown Instruction of 3 December 1965, and it now consists of a chairman and ten other members appointed by the Crown. It may also, if necessary, call on the services of experts and specialists. It is responsible, *inter alia*, for : (1) keeping in touch with new developments in the field of products dangerous to health and pesticides; (2) keeping under surveillance the observance of the provisions of the Ordinances of 14 December 1962 on poisons and pesticides, and the Orders made pursuant to these Ordinances; (3) submitting to the Government proposals for such measures as it may consider necessary for the performance of its duties.

As far as pesticides are concerned in particular, the Board is responsible for their registration, classification according to toxicity, and labelling.<sup>5</sup>

#### *Ordinances of 1962 on poisons and pesticides*

Crown Ordinance No. 702 of 14 December 1962 on poisons and other products dangerous to health (Poisons Ordinance) and Crown Ordinance No. 703, of the same date, on pesticides (Pesticides Ordinance),



contain provisions of similar character. The two Ordinances differ, however, in the fields to which they are applicable. According to the definition given in the first Ordinance "a product dangerous to health means any substance which, because of its properties and its use, may cause death, disease or infirmity in man". Thus a pesticide or plant protection product which, when used in the prescribed manner, was not toxic to man, could not be covered by the provisions of this Ordinance. Nevertheless, certain of its provisions, concerning manufacture, import, transport and the National Poisons and Pesticides Board, are applicable to pesticides. In contrast, the definition given in the second Ordinance is based solely on the use of the product concerned. It is laid down that the term "pesticide" [bekämpningsmedel] means any substance or preparation intended for the prevention of the harm and nuisance caused by weeds, animals, bacteria or viruses. Products intended principally for purposes other than the destruction of harmful animals and plants, such as medicaments, food preservatives, pharmaceutical preparations, colouring matters, varnishes, tars, etc., are not covered by this definition. It does, however, cover herbicides, raticides, insecticides, etc., and products used for the impregnation of wood, textiles, etc.<sup>6</sup>

No pesticide may, in the absence of special instructions to the contrary, be sold, supplied or used unless it has been registered by the authority designated to this effect by the Crown. Order No. 442 of 28 June 1963 lays down that the competent authority is the above-mentioned Board. Registration is refused if: (a) the product is excessively poisonous or if it is liable to have a harmful effect on man, domesticated animals, game or useful insects or plants; (b) its lack of effectiveness makes it unsuitable for the purpose proposed; (c) its name may be misleading as to its composition, effects or properties, or cause confusion with another pesticide. Pesticides are allocated on registration to one of the three following classes: *Class 1*: products liable to cause serious poisoning in man and animals if the prescribed precautions are not taken; a special licence is required before such products can be sold or used (see p. 82); *Class 2*: products which, though not belonging to Class 1, are liable to cause serious poisoning; *Class 3*: other pesticides.

The registration procedure is also laid down in the Order. A separate application for each product must be submitted in triplicate to the Board by the manufacturer (or his representative in Sweden, in the case of a foreign manufacturer) who must provide the following information: (a) the name or company name of the applicant and his address; (b) the name under which the pesticide will be marketed and an indication as to whether the name has been registered as a trade mark; (c) the purpose for which the product is intended; (d) the size and type of package; (e) a complete statement as to the composition of the product and information on its form; (f) the information necessary to determine the degree of toxicity of the product or any harmful effects on man, domesticated animals, game, or useful insects or plants; (g) information on the effectiveness of the product for the purpose indicated.

The application must be accompanied by : (a) a draft of the label and three copies of the instructions for use; (b) three packages of the pesticide, unless the Board orders otherwise; (c) the registration fee; (d) in the case of a product manufactured abroad, the power of attorney authorizing the applicant to represent the manufacturer in dealings with the Board. If the Board so requests, the applicant must also : (a) provide information as to the analytical methods used during manufacture for identifying the constituents of the pesticide, and their amounts, and the method of determining the residue of the pesticide in food; and (b) supply samples of the substances of which, according to the statement submitted, the product is composed. The Board may make registration subject to the coloration of the pesticide or the use of some other method of distinguishing it from products intended for consumption.

The label prescribed by the Board must mention : (a) the name of the pesticide, its registration number and a short description of its field of application; (b) the class to which the product belongs; (c) a warning notice or other statement on the protection of human beings, domesticated animals, etc.; (d) the method of use recommended from the safety point of view; (e) the names and amounts of the active ingredients of the product; (f) unless the Board stipulates otherwise, the names of any other ingredients which may contribute to the toxicity of the product.

If the Board finds that the circumstances on which registration was based no longer obtain, it has the right to cancel the registration.

Every pesticide must, when supplied, be contained in a package which can be considered as safe from the point of view of transport, storage and use, and which by its shape is unlikely to be confused with other products, and in particular with those intended for human consumption. The package used for a registered pesticide must bear : (a) the label prescribed by the Board; (b) the name of the manufacturer or importer, or the company name, and the address; (c) the batch number or some other means of determining the origin of the product; (d) in the case of a product which decomposes easily, the expiry date. In addition, every Class 1 pesticide, when supplied to the user, must bear the name or company name of the seller and his address. The above information must be in Swedish, be clearly legible, and appear in a conspicuous position.

Class 1 pesticides may be supplied only to persons who trade in these products, and persons licensed to use them. The licence is granted by the Royal Agricultural Board to persons engaged in agriculture, forestry or horticulture, and by the National Board of Health and Social Welfare in all other cases. No minimum age is specified, but under the provisions of Section 15 of the Poisons Ordinance of 1962, no poison may be supplied to any person less than 18 years of age.

Trade in Class 1 pesticides may be carried out only by : (a) persons licensed to manufacture such products; (b) persons licensed to trade in poisons in general; and (c) persons licensed to trade specifically in such pesticides. The licence is granted, in the last-named case, by the local police authorities, after having consulted the labour inspectorate. The

licence is granted for a limited period or until notice and either for a particular Class 1 pesticide or for all the pesticides in this class. The application for the licence must state : (a) the name or company name of the applicant and his address; (b) the location of the premises; and (c) the name of every product for which the application is submitted. Copies of the licence must be sent to the labour inspector, the county medical officer and the local public health committee. Every person responsible for trade in Class 1 pesticides must be approved by the labour inspector, and must have, in particular, the necessary theoretical knowledge and satisfactory practical experience in this field.

In sales premises, Class 1 pesticides must be kept in a locked cupboard or room which must not contain products of any other kind. Class 2 pesticides must be kept well separated from other products. An entry must be made in a register whenever a Class 1 pesticide is sold, this entry stating the nature and quantity of the product, and the name or company name and address of the person for whom it is intended; the register must be kept for a period of not less than three years. Pesticides may be sold only in the original packages provided by the manufacturer.

It should be noted that a large number of pesticides now on sale and in use have not yet been registered by the National Poisons and Pesticides Board, namely those already on the market on 1 October 1963. Pending final examination of the application for registration, they may be sold and used, unless the Board orders otherwise. A list of the products concerned was drawn up by the Board in September 1964.<sup>5</sup>

Instructions are given as to the methods of reducing the risk of accidents in the handling of pesticides. In general, the user is advised to read carefully the instructions for use and the warning notices, to keep pesticides out of the reach of children and preferably locked up (this is compulsory in the case of Class 1 pesticides), to keep them well separate from foodstuffs, never to transfer a pesticide to another container and to destroy pesticide residues and packages in such a way as to avoid all risk of damage or pollution.<sup>7</sup> Special recommendations are given as to the protection of useful insects such as bees. The dressing of seeds and the treatment of potatoes requires a special licence, and such seeds or potatoes must be placed in special packages. It should also be noted that the Board recently prohibited the use of certain products, and in particular of alkyl mercury compounds as seed dressings.<sup>2</sup> In addition, the use of certain chlorinated organic compounds (aldrin, dieldrin and DDT) has been prohibited or severely restricted.<sup>4</sup>

### *Manufacture of pesticides*

The provisions applicable to the manufacture of pesticides are those of Sections 8 to 10 of the Poisons Ordinance of 14 December 1962. For the purposes of this Ordinance, the term "manufacture" means production, purification, or any other form of processing, as well as packaging. The industrial manufacture of poisons may be carried out only by persons possessing a special licence. The industrial manufacture of

dangerous substances may be carried out only by persons licensed to manufacture poisons or who have been approved by the labour inspector. An official list with examples of substances belonging to these classes is published by the National Poisons and Pesticides Board. Moreover, the poisons authority, when requested, issues decisions as to whether a certain article is to be regarded as dangerous to health and whether, in that event, it constitutes or is to be regarded as a poison or dangerous substance.

Order No. 441 of 28 June 1963 lays down that the licence to manufacture poisons is granted by the local police authorities, after they have consulted the county medical officer and the labour inspector. The licence may be valid for a limited period or until further notice, and may be for one or more substances. The application for a licence must state : (a) the name or company name of the applicant and his address; (b) the address of the premises used for manufacture and storage; (c) if the application is not for a general licence, the name of every substance concerned. Copies of the licence must be sent to the labour inspector, the county medical officer and the local public health committee. The manufacture of poisons may be carried out only under the control of a person approved by the labour inspector, such approval being given only to persons having the necessary theoretical knowledge and adequate practical experience. The person in charge must ensure that suitable technical procedures are used in the manufacture and that all the relevant legal provisions are observed.

A licence may be cancelled by the police authorities if : (a) the manufacturer does not observe all the legal provisions applicable to poisons or dangerous substances; (b) the person in charge is absent or fails to control the operations, or is clearly unable to carry out such control in a satisfactory manner; (c) frequent or serious errors are made in the course of manufacture; (d) the manufacture is carried out under conditions which are not satisfactory from the point of view of order and safety.

In a more general way, industrial safety is dealt with in Law No. 1 of 3 January 1949 on the protection of workers [Arbetskyddslag] and the orders made for its implementation. Section 7 of this Law makes it compulsory for employers to take all the measures necessary or prescribed by the legislation for the purpose of preventing industrial accidents and occupational diseases. In turn, workers are required to obey all the instructions given to them in connexion with questions of safety and to co-operate in the prevention of industrial accidents and occupational diseases. Section 12 provides that personal protective equipment must be used where necessary. Section 28 makes annual medical examinations compulsory for all persons less than 18 years of age engaged in work which is dangerous to their health.

Crown Order No. 208 of 6 May 1949 for the implementation of the above-mentioned law also provides, in Section 2, for the medical examination of all workers carrying out work involving a danger to health. Pursuant to the provisions of Section 5 of this Order, every industrial

accident and case of occupational disease must be notified immediately by the employer to the labour inspector. The manufacture or handling in any other way of poisons or substances dangerous to health is specifically mentioned in Section 25, which lays down that all the necessary safety measures must be taken. Section 29 requires employers to provide workers with the protective clothing, gloves, boots, goggles and masks prescribed.

Crown Order No. 209, also of 6 May 1949, prohibits the employment of persons less than 18 years of age in the manufacture, processing or handling in any other way of Class 1 poisons, as now defined by the 1962 legislation. Persons between 16 and 18 years of age may be employed in such work, however, provided that special precautions have been taken (installation of a ventilation system, extraction fans, etc.) and that the labour inspector is in agreement.

The National Board of Industrial Safety [Arbetskyddsstyrelsen] and the Labour Inspectorate [Yrkesinspektionen] are the authorities responsible for keeping working conditions under surveillance. The National Institute of Public Health has a special department of occupational health responsible, *inter alia*, for carrying out research on occupational diseases. Many other organizations and institutions also carry out research and inspections in the field of occupational health.<sup>1</sup>

Finally the Law of 1954 on insurance against industrial accidents [yrkesskadeförsäkring], as amended in 1962, also applies to occupational diseases, and in particular those caused by poisons, as laid down in item (b) of Section 6.

#### *Transport of pesticides*

Section 16 of the Pesticides Ordinance of 1962 lays down simply that "pesticides must be transported under conditions such as to ensure complete safety, taking into account the nature of the products concerned". This is identical with what is laid down in Section 19 of the Poisons Ordinance. The National Poisons and Pesticides Board has issued a circular<sup>3</sup> giving instructions on the transport of pesticides, according to which it is the responsibility of the carrier to take all the necessary safety measures. The choice of the package is of great importance, and it is always necessary to check that it is of adequate strength, from the point of view of the means of transport used, the time of year, the nature of the pesticide, etc. Every vehicle must be loaded in such a manner that the stress on the package is as small as possible during transport. If a pesticide is found to have leaked out, it is often necessary to take measures rapidly to prevent the poisoning of man or animals and the pollution of the soil or of water. The Board emphasizes, therefore, the need to train carriers in the measures to be taken in case of accident.

#### *Residues in foodstuffs*

Crown Order No. 706 of 14 December 1962 amended Regulations No. 824 of 21 December 1951 on foodstuffs by adding a new sub-section 3

to Section 7 as follows : " The Board of Commerce [Kommerskollegium] shall be responsible for determining the maximum permissible amounts of pesticide residues which may be present in products sold as foodstuffs or supplied to third parties for the purpose of use as foodstuffs. "

Since this Order entered into force on 1 January 1964, the Board of Commerce has from time to time published lists of maximum permissible residues (expressed as mg/kg) of certain pesticides in various fruits and vegetables. The inspection of foodstuffs from the point of view of hygiene is the responsibility of the National Institute of Public Health.

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### UNION OF SOVIET SOCIALIST REPUBLICS

Legislation for the control of pesticides in the USSR covers a wide range of aspects of the problem, including the assessment of new pesticides for use in agriculture, working conditions in the manufacture of pesticides, maximum permissible concentrations of pesticides in the atmosphere of work-places, pesticide residues in foodstuffs and the methods of determining such residues, the use of protective equipment by agricultural workers engaged in applying pesticides, etc. The most important place, among these various items of legislation, is occupied by Health Regulations No. 531-65 of 10 June 1965, concerning the storage, transport and use of poisonous chemicals in agriculture, and these will therefore be considered first.

The aim of these Regulations is stated to be " to prevent the poisoning of persons coming into contact with poisonous chemicals in the working process (the use, storage and transport of poisonous chemicals, work on fields treated with poisonous chemicals, etc.), and to prevent the contamination, by such chemicals, of foodstuffs, the atmosphere, inhabited localities, and bodies of water. " It should be noted that the Regulations do not make use of the term " pesticides ", but refer exclusively to " poisonous chemicals " [jadohimikaty].

These chemicals are divided into four classes, as follows : (1) highly active poisonous substances (arsenates and arsenites, aldrin, Paris green, nicotine sulfate, chloropicrin, etc.); (2) highly toxic substances (methyl bromide, dichlorethane, dinitro-ortho-cresol, zinc phosphide, etc.); (3) moderately toxic substances (DDT and preparations based on DDT, 2,4-dichlorophenoxyacetic acid and preparations based on it, malathion, formalin, etc.); (4) slightly toxic substances (Bordeaux mixture, dichloropropionic acid, green vitriol, captan, zineb, ziram, etc.).

The Regulations then specify the general protective measures to be taken. These include pre-employment and periodic medical examinations for all persons engaged in work with poisonous chemicals. Such work may not be carried out by adolescents under 18 years of age, nor by pregnant women or nursing mothers; persons in a state of inebriation are also forbidden to engage in work with poisonous chemicals.

Every year, before the commencement of work with poisonous chemicals in collective farms and similar undertakings, the workers concerned must be instructed, by specialists in plant protection and medical workers, in the precautionary measures to be taken, the provision of first aid, and the methods of preventing the contamination of food-stuffs, the atmosphere and bodies of water. A certificate is issued to every person who undergoes such instruction, on which appropriate entries are made each year, both as to the instruction received and the medical examinations undergone. No person may work with poisonous chemicals unless he holds this certificate, on which the necessary entries must have been made. Furthermore, no person may work with such chemicals unless he has been provided with the necessary special clothing and personal protective devices.

Every poisonous chemical must be stored, transported and supplied in a special container, tightly sealed, and marked with the word "poison". Every such container must carry a label bearing the following information :

- (a) the complete name of the preparation;
- (b) the percentage content of the active ingredient and the most important of the other ingredients;
- (c) the name of the undertaking which manufactured the preparation;
- (d) the batch number;
- (e) the date of manufacture and the date of acquisition;
- (f) the net weight and the gross weight.

In addition, every store of poisonous chemicals and work-place in which such chemicals are used must be provided with instructions, notices, etc., as to the precautions to be taken and the first-aid procedures to be adopted.

Foodstuffs, water, feeding stuffs and articles in everyday use must not be stored in places in which work with poisonous chemicals is carried out. Such chemicals must not be left unprotected in fields or other places. Chemicals not used must be returned to store or destroyed.

No person may work more than six hours per day with poisonous chemicals, or more than four hours per day with highly active poisonous preparations. All workers with such chemicals must strictly observe the rules of personal hygiene; eating, drinking and smoking at the work-place are all prohibited. Eating is permitted at a special place, located not less than 100 m from the work-place, and this special place must be provided with water, a wash-stand, soap and towels.

No person may carry out work in an area treated with poisonous chemicals, or within 300 m of such an area, before the expiry of the prescribed period during which such work is prohibited, unless all the necessary precautions are taken; access is restricted to persons provided with the appropriate special clothing and personal protective equipment.

In no case may the concentrations of poisonous chemicals in the inhaled air exceed the maximum permissible values laid down in Annex 1 of the Regulations.

A special part of the Regulations is concerned with the contraindications to work with poisonous chemicals. It is laid down, in this connexion, that the oblast health section is responsible for organizing the pre-employment and periodic medical examinations previously mentioned, while the supervision of the organization and carrying out of the periodic examinations is the responsibility of the local agencies of the sanitary and epidemiological services.

The following contraindications against work with poisonous chemicals are then listed :

1. organic diseases of the central nervous system;
2. mental diseases (even during remissions);
3. epilepsy;
4. diseases of the endocrine glands and the sympathetic nervous system;
5. active forms of pulmonary tuberculosis, scleroma and tumours of the upper respiratory passages;
6. bronchial asthma;
7. inflammatory diseases of the respiratory system (bronchitis, laryngitis);
8. diseases of the gastrointestinal system (ulcers, chronic gastritis, chronic colitis);
9. serious liver disease;
10. kidney diseases (nephritis, nephrosis, nephrosclerosis);
11. eye diseases (chronic conjunctivitis, keratitis, diseases of the lachrymal duct and eyelids, temporary amaurosis with restriction of the field of vision);
12. skin diseases (eczema, dermatitis);
13. diseases involving loss of respiratory function of the nose;
14. serious diseases of the respiratory and cardiovascular systems which would make the use of a respirator difficult.

In addition to the above, there are specific contraindications to work with particular types of chemical poisons, as follows :

*A. Organic mercury compounds :*

- (i) serious neuroses (neurasthenia, hysteria, psychasthenia), as well as serious neurotic conditions of diverse aetiology;
- (ii) chronic or frequently recurring gingivitis, stomatitis or alveolar pyorrhoea;
- (iii) diseases of the optic nerve or retina, or glaucoma;



B. *Arsenic compounds*:

- (i) chronic and recurrent diseases of the peripheral nervous system;
- (ii) severe atrophic rhinopharyngolaryngitis, ozena, nasal sycosis, or severe distortion of the nasal septum;
- (iii) diseases of the optic nerve or the cornea, or glaucoma;
- (iv) all blood diseases and secondary anaemia (less than 50% haemoglobin);

C. *Organochlorine compounds*:

- (i) severe neurosis;
- (ii) atrophic rhinitis, ozena, nasal sycosis, or diseases of the paranasal sinuses with frequent acute episodes;
- (iii) chronic laryngitis with frequent acute episodes, or laryngeal stenosis;
- (iv) various liver and kidney diseases;

D. *Organophosphorus compounds*:

diseases of the cardiovascular system with circulatory insufficiency;

E. *Carbon disulfide*:

- (i) severe neurosis (neurasthenia, hysteria, psychasthenia);
- (ii) psychopathy;
- (iii) chronic and recurrent diseases of the peripheral nervous system;
- (iv) very severe atrophic rhinitis, ozena, nasal sycosis, or chronic inflammation of the upper respiratory passages with frequent acute episodes;
- (v) any permanent condition which markedly reduces nasal function (cleft palate, cleft lip, etc.);
- (vi) diseases of the optic nerve or the retina;

F. *Nicotine sulfate and anabasine sulfate*:

all diseases of the cardiovascular system.

As far as the periodic medical examinations are concerned, it is laid down, in addition, that in the case of persons coming into contact with mercury compounds, the mercury content of the urine must be determined. Persons found to have a content of mercury in the urine greater than 0.01 mg/l and to show clinical signs of mercury poisoning must be forbidden to work with mercury compounds. Similarly, in the case of persons working with organophosphorus and carbamate pesticides, a systematic check must be kept on the cholinesterase levels in the blood, both before work is begun and not less than once a week during the course

of the work. No person may be allowed to continue work with such pesticides if there is a drop of more than 25% in the cholinesterase level.

Further special parts of the Regulations deal with the transport, storage and supply of poisonous chemicals. It is laid down, *inter alia*, that the persons accompanying poisonous chemicals during transport must wear special clothing and be provided with personal protective devices. The transport of foodstuffs and other goods together with poisonous chemicals is strictly prohibited; vehicles used for the transport of foodstuffs and passengers may not be used for the transport of poisonous chemicals. If such chemicals are transported by rail, wagons specially made for this purpose for the Ministry of Communications of the USSR must be used; these must be painted and marked in a special way. Detailed regulations governing the rail transport of poisonous chemicals are laid down by the above-mentioned Ministry.

The storage of poisonous chemicals in collective and state farms is subject to the approval of the agencies of the sanitary and epidemiological services, which is given only if the corresponding sanitary requirements are satisfied by the conditions of storage. As evidence of such approval, a certificate [pasport] is issued by the agency; this can be withdrawn if it is found that the requirements are no longer satisfied.

Detailed provisions are laid down as to the construction and location of storage premises for poisonous chemicals, e.g. such premises must be located in a dry place not less than 200 m from dwellings and other buildings, sources of water supply, etc., they must be dry and adequately lighted, the walls must be smooth, etc. The storage of poisonous chemicals in the open air is strictly prohibited. The ventilation of the storage premises must satisfy the standards of hygiene, and be such as to permit the weighing and measuring of poisonous chemicals without risk. They must consist of at least two sections, the first for the storage and supply of the chemicals, and the second for clerical work and the storage of the special clothing; this second section must also be provided with water, soap, towels and the necessary first-aid kit. A shower must adjoin the storage premises. The storekeeper, who must have a good knowledge of the toxic properties of poisonous chemicals, is responsible for the storage and supply of such chemicals.

Whenever a poisonous chemical is received or supplied, an entry must be made in a register as to, *inter alia*, the name of the chemical concerned, the date, the document on the basis of which the chemical was received or supplied, and in the latter case, the name of the person to whom it was supplied.

Eating, drinking and smoking are prohibited in the storage premises, and no person may work in them unless he is wearing the necessary special clothing. A respirator must be worn when poisonous chemicals in the form of dusts, or chemicals which give off gases, are weighed out.

Poisonous chemicals are supplied from store only on the basis of a written order from the chairman of the collective farm, director of the state farm, or person in charge of such other establishment as may be concerned.

The provisions governing the safety measures to be taken in the application of poisonous chemicals also form a special part of the Regulations and are extremely detailed in character. It is laid down, as a general principle, that all operations connected with the application of such chemicals must be mechanized, and that apparatus specially designed for this purpose may alone be used; such apparatus must be kept in a good state of repair. It must be cleaned mechanically after use, and then stored in a special place, away from all other agricultural machinery. Warning notices must be put up in all areas in which work with poisonous chemicals is being carried out, and on all roads crossing fields which have been treated with such chemicals. Work with poisonous chemicals in hot weather must be carried out either in the morning or evening, under conditions of minimum air temperature, minimum insolation, and minimum air movement. The dusting and spraying of plants by means of apparatus located on the ground, the dressing of seeds in the open air, and other similar types of work, are prohibited if the wind velocity is greater than 3 m/sec. Aerial dusting is prohibited if the wind velocity is greater than 2 m/sec, fine spraying if it is greater than 3 m/sec, and coarse spraying if it is greater than 4 m/sec. Mechanical warning signals must be used when aerial dusting or spraying is carried out. Detailed instructions as to agricultural aircraft operations are drawn up jointly by the Ministry of Civil Aviation, the Ministry of Agriculture, and the Ministry of Health.

As far as the spraying of highly active and highly toxic poisonous chemicals is concerned, this is permitted only if it is effected by means of aircraft or tractors. The preparation of the solutions of poisonous chemicals to be used in spraying must be carried out using special vats and mechanical mixers at specially equipped filling points, provided with an asphalt or cement floor. Such points must be located not less than 200 m from dwellings and stock yards, sources of water supply, places for the storage of feeding stuffs, and crops. If plants are treated by means of knapsack sprayers, the workers concerned must remain at a distance of not less than 5 to 6 m from one another. Poisonous chemicals must not be spilled on to the clothing, shoes or exposed parts of the body of the workers, or on to the ground. If accidental spillage on to the ground occurs, this must immediately be decontaminated and dug over. If spillage on to the body occurs, the poisonous chemical must immediately be removed with water.

In the case of the fumigation of buildings, the administrative body concerned must inform the agencies of the sanitary and epidemiological services as to the time at which it is proposed to carry this out; the operations are, in any case, subject to the approval of the agencies just mentioned. The fumigation of establishments located less than 50 m from dwellings, or less than 30 m from industrial premises, administrative buildings or railways, is prohibited. Fumigation may be carried out only if the air temperature in the premises concerned does not exceed 35°C. It must be undertaken only by specially trained teams, and work with fumigants may never be carried out by a single individual alone.

Gas-masks must be worn, and food, water, beverages, cigarettes, tobacco, cigarette paper, etc., must not be brought into the premises to be fumigated.

Special provisions are also laid down in the Regulations as to soil fumigation, and the use of poisoned baits and aerosols. These are followed by detailed provisions on the application of seed dressings. This must be effected by means of special machines, located not less than 200 m from dwellings, sources of water supply, stock yards, food stores, etc., and operated in the open air. The operations may be carried out in special premises only when effective aeration can be ensured. The workers engaged in the application of seed dressings must wear respirators, which must be provided with covers made of a fabric which is impermeable to dust. Special dust-proof overalls must be worn, as well as gauntlets and special shoes, to protect the exposed parts of the body. Not more than four hours per day must be spent in the application of seed dressings. The use of dressed grain for food purposes, after it has been washed, aerated or "cleaned" in some other way, is prohibited. The mixing of dressed grain with grain which has not been treated, and the supply of the mixture for the manufacture of bread, is also prohibited, as is the use, for the storage of foodstuffs, etc., of the containers, sacks, etc., used for the seed dressing or the dressed seed.

For the purpose of protecting foodstuffs from contamination with poisonous chemicals, records must be kept in every collective and state farm of the poisonous chemicals used for the treatment of plants, covering the nature of the crops treated, the names of the poisonous chemicals used, their form, and the methods and date of treatment, the quantity of product used, the date of harvest, and the names of the persons responsible for applying the treatment. Poisonous chemicals may be used for the treatment of crops only at the times laid down by the corresponding instructions of the Ministry of Agriculture, issued in agreement with the Chief Sanitary and Epidemiological Directorate of the Ministry of Health. The treatment of milch cows and slaughter animals with DDT, HCH and other similar poisonous chemicals, which may be stored up in the organism and secreted with milk, is strictly prohibited. Similarly, milch cows and slaughter animals may not be pastured in fields which have been treated with preparations of DDT, HCH, heptachlor, and other stable poisonous chemicals, nor may they be fed with potato or beet tops treated with such chemicals, until the prescribed period of time has elapsed. Stable organochlorine compounds, such as aldrin and heptachlor, may not be introduced into the soil. The persons in charge of collective and state farms or other undertakings must indicate, on the certificates relating to the shipment of batches of foodstuffs for sale, the names of the preparations used, the dates, and the methods used for the treatment, by means of poisonous chemicals, of the crops from which these foodstuffs were obtained. The list of permitted poisonous chemicals for the treatment of the premises used for housing milch cows, is drawn up by the Ministry of Agriculture, in agreement with the Ministry of Health. The agencies of the sanitary and

epidemiological services must, in all cases, decide as to the use, for food, of products containing poisonous chemicals in amounts greater than the maximum permissible. The methods used for the determination of the amounts of poisonous chemicals in foodstuffs must be those prescribed by the Chief State Sanitary Inspectorate and the Chief Sanitary and Epidemiological Directorate of the Ministry of Health.

The atmosphere and sources of water supply must also be protected against contamination by poisonous chemicals. Thus, it is forbidden to use aerosol generators or agricultural aircraft for the treatment of areas located less than 300 m from bodies of water, inhabited localities, establishments concerned with foodstuffs, and individual buildings. Such areas may be treated by means of apparatus located on the ground, and using slightly toxic preparations. When poisonous chemicals are used in inhabited localities, the organization responsible for the operations must determine the content of these chemicals in the water of sources of water supply and in the atmosphere; spot checks must be made by the agencies of the sanitary and epidemiological services. Pits for the disposal of poisonous chemicals, solutions, wash waters, etc., must be located not less than 200 m from dwellings, livestock farms, wells and surface waters, in conformity with the provisions of the legislation for the protection of waters from pollution. The location of such pits must be approved by the agencies of the sanitary and epidemiological services.

Detailed provisions are laid down as to the personal protective equipment which must be supplied by collective and state farms and other undertakings to workers engaged in the application of poisonous chemicals; these include special clothing and footwear, gloves, respirators and goggles. The Regulations also contain detailed provisions as to the decontamination of special clothing, premises, containers and vehicles. Thus sacks and other containers made of paper, as well as wooden containers, must be burned in places specially designated for this purpose, located at a distance of not less than 200 m from dwellings and industrial installations. Containers made of metal or glass can be decontaminated and used again, but only for industrial purposes, e.g. the storage of kerosene. Other provisions concern the methods to be used for the disposal of unused residues of poisonous chemicals and of such chemicals which have become unfit for use.

The question of the provision of first aid in cases of poisoning by poisonous chemicals is also the subject of special provisions. First-aid kits must be provided for this purpose at the work-place, and at feldsher and medical posts. Instructions are given as to the first-aid procedures to be adopted, irrespective of the poison concerned, by untrained personnel.

It is laid down finally that the Regulations apply to all forms of use of poisonous chemicals and regulate the use of such chemicals in agriculture. Work with poisonous chemicals must be carried out in conformity with the special instructions laid down by the Ministry of Agriculture, in agreement with the Chief Sanitary and Epidemiological Directorate of the Ministry of Health, under the direction of suitably

qualified persons who have been trained in the precautions to be taken and who are familiar with the methods of preventing the contamination of foodstuffs, the air, water and the soil. The persons in charge of collective or state farms or organizations using poisonous chemicals are responsible for seeing that the provisions of these Regulations are obeyed. Every person responsible for work with poisonous chemicals must inform the agencies and establishments of the sanitary and epidemiological services as to the poisonous chemicals received, and the purposes for which they are intended, the times at which they are to be used, and the methods of use.

The Annexes to the Regulations contain, *inter alia*, the maximum permissible concentrations of vapours and aerosols of poisonous chemicals in the air of the working area, in watercourses, and in the atmosphere, and the maximum permissible residue levels of such chemicals in foodstuffs.

As will be seen from the foregoing, the Regulations of 1965 are extremely comprehensive and detailed in character; nevertheless, there are, in the USSR, a number of other items of legislation on the control of pesticides, which are of considerable importance and are concerned with various special aspects of the problem. Among these items, mention should be made of Instructions No. 286-69 of 29 May 1969 on the investigation and hygienic assessment of new pesticides,<sup>a</sup> which evidently replaced earlier Instructions dated 23 April 1957.

A number of other items of legislation concerned with pesticides come under the heading of occupational health in the chemical industry. These include, for example, Health Regulations No. 534-65 of 24 June 1965 concerning stores for highly active poisonous substances, a term which, in this context, includes pesticides such as demeton-O, dieldrin, aldrin, chloropicrin and carbon disulfide, as laid down in the list issued in 1961. Stores for such substances are divided into three classes, i.e. principal stores, general supply stores, and railway stores, and detailed provisions are laid down as to their siting, construction and equipment. Thus they must be provided with equipment for the decontamination of poisons, personal protective devices for the workers, and the pharmaceutical products needed for first-aid purposes. No person under 18 years of age, and no pregnant woman or nursing mother, may work in such stores. Every worker employed must undergo a pre-employment medical examination, and periodic medical examinations at intervals not exceeding six months.

The Circular [metodičeskoe pis'mo] of 18 May 1955 contains a description of various processes used in the chemical industry, including, *inter alia*, those for the production of organochlorine insecticides, such as HCH, DDT, etc., and the associated hazards to the workers, and considers the choice of the site for chemical plants, the requirements in respect of the water supply and drains, the production premises and processes, the equipment used, heating and ventilation, etc. It is laid

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<sup>a</sup> Not available at the time of going to press.

down that every chemical plant employing more than 1000 workers must be provided with a medical and sanitary unit, while a medical health post must be located within the area occupied by the factory.

The Health Regulations of 3 July 1962 are concerned with the construction and maintenance of undertakings for the production of DDT. They contain detailed provisions as to the hygienic requirements applicable to the production premises and processes, the ancillary premises, lighting, etc. They also lay down the provisions governing the medical examination of the workers employed in such undertakings. Such workers must undergo a pre-employment medical examination, as well as subsequent periodic examinations, before a board which must include an internist [terapevt] and a neuropathologist and, if necessary, an otorhinolaryngologist and a gynaecologist. The periodic medical examinations must include a blood test and a chest X-ray. The following are considered to be contraindications to employment in the manufacture of DDT: organic diseases of the central nervous system, epilepsy, severe neurosis, mental diseases, severe forms of disease of the endocrine and sympathetic nervous systems, severe liver disease, nephritis and nephrosclerosis, atrophic rhinitis, ozena, nasal sycosis, diseases of the paranasal sinuses (with frequent acute episodes), chronic laryngitis (with frequent acute episodes), laryngeal stenosis, tuberculosis, scleroma and tumours of the upper respiratory passages. Other contraindications are listed to employment in the production of DDT dusts, presumably arising from the use of talc and kaolin in the various processes, and to employment in the synthesis of DDT. In the case of the manufacture of DDT, the periodic medical examinations must be carried out at intervals not exceeding 12 months.

As far as undertakings for the production of the herbicide 2,4-D are concerned, the Health Regulations of 13 June 1964 lay down, *inter alia*, that all workers employed in such undertakings must undergo pre-employment and periodic medical examinations in accordance with the corresponding Order of the Ministry of Health.

Mention should also be made, in the field of occupational health, of the Instructions of 1962 concerning the use of personal protective devices in work with poisonous chemicals, and in the decontamination of containers, etc., in collective and state farms. These give details, e.g. as to the type of respirator to be worn when work is carried out with various poisonous chemicals, the types of protective clothing to be used, the laundering of contaminated clothing, etc. Details are also given as to the different decontamination procedures to be adopted.

The question of residues of poisonous chemicals in foodstuffs is the subject of numerous items of legislation, including the Instructions of 27 June 1963 on the sampling of foodstuffs treated by means of pesticides, drawn up by the Ukrainian Institute of Nutrition. These apply solely to agricultural research establishments studying the insecticidal effectiveness, on experimental plots, of new pesticides, and sending foodstuffs, obtained from the treated crops, to hygiene establishments for investigation.

The Ukrainian Institute of Nutrition was also responsible for drawing up the Circular of 25 May 1960, concerned with the control of the use of poisonous chemicals in agriculture, with the aim of ensuring the production of foodstuffs of good quality, and that foodstuffs undergo expert examination. This Circular points out that the information available reveals gross failure to conform to the instructions regarding poisonous chemicals, in agricultural practice, as shown, e.g. by the cases of poisoning which have resulted from the consumption of foodstuffs made from grain to which toxic dressings had been applied. To prevent such occurrences, the Circular lists the following steps to be taken :

1. at the beginning of each year, the agencies responsible for sanitary surveillance must find out from the agricultural authorities which poisonous chemicals are to be supplied to the oblasts and rayons, and rayons, and the crops on which they are to be used;
2. starting from the time at which the crops come into flower, the above agencies must check that poisonous chemicals are being used correctly in collective and state farms, paying special attention to the use of DDT, demeton-O-methyl, and arsenic preparations; workers from the rural medical units and the feldsher-midwife posts may be employed for this purpose, as well as Red Cross personnel;
3. the agronomists of collective and state farms must keep records of the crops treated, the poisonous chemicals used, the dates of application, the form and the amount of the preparation used, the method of application, the date of harvesting and the person responsible for carrying out the treatment; the sanitary workers must assess whether the poisonous chemicals have been correctly used.

The Circular then lists the crops which, when treated correctly, may be used without prior laboratory investigation. It specifies that the use, for food, of products derived from seeds treated with mercury compounds, arsenic preparations, DDT, HCH, organochlorine compounds (e.g. aldrin and dieldrin), etc., is strictly prohibited. If the instructions on the use of poisonous chemicals for the treatment of crops are not obeyed, the agencies responsible for sanitary surveillance must call the persons responsible to account, and must decide as to the possibility of using the products derived from such crops solely on the basis of the determination of the residues of poisonous chemicals in them. Foodstuffs containing pesticides in quantities exceeding the maximum permissible levels may not be used for consumption.

Apart from the foregoing, there are also numerous circulars dealing with the methods to be used for the determination of the residues of various pesticides in foodstuffs, and for determining the concentration of pesticides in the air. These are of comparatively limited interest and will not be discussed here.

It is of interest that insecticides and raticides are covered by an item of pharmaceutical legislation, namely the Regulations of 20 May 1938, concerning the reception, storage and distribution of poiso-



nous substances by sanitary stations and disinfection establishments, which still appear to be in force. These lay down that certain poisons, including products used for disinsection and deratization, are obtainable from the stores and pharmacies of the pharmacy directorates of the individual republics of the USSR on production of an authenticated order from the person (physician) in charge of the establishment, or from a member of a paramedical profession authorized to this effect. The transport of poisons by rail must be carried out in accordance with the rules and instructions of the militia. Poisons may not be sent through the post. Detailed provisions are laid down as to the construction of premises used for the storage of poisons, the equipment to be present in such premises, the disposal or decontamination of containers for poisons, etc. Every person directly engaged in work with poisonous insecticides or raticides must be thoroughly familiar with the properties of these substances, have been specially trained and be provided with the corresponding written instructions, and must sign a statement to the effect that he knows the regulations applicable to the use of the poisons concerned and will obey them strictly. Every such person must also take all the necessary measures at the work-place for the prevention of accidents. The preparation of insecticides and raticides containing poisons must be carried out in conformity with precise technological rules.

All the foregoing items of legislation are applicable to the USSR as a whole. The individual republics do, however, possess certain legislative powers in this field, as is apparent from the fact that a Decree for the protection of the population in connexion with the widespread use, in agriculture, of plant protection chemicals, was promulgated by the Council of Ministers of the RSFSR on 5 April 1965.

This Decree requires every Council of Ministers of an autonomous republic, executive committee of a krai [kraiispolkom], executive committee of an oblast [oblispolkom], Council of National Economy [sovnarhoz] (such Councils no longer exist), ministry or other authority of the RSFSR :

1. to ensure that workers are assigned, on a permanent basis, in all collective and state farms and other agricultural undertakings to undertake the transport, storage, and use of poisonous chemicals, and that specialists are appointed to be in charge of such operations, and also to ensure that the above-mentioned workers are kept under systematic medical surveillance;

2. to ensure that all agricultural workers using poisonous chemicals are instructed, by means of short courses, in the safe methods of handling poisonous chemicals, and to ensure that these methods are used in practice; no person may work with poisonous chemicals unless he has undergone such instruction;

3. to take the necessary steps to ensure that premises used for the storage of plant protection products are provided with the necessary sanitary facilities and also with first-aid kits.

The Councils of National Economy (now the agencies which have replaced them) must ensure that manufacturers supply poisonous chemicals to users in suitable containers, each of which must be provided with a label bearing instructions as to the storage and handling of the chemical concerned.

The Ministry of Health of the RSFSR is required :

1. to carry out the systematic surveillance of the accumulation of poisonous chemicals in agricultural produce, and to intensify the surveillance of the observance of sanitary and hygienic standards and regulations by collective and state farms and other agricultural undertakings;
2. to hold seminars periodically for medical workers on the prophylaxis, diagnosis and treatment of cases of poisoning by poisonous chemicals, and to extend scientific research on hygiene, the toxicological and carcinogenic properties of poisonous chemicals, and the fate of such chemicals in the environment;
3. to carry out a large-scale information campaign among the population as to the importance of observing the sanitary and hygienic regulations, using the press, radio, cinema and television;
4. to draw up the list of medicaments to be included in first-aid kits for use in cases of poisoning, and to arrange for their supply to collective and state farms and other agricultural undertakings using poisonous chemicals;
5. to establish, in the Chief Sanitary and Epidemiological Directorate of the Ministry, a "hygiene group" concerned with the problems arising from the introduction of chemicals into the national economy under the chairmanship of the Chief Inspector-Hygienist;
6. to establish, in the various sanitary and epidemiological stations, laboratories for determining the extent to which poisonous chemicals have accumulated in agricultural produce.

Finally, the Russian Consumers' Co-operative [Rospotrebojuz] must supply collective farms with all the necessary protective equipment, and special clothing and footwear, needed by workers with poisonous chemicals.

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#### UNITED KINGDOM

The arrangements for the control of pesticides in the United Kingdom are of particular interest for two reasons : in the first place, such control is at the present time effected to only a limited extent by means of legislation and depends mainly on what is known as the Pesticides Safety Precautions Scheme, a voluntary agreement between Govern-

ment departments and industry, and, in the second place, new legislation has been proposed which would do away with the voluntary scheme referred to.

As far as existing legislation is concerned, this takes the form not of a single Act concerned with pesticides but of a number of Acts (and regulations made for their implementation) covering various aspects of the problem. Thus, certain enactments are intended to protect the user and third parties, while others impose restrictions on the sale and supply of pesticides insofar as the latter are classified as poisons; there exists, moreover, legislation designed to protect the consumer against undesirable foodstuffs, while certain legislative instruments aimed at protecting animals and birds and at preventing water pollution are also relevant.

Each of these aspects will be dealt with in turn by analysing the pertinent items of legislation before examining the existing voluntary scheme and the proposed new legislation by which it may be replaced.

#### *The Agriculture (Poisonous Substances) Act 1952 and Regulations*

This Act (as extended by the Agriculture (Poisonous Substances) (Extension) Orders of 1960, 1965 and 1966) is intended to protect agricultural workers against poisoning by the more dangerous pesticides, although it does not at present apply to the self-employed. Its introduction followed a period (1946-1950) during which the widespread use of the herbicide dinitro-ortho-cresol (DNOC) had resulted in seven fatal accidents among workers engaged in its application; according to Miller,<sup>5</sup> these workers had sprayed the product over long hours in hot weather, wearing little or none of the recommended protective clothing. In response to the resulting public concern, the Government set up an official Working Party in 1950 which, in its report, came out strongly in favour of legislation to protect agricultural workers and this advice was accepted. In the 15 years following the passing of the Act, there was only one death caused by a pesticide. Data reported by Bates<sup>2</sup> indicate that the annual number of non-fatal accidents in agriculture due to pesticides during the period 1962-1967 never exceeded 27 (out of a total number of such accidents fluctuating between 8500 and over 12,000).

The Act is an enabling act and empowers the Minister of Agriculture and Fisheries (now the Minister of Agriculture, Fisheries and Food) and the Secretary of State for Scotland to make regulations covering numerous aspects of the protection of agricultural workers against poisoning by pesticides (see below). In addition, the Act provides for the appointment of inspectors and defines their powers, which include the power to enter land, to require the production of records and to take samples for analysis. The Act originally applied only to dinitrophenols and their salts, dinitro-substituted phenols and their salts, and organophosphorus compounds, but other substances (including organomercury compounds, arsenical compounds, and fluoroacetic acid and its derivatives) have since been added.

Regulations under the Act were originally promulgated in 1953 but these and subsequent regulations have now been consolidated into the Agriculture (Poisonous Substances) Regulations 1966 to 1967. The schedules to the Regulations specify 18 agricultural and horticultural operations and 38 active ingredients, the latter divided into four classes. The explanatory note accompanying the Regulations provides the following succinct summary: "Workers to whom these regulations apply may not, and their employers may not cause or permit them to, carry out certain operations with specified poisonous substances unless the prescribed safety measures, including the wearing of protective clothing, are observed." The Regulations are too complex to be described in detail here but, as an example, a worker opening a container of demeton must wear rubber gloves, rubber boots, a respirator, and either an overall and rubber apron or a mackintosh. It has been stated that "the Regulations take into account the fact that one method of using a chemical may be inherently more dangerous to the operator than another; other things being equal, soil application is safer than outdoor spraying, which in turn is safer than the use of aerosols under glass." <sup>11</sup>

The Regulations prescribe that the employer must provide every worker engaged in scheduled operations with protective clothing, including respirators or dust-masks, where necessary, adequate washing facilities, piped running water or clean water in containers, a supply of drinking water, etc. Such workers must wear the protective clothing provided, must remove all protective clothing, wash and leave the area treated before eating, drinking or smoking, refrain from blowing, sucking, or applying their mouths to jets, sprinklers, nozzles or other spraying or soil-application apparatus which may contain a poisonous substance, etc. The employer must keep a register containing particulars of the name and address of every worker engaged in scheduled operations, the number of hours worked by every such worker, and the substances used, in the case of all treatment of ground crops, bushes, climbing plants (including hops), or trees, or in greenhouses, provided that the area treated exceeds certain minimum acreages. The hours that any worker may be employed in the application of pesticides are restricted to 10 hours on any one day, 60 hours in any period of seven consecutive days, or 120 hours in any period of 21 consecutive days.

If an employer believes that a worker may be suffering from poisoning by a specified pesticide, he must immediately notify an inspector; he must also notify an inspector when a worker has been absent for more than three days and was previously engaged in the application of such pesticides, the precise conditions depending on the nature of the pesticide concerned. The employer must ensure that every worker assigned to work on scheduled operations has been thoroughly trained in the precautions to be taken and is under adequate supervision. No person under the age of 18 years may be employed to work on scheduled operations, or in any other operations involving the agricultural use of smoke-generators.

*The Agriculture (Safety, Health and Welfare Provisions) Act 1956 and Regulations*

This Act, which is of comparatively minor importance from the point of view of the control of pesticides, makes no mention, in fact, of pesticides as such. Sprayers, and soil application and granule placement machines are, however, included among the machines subject to the provision of the Agriculture (Field Machinery) Regulations 1962 made under the Act, and these Regulations are enforced by safety inspectors, who are required to take into account the chemical hazards associated with the operation of machines for the application of pesticides.

*Control of agricultural aviation*

Under Article 32 of the Air Navigation Order 1960 (as amended), and Rule 5 of the Rules of the Air and Air Traffic Control Regulations 1960 (as amended), made under this Order, the aerial distribution of solids and liquids and low flying are both effectively prohibited. As explained by Petts,<sup>6</sup> "The Minister of Aviation permits agricultural operations by granting exemption from certain, but not all, of the provisions of Article 32 and Rule 5. For example, exemption is given from the provisions of Article 32 (2), which says that 'Articles . . . shall not be dropped or permitted to drop to the surface from an aircraft flying over the United Kingdom', but not from article 32 (1), which says that 'Articles . . . shall not be dropped or permitted to drop from an aircraft in flight, so as to endanger persons or property.'"

Each exemption granted is valid only for the particular operator and aircraft and is subject to certain conditions. In addition, the exemption does not authorize or permit the spraying or projection of any substance including parathion, or any of the following chemicals, unless they are in the form of granules: demeton, amiton, mevinphos, mipafox, sulfotep, TEPP. The Ministry of Agriculture, Fisheries and Food advised as to the chemicals to be included in this list.

Since 1 January 1966, the issue of an agricultural exemption has been made conditional on the production, by the operator, of a satisfactory operations manual. The Ministry of Aviation has listed a number of headings, including protection from chemicals, under which entries will be required in any operations manual. The Ministry has also announced that a change in the legislation is to be introduced whereby agricultural aviation operations will be subject to formal permission, rather than exemption by the Minister.

*The Hydrogen Cyanide (Fumigation) Act 1937 and Regulations*

This Act is intended to protect both operators and third parties during and after the fumigation of buildings, ships, vehicles and aircraft with hydrogen cyanide, e.g. for the control of pests of stored foodstuffs. It does not apply to the fumigation of rabbit warrens or to fumigation

carried out in the open air. Notification of accidents resulting from fumigation must be sent to the Secretary of State.

The Regulations made under the Act, in 1951, provide that, before fumigation is carried out, the police (or the harbour authority, as the case may be) and the medical officer of health must be informed 48 hours beforehand, and also when fumigation has been completed. Permission must be obtained from the medical officer of health before food-stuffs are fumigated, and the fumigation may be made subject to such conditions as he may prescribe.

Every fumigation must be carried out by at least two competent persons, one of whom must have carried out fumigation on at least 20 occasions, of which not less than six must have been concerned with the fumigation of buildings, during the preceding two years, while the other must, during the preceding six months, have engaged in fumigation on not less than six occasions. It has been pointed out,<sup>12</sup> in this connexion, that "so far as the use of pesticide products is concerned, this Act (i.e. the Hydrogen Cyanide (Fumigation) Act) currently provides the only attempt to define what is meant by an experienced operator." Every operator must be trained in the use of the respirator and other apparatus, and in first-aid, and must know the symptoms of hydrogen cyanide poisoning, the preliminary action to be taken and the appropriate first-aid treatment. The appliances to be kept available during fumigation include respirators, apparatus for the administration of oxygen and carbon dioxide, spare respirator canisters, etc. There are also safety requirements as to the manner in which the fumigant is generated, and the containers holding the fumigant, provisions as to the keeping of records, etc.

#### *The Farm and Garden Chemicals Act 1967*

Essentially enabling legislation in character, this Act empowers the Minister of Agriculture, Fisheries and Food, acting jointly with the Secretary of State for Scotland, to make regulations as to the labelling and marking of farm and garden chemicals; these are defined to include all forms of pesticides, weed-killers, bird or animal repellents, plant growth regulators, defoliants, desiccants and agents for thinning fruit or preventing the premature fall of fruit. The regulations may, *inter alia*, require the labels used for such chemicals to indicate the name of the active ingredient, to bear a prescribed mark, symbol or colour to indicate the extent of any hazard which the product constitutes to human beings or other forms of life and to carry prescribed words of explanation or warning.

#### *The Pharmacy and Poisons Act 1933 and the Poisons Rules*

The active ingredients of certain pesticides are covered by the Pharmacy and Poisons Act 1933 and the Poisons Rules (the most recent version of these Rules was issued in 1968) made under it. The Act and the Rules are administered in England and Wales and in Scotland by the Home Secretary, who is advised by a committee called the "Poisons Board".

No attempt is made in the Act to give a fundamental definition of the term "poisons"; for the purposes of the Act, poisons are merely those substances, or articles containing any one of them, which are contained in the Poisons List issued by the Home Secretary. The list is divided into two parts, of which, broadly speaking Part I contains poisons which may only be sold retail by "an authorised seller of poisons" (e.g. a pharmacist) while Part II contains those substances which, where they are non-medicinal poisons, are prohibited from being sold except by a person lawfully conducting a retail pharmacy business or by a "listed seller of Part II poisons", i.e. a person entitled to sell such poisons by virtue of the inclusion of his name in a list kept by a local authority.<sup>a</sup> Part II poisons are normally those which are in common use for non-medicinal purposes, or which are likely to come into use for such purposes. The Act embodies general provisions dealing with the labelling and sale of scheduled poisons. The Poisons Rules, made under the Act, contain detailed provisions regarding restrictions on sales by authorized and listed sellers, the colouring of certain poisons, the labelling and form of containers, the manufacture, storage and transport of poisons, etc. Sixteen Schedules, several of which give lists of substances and preparations to which particular provisions apply, are appended to the Poisons Rules.

The first Schedule lists a large number of substances, including an appreciable number of substances used as pesticides (e.g. dinitrocresols and their compounds with a metal or a base, other than winter washes containing not more than the equivalent of 5% of dinitrocresols, endosulfan, endrin, hydrocyanic acid and cyanide preparations above a specified concentration, 30 organophosphorus compounds, compounds of fentin, and thallium salts) to which special restrictions apply. For substances included in this Schedule, the purchaser must either :

- (1) be known to the seller as a person to whom the poison concerned may properly be sold; or
- (2) present a certificate of the form prescribed in Schedule 11.

The seller must enter the following details in the Poisons Book, which must be retained for two years from the date of the last entry :

- (1) the date of sale;
- (2) the name, address and business, trade or occupation of the purchaser;
- (3) the name and address of the person providing the certificate, if any, and the date of this certificate;
- (4) the name and quantity of the substance;
- (5) the purposes for which the substance is stated to be required.

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<sup>a</sup> Account has been taken of amendments introduced by the Medicines Act 1968 (see *Int. Dig. Hlth Leg.*, 1969, 20, 509).

The purchaser must sign the entry, except in the case of a sale for the purpose of a trade, business or profession, when the purchaser may send a signed order, which the seller must keep for two years.

The label used for a poison included in the First Schedule must show :

- (1) the name of the seller and the address of the premises on which it was sold;
- (2) the name of the poison;
- (3) the proportion of the poison, if the substance contains other ingredients;
- (4) the word "Poison" or the prescribed "cautionary notice".

The cautionary notice prescribed in the case of dinitrocresols and their compounds with a metal or a base (subject to the exception indicated above), dinosam and dinoseb and their compounds with a metal or a base, endosulfan, endothal and its salts, endrin, fluoroacetamide, fluoroacetanilide, organomercury compounds in aerosols, compounds of fentin, and 28 of the 30 organophosphorus compounds referred to above, is as follows (Schedule 7) : "Caution. This substance is poisonous. The inhalation of its vapour, mist, spray or dust may have harmful consequences. It may also be dangerous to let it come into contact with the skin or clothing."

The containers used must be impervious to the poison and strong enough to prevent leakage in ordinary handling and transport. As far as storage is concerned, substances for use in agriculture or horticulture must be stored only in a cupboard or drawer reserved solely for such poisons, or in a part of the premises which is partitioned off or otherwise separated from the remainder of the premises, to which customers are not permitted to have access, and in which no food is stored.

It should be noted that the substances listed in Schedule 8 to the Poisons Rules, which include those mentioned previously in connexion with the cautionary notice, together with a few others (including arsenical poisons, strychnine, thallium salts, hydrocyanic acid and certain cyanide preparations), may not be transported unless the outside of the package is labelled conspicuously with the name or description of the poison, and a notice stating that it must be kept separate from food and from empty containers in which food has been contained. Such substances must not be transported in any vehicle together with food, unless the food is in a separate part of the vehicle or is otherwise adequately protected from the risk of contamination.

The Rules lay down particularly severe restrictions on the sale or supply of strychnine, *inter alia*, for the killing of moles, and of mono-fluoroacetic acid, its salts, fluoroacetamide or fluoroacetanilide, as a rodenticide. A number of pesticide preparations (listed in Schedule 16) may not be sold for use as weed killers or in the prevention or treat-



ment of infestation by animals, plants or other living organisms unless they have been dyed a distinctive colour (or already have a distinctive colour).

Substances or articles exempted from the provisions of the Act and the Rules are listed in Schedule 3; they include mercury compounds for use as seed or bulb dressings, and phenyl mercuric salts when used in textiles in a proportion not exceeding 0.01 %, as a bacteriostat and fungicide. In addition, rodenticides containing barium carbonate or zinc phosphide are exempt from the provisions applicable to Schedule 1 substances.

It is also of interest that Schedule 5 to the Poisons Rules specifies, in Part A, the forms to which the substances specified (with one exception these are all active ingredients of pesticides) are restricted when sold by listed sellers of Part II poisons, e.g. arsenious oxide may be sold only in the form of sheep dips and sheep washes. Part B of the same Schedule lists the poisons which may be sold by listed sellers of Part II poisons only to persons engaged in the trade or business of agriculture or horticulture and for the purpose of that trade or business; these are, of course, all active ingredients of pesticides.

It has already been seen that certain poisonous substances used in agriculture are also subject to control under the Agriculture (Poisonous Substances) Act 1952 and the Regulations made under it. For purposes of co-ordination, when the Government Departments concerned decide that a particular active ingredient is to be controlled by these Regulations, the Secretary of the Poisons Board is advised so that consideration can, if necessary be given to its inclusion in the Poisons List and Rules.<sup>13</sup>

Convenient summaries of the pertinent provisions of the legislation on poisons have been published (a) by the Association of British Manufacturers of Agricultural Chemicals (now the British Agrochemical Association),<sup>8</sup> and (b) by direction of the Council of the Pharmaceutical Society of Great Britain.<sup>7</sup>

### *The Food and Drugs Act 1955 and Regulations*

The main purpose of the Food and Drugs Act 1955 (this applies only to England and Wales but similar Acts were passed in 1956 and 1958 for Scotland and Northern Ireland respectively) is to ensure that food sold to the public is free from contamination and harmful ingredients, and fit for human consumption. This would seem to have an obvious bearing on the question of pesticide residues. At the present time however, the only regulations made under the Food and Drugs Act which concern particular substances liable to be present as pesticide residues, are those specifying the amounts of arsenic and lead allowed in food. A detailed account of the origins of the arsenic tolerance, which go back to an epidemic of arsenical poisoning caused by beer at the beginning of the century, has been given by Martin.<sup>4</sup> It was not until 1959, however, that the Arsenic in Food Regulations were introduced, whereby the maximum arsenic content of alcoholic beverages was set at 0.2 p.p.m., and that of solid food, with certain exceptions, at 1.0 p.p.m.

Although it is clear, from Martin's account, that the contamination of the beer which caused the original epidemic had no connexion with the use of pesticides, a number of pesticides, of course, do contain arsenical compounds, either as the active ingredients or as impurities.

The Lead in Food Regulations of 1961 make it an offence for any person to sell, consign, deliver or import any food containing more than a specified amount of lead (3 p.p.m. in the case of lead arising from an agricultural use <sup>a</sup>).

Further indications on how the Act may be relevant in practice, in relation to the use of pesticides, are given in an appendix to a 1967 report of a Government-appointed Committee.<sup>14</sup>

### *Animal and bird protection*

It is an offence, under the Protection of Animals Acts 1911 to 1927 (and the corresponding legislation for Scotland), to place in or on any land or building any poison or any edible matter (other than sown seed or grain) which has been rendered poisonous. It is a defence that the poison was placed for the purpose of destroying vermin, where this is found necessary in the interest of public health, agriculture, etc., and that all reasonable precautions were taken to protect domestic animals and wild birds. Similarly, under the Protection of Birds Acts 1954 to 1967 it is an offence to use (other than on the basis of a licence) any poisoned, poisonous or stupefying substance for the purpose of harming or killing any wild bird. It is again a defence that the procedure was adopted in the interests of public health, agriculture, etc.

### *Prevention of water pollution*

Various items of legislation, which need not be enumerated here, make it an offence to introduce poisonous or noxious substances into streams or fishing waters. This is of obvious applicability to, for example, the disposal of unwanted pesticides. In England and Wales, River Authorities are empowered to take any emergency measures they deem necessary when polluting matter enters water (as a result of an accident or similar cause) within their area of jurisdiction.

### *The Pesticides Safety Precautions Scheme*

It will be seen from the analysis of existing legislation that, unlike the situation in several other countries, no provision is made in the United Kingdom for the compulsory registration or licensing of pesticides. Instead, a voluntary safety scheme exists, known as the Pesticides Safety Precautions Scheme (formerly known as the Notification of Pesticides Scheme) and established pursuant to the recommendations of the second report of the Working Party referred to on page 99, after negotiations between the Government Departments and industrial associations concerned.<sup>1,5</sup>

<sup>a</sup> Bates, J.A.R. (1969) personal communication.

As stated in the introduction to the current version of the Scheme,<sup>15</sup> its purpose is "to safeguard human beings (whether they be users, consumers of treated produce or other members of the public), livestock, domestic animals and wild life, against risks from pesticides." For this purpose, manufacturers, importers, formulators and servicing companies, or anyone who prepares or approves the claims and precautions which will appear on the label of the product as used by a servicing company or as purchased by a user (all these persons are referred to collectively, for the purposes of the Scheme, as "distributors") who propose to introduce new pesticides or new uses of pesticides into agricultural, horticultural, home garden or food storage practice in Great Britain undertake :

(a) to notify such new pesticides or new uses to Departments (this term covers the Ministry of Agriculture, Fisheries and Food, the Ministry of Health, and the corresponding Scottish Departments) before they are introduced;

(b) to ascertain and disclose to Departments all the information needed to enable them to advise on the precautionary measures which should be employed when products containing these pesticides are used;

(c) not to introduce such products until agreement has been reached on the appropriate precautionary measures;

(d) to include the agreed precautions and the common name (or, in its absence, the chemical name) of the active ingredient on the label of every container of the product offered for sale, and to take all reasonable measures to ensure that others concerned are aware of and, as far as possible, observe the precautionary measures advised by Departments;

(e) to withdraw a product from the market if recommended to do so by Departments on the advice of the Advisory Committee on Pesticides and Other Toxic Chemicals (a standing committee set up to advise the Government on all risks arising from the use of pesticides in food production and storage; the establishment of such a committee was recommended by the Working Party mentioned above), following a review of the safe use of its active ingredient, provided that the distributor has been given every opportunity to make representations to Departments about their recommendation.

The Scheme applies to "all active ingredients formulated as pesticides... for use in agriculture, horticulture, home gardens and food storage practice",<sup>16</sup> where this last term covers the use of any pesticide on food after harvesting or in premises where food is transported, stored or processed, e.g. in ships' holds, warehouses, food factories, etc. It is applicable to :

(a) any product using a new active ingredient, i.e. one not previously used in Great Britain as a pesticide;

(b) any extension of the use of an existing pesticide;

(c) any product containing an active ingredient which, though not new, is in a new formulation, is used in a new way, which could produce a new or increased risk to the user, etc.

Certain uses of pesticides are outside the scope of the Scheme, e.g. the control of domestic pests, such as clothes-moths, and of infestations in or around industrial premises, but distributors may and, if in doubt about the associated risks, should, notify such uses also. In addition, the Scheme does not apply to products intended for export.

The notification called for by the Scheme should be submitted by the distributor, who thereby becomes the "notifier". It should be made to the Ministry of Agriculture, Fisheries and Food before a new product is marketed or brought into commercial use, and before an extended use of an existing product is recommended. The object of notification is "to obtain official recommendations on the measures required to ensure the safe use of the product."<sup>17</sup> Notifications are normally considered by the Advisory Committee and its Scientific Subcommittee but a "quick procedure" also exists whereby, if it is considered that reference to these Committees is not necessary, a notification may be dealt with merely by a limited number of officials. If there is valid evidence that the use of an active ingredient or a pesticide product is, or appears to be, responsible for a hazard or degree of risk which is novel or was not studied prior to notification, such evidence should be submitted to Departments for review, but before this takes place, the notifier must be informed, supplied with all the evidence, and given the opportunity to comment. The review is then treated in the same way as a notification.

The appendices to the Scheme contain further valuable information as to its mode of operation. Thus Appendix A, entitled "Information guide", specifies the information which should be given in the notifying letter, namely :

- (i) the name and address of the notifier;
- (ii) name or reference code of the product;
- (iii) the active ingredients;
- (iv) the category of the notification (e.g. new active ingredient, extension of use of existing product, new manner of application of an existing product, or new formulation of existing active ingredients);
- (v) type of clearance requested (viz. trials clearance, limited clearance, provisional commercial clearance or commercial clearance);
- (vi) type of formulation and details of composition;
- (vii) size and type of pack or packs;
- (viii) proposed use (agriculture and/or horticulture, home garden, food storage practice, domestic, etc.);
- (ix) crops to be treated;
- (x) dosage in terms of active ingredient per application and number of applications;

(xi) suggested precautions for the safety of operators (e.g. protective clothing, need for control under the Agriculture (Poisonous Substances) Regulations), workers handling crops shortly after treatment, consumers of treated foodstuffs (e.g. minimum interval between last application to crop and harvesting, expected residue level in the harvested crop), livestock, wild life and the public, especially children (e.g. for protection against the careless disposal of incompletely empty containers or surplus material). All the available information should be supplied in the form of a Summary Data Sheet, the pattern for which is given in Working Document No. 1.

Of the remaining appendices, Appendix B is concerned with the scope of toxicological studies in relation to the safe use of pesticides, and gives a general plan of the studies on toxicity which should be carried out; these cover such aspects of the question as acute, cumulative and chronic toxicity, metabolic studies, potentiation, and diagnosis and therapy. Appendix C deals with the residue data needed in support of a notification, and Appendix D with the provision of information about effects on wild life.

Appendix E is of particular interest, since it provides a guide to the notifier on the safety labelling of pesticide products; this does not cover, of course, the statutory labelling requirements, e.g. under the Pharmacy and Poisons Act, nor that part of the label concerned with biological efficiency. It is recommended that all labels for pesticide products should contain the following minimum information relevant to their safe use :

- (i) the trade or proprietary name of the product;
- (ii) the name and address of the distributor or, in the case of an imported product, the agent through whom further advice on safety can be obtained;
- (iii) the common name(s) of the active ingredient(s) or, if not available, the chemical designation according to Chemical Society Rules; it would be helpful, it is pointed out, if the concentration of the active ingredient(s) could be stated;
- (iv) an appropriate phrase describing the purpose for which the product is to be used, e.g. "For use only as an agricultural pesticide";
- (v) a suitable and clear indication of risk (see below);
- (vi) the safety precautions required;
- (vii) where justified by the toxicity of the active ingredient, the recommended first-aid treatment, the antidote, if any, and medical treatment in case of poisoning;
- (viii) the sentence "Read accompanying instructions before use" (if relevant).

The "suitable and clear indication of risk", mentioned above, should be given by the use of what are called "standard phrases"; these

are given in Working Document No. 7, for commercial agricultural and horticultural use, in Working Document No. 8 for home garden use, Working Document No. 10 for food storage practice, and Working Document No. 11 for domestic food storage practice. Thus, for example, standard phrases 7.1 and 7.2 are concerned with the way in which the product concerned may be dangerous or harmful (by skin contamination, breathing vapour, etc. or mouth contamination), 7.4 is "protective clothing required", 7.5 "wash all protective clothing thoroughly after use, especially the insides of gloves." The most complex is 7.20, which reads: "If *any* of the above symptoms (referred to in 7.19) occur, particularly if there is known contamination: STOP WORK. Remove contaminated clothing. Wash exposed skin and hair. If swallowed cause vomiting without delay. Prevent all exertion. Call doctor AT ONCE and show him this label". Only eight standard phrases are listed for products for home garden use (as compared with 25 for products for commercial use).

Appendix F is a carcinogenicity guide, which states that "If a chemical is known or shown to be a carcinogen it will not be permitted to occur as a residue in food. Each new chemical will be considered individually as to the need for carcinogenicity testing and as to the appropriate tests." If carcinogenicity testing is required, the procedure used should follow the lines recommended by the Ministry of Health and the Public Health Laboratory Service. The final statement made in the Appendix is that "if Departments decide that the chemical might present a carcinogenic hazard to man, its future in agriculture and food storage is a matter for discussion between the notifier and the Ministry of Agriculture, Fisheries and Food." Appendix G is a guide to the types of clearance given.

Apart from those already mentioned, the Working Documents deal with questions such as tests for the neurotoxicity of organophosphorus compounds, screening organophosphorus anticholinesterase compounds for response to reactivating agents, assessing the short-term risks to wildlife from pesticides, etc. Working Document No. 9 is concerned with the medical advice to be given on the labels for pesticides, and covers the statements to be made in the case of the organophosphorus compounds, dinitro compounds and carbamate compounds. For each group of compounds, advice is given under the following headings: symptoms of poisoning, first-aid, and guide to doctor.

Working Document No. 12 contains a safety code for commercial pesticides used by servicing operators in the course of their duties. This covers the carrying and storage of pesticides, the use of protective clothing, the provision of adequate ventilation, the safe disposal of used containers, etc.

Information on the operation of the Scheme in practice has been given by Bates.<sup>1,2</sup> It may be mentioned at this juncture that a voluntary scheme for the approval of proprietary crop protection chemicals from the point of view of efficiency also exists (the Agricultural Chemicals Approval Scheme). Products cannot however be considered for appro-

val until they have first been cleared through the Pesticides Safety Precautions Scheme.<sup>1</sup>

### *Proposed new legislation*

As already mentioned, the voluntary scheme described above may be replaced by legislation. This is in spite of the fact that, as shown by Miller,<sup>5</sup> the Scheme proved to be effective on those occasions when it was tested, e.g. when a number of cases of poisoning by arsenites, used for potato haulm destruction, occurred in 1959. Government departments then invited the manufacturers of these products to withdraw them voluntarily, and this proposal was accepted, although a period of one year was allowed for the using up of stocks. Similar voluntary withdrawals also took place in respect of certain insecticidal seed dressings, and of fluoroacetamide. Nevertheless, when in 1964 the then Minister of Agriculture, Fisheries and Food accepted the recommendations of an official report on the persistent organochlorine pesticides, he stated that while the voluntary scheme had so far worked well, as scientific knowledge increased and more restrictions were found to be necessary, these arrangements would come under increasing strain.<sup>9</sup>

For this reason, the Advisory Committee on Pesticides and Other Toxic Chemicals was asked "To consider and advise on any improvements and extensions of present safety arrangements that may be desirable to provide greater protection against the hazards arising from the use of toxic chemicals in agriculture and food storage; in particular to consider whether stricter criteria should be applied in the approval of existing products."

In its report, published in 1967, the Committee made a total of 32 recommendations,<sup>10</sup> some of which are given below :

(i) it should be made an offence to sell, supply or import any pesticide product for use in agriculture, home gardens or food storage, which is not suitably controlled by other legislation, unless it has received a licence and fulfilled the conditions of the licence;

(ii) the licensing scheme should require the distributor to submit an application to the licensing authority, together with the necessary data on the safety in use of the product and any other information the authority might require; the amount and type of information required should be easily adjustable to take into account the nature of the product and the need for continuous revision of scientific standards as new knowledge becomes available; the authority would decide whether or not a licence should be issued and the conditions to be attached to it as to the formulation, labelling, permitted uses, etc.;

(iii) the enforcement of the licensing provisions and any other legal requirements relating to labelling, advertising, etc., should be the responsibility of the appropriate local authorities;

(iv) Ministers should be given powers to control advertisements and to prevent the use of objectionable or misleading names for pesticide products;

(v) the Agriculture (Poisonous Substances) Act 1952 should be amended to cover the use of pesticide products in food storage and to make it applicable to all users in agriculture and food storage, including employers and self-employed persons;

(vi) the provisions of the Hydrogen Cyanide (Fumigation) Act should be applied to fumigation with methyl bromide;

(vii) all cases of suspected poisoning by pesticide products should immediately be reported to a safety inspector;

(viii) operations manuals for the aerial application of pesticide products should clearly state the operator's and pilot's responsibilities regarding the pilot's knowledge of pesticide products applied from the air;

(ix) consideration should be given to the need for statutory tolerances, under the Food and Drugs Acts, for pesticide residues.

Proposals for new legislation, based largely on the recommendations of the Committee, were published in 1968 by the Ministry of Agriculture, Fisheries and Food.<sup>3</sup> The new Pesticides Bill would include the provisions of the Agriculture (Poisonous Substances) Act 1952, and the Farm and Garden Chemicals Act 1967, while certain regulations made under the Fertilisers and Feeding Stuffs Act 1926, affecting pesticides incorporated in fertilizers, would also be superseded.

The main change to be introduced by the Bill would be the replacement of the present Pesticides Safety Precautions Scheme by the compulsory licensing of pesticides. It would be made an offence, in fact, to sell, supply or import any agricultural pesticide product which had not been licensed or which failed to conform to the conditions imposed by a licence. The Act would cover pesticides used both in agriculture and in gardens, the protection of stored foodstuffs, insecticidal paints, pesticides dispersed by vaporizers, and the supply of pesticides for use in forestry and as herbicides on non-agricultural land, but not pesticides intended for export. The conditions under which a licence would be granted could specify :

(i) the formulation of the pesticide product;

(ii) the uses for which the product might be supplied and the corresponding wording on the labels;

(iii) the other matters to be mentioned on the label, including the directions for use and any restrictions on use;

(iv) restrictions on the manner or place of use for which the product might be supplied;

(v) the date of issue and of expiry of the licence;

(vi) the additional information needed before the licence could be considered before renewal;

(vii) the nature of the container;



(viii) the other details relating to the safe and correct use of pesticide products as required by the licensing authority.

In order to retain the flexibility provided by the voluntary scheme, which is considered to be essential, it is proposed to include a clause granting the licensing authority power to demand any information it thinks necessary before granting a licence.

A standard precautionary warning would be required to appear on every label for a licensed product. Statements made in advertisements could be controlled by regulations, and the use of objectionable or misleading names prevented in the same way. It would be illegal for commercial users to ignore the instructions given on the label, to overdose a crop deliberately, to harvest a crop too soon after treatment, to continue using a product after it has been withdrawn, to use dressed seed for feeding animals or poultry or for milling, and to scatter dressed seed as a bait for wild birds, except for the control of bird pests.

Commercial users would be required to keep records of all pesticide products used in agriculture and food storage containing active ingredients at present covered by the Agriculture (Poisonous Substances) Regulations, the Hydrogen Cyanide (Fumigation) Act and the Pharmacy and Poisons Act. These records would include the date of purchase, the amount purchased, and the use or uses to which the pesticide product has been put, the last-named item including the date of application, the quantity and type of pesticide product used, the extent of the area concerned and the location of the crop treated.

All pesticide products (except fertilizers containing pesticides) for commercial use in agriculture would have to be kept together in a separate store, and certain premises would have to be kept locked up. The posting of warning notices might be necessary where food storage premises or other buildings have been fumigated or otherwise treated.

Limits may be imposed on the residues of active ingredients or their metabolites on any crop, including unprocessed grain, or food-stuffs to ensure that good agricultural and food storage practice in the use of pesticide products has been observed, irrespective of any immediate hazard to the consumer.

The licensing authority would comprise the Minister of Agriculture, Fisheries and Food, the Secretary of State for Scotland, the Minister of Health, and appropriate Ministers in Northern Ireland. It would be advised by a committee similar to the Advisory Committee on Pesticides and Other Toxic Chemicals, previously mentioned. The committee would be responsible for dealing with all applications for licences, except where this is not considered to be necessary, e.g. in the case of a new pesticide product which is similar to an existing formulation used for the same purpose. Provision would be made for the issue of special licences for the import of pesticide products for use in trials in which workers are employed, the produce is to be sold or supplied for human or animal consumption, or a hazard to third parties or animals may reasonably be expected to exist.

The provisions of the act would be enforced by the Weights and Measures Authorities, who would ensure that products were licensed and properly labelled, advertised and packaged. The composition of each product would be checked by field officers about every three years.

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#### UNITED STATES OF AMERICA

In the field of the control of pesticides, as in many other branches of public health in the United States of America, legislation exists at both the federal and the state levels. As far as pesticides are concerned, however, as compared with, say, radiation protection or water pollution, there is the difference that the legislative provisions at these two levels do not completely overlap. Thus, while there is both federal and state legislation covering the registration of pesticides, pesticide residues in foodstuffs and the aerial application of pesticides, the states are exclusively responsible for the control, if any, of the application of pesticides on the ground. This is easily understood on the basis of the principle that the Federal Government is entitled to legislate only on matters affecting more than one state, and it is clear that the application of pesticides, on the ground at least, can be effected only within the boundaries of a particular state. In addition, legislation on occupational health in the application of pesticides is also the prerogative of the states.

As far as the federal legislation is concerned, the first, and very limited, step was taken in 1910 by the enactment of the Insecticide Act. This Act was passed not so much as a measure for the protection of public health as in order to protect consumers against substandard or fraudulent products. The Act remained in force for 37 years but, according to Ward,<sup>10</sup> "was recognized as being inadequate during World War II when the flood of new products based in part on wartime research began to reach the market". As a result, it was superseded by the Federal Insecticide, Fungicide, and Rodenticide Act in 1947. It was this Act which, for the first time, introduced the effective control of pesticides in the United States. The Act has been amended on a number of occasions since 1947, in particular in 1959, when its provisions were extended to cover nematocides, plant regulators, defoliants and desiccants. The responsibility for the enforcement of the Act was delegated to the Pesticides Regulation Division of the Agricultural Research Service of the United States Department of Agriculture.

A different type of control of pesticides was introduced by the so-called Miller Amendment to the Federal Food, Drug, and Cosmetic Act in 1954. This provided for the control of pesticide residues on raw agricultural commodities, effected by the Secretary of Health, Education, and Welfare, through the intermediary of the Food and Drug Administration. There is close liaison between this Administration and the Department of Agriculture.

A third Government agency, the Federal Aviation Administration, is responsible, through Part 137 of the Federal Aviation Regulations, adopted in 1965, for the control of agricultural aircraft operations, which include the spraying of pesticides from aircraft.

Finally, the transportation of poisons, including pesticides, is the responsibility of the Department of Transportation.

*Control under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended*

Although this Act is concerned essentially with the control of pesticides, the term "pesticide" as such is not used in it. Instead, the Act speaks of "economic poisons", where an economic poison is defined to mean: "(1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any insects, rodents, nematodes, fungi, weeds, and other forms of plant or animal life or viruses, except viruses on or in living man or other animals, which the Secretary (of Agriculture) shall declare to be a pest, and (2) any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant". Nevertheless, according to Harris and Cummings,<sup>4</sup> "Economic poison", as used in the language of the Act, has been largely replaced in common usage by the term 'pesticide'".

This definition of "economic poison" is supplemented by a series of definitions for the terms "insecticide", "fungicide", "rodenticide", "herbicide" and "nematocide". Thus, for example, insecticide is defined to mean "any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any insects which may be present in any environment whatsoever". Definitions are also given of the terms "plant regulator", "defoliant" and "desiccant". It should be noted that the Act also defines "device" to mean "any instrument or contrivance intended for trapping, destroying, repelling, or mitigating fungi, nematodes, or such other pests as may be designated by the Secretary, but not including equipment for the application of economic poisons when sold separately therefrom". No definition of the term "pest" is given in the Act, although "weed" is defined as "any plant which grows where not wanted".

Other definitions of major importance are those of "label" and "labeling". Of these, "label" is given the usual meaning of "written, printed, or graphic matter on, or attached to, the economic poison or device or the immediate container thereof, and the outside container or wrapper of the retail package, if any there be, of the economic poison or device". "Labeling", in contrast, is defined more broadly to include, not only the labels as such, but all other written, printed or graphic matter accompanying the economic poison or device, or to which reference is made on the label or in literature accompanying such poison or device, unless the reference is to current official publications.

As will be seen later, the concept of "misbranding" is a vital part of the Act, but the term, as such, is not defined in it. Instead, a list of conditions is given under which an economic poison will be considered

as misbranded, of which some are clearly intended to protect the consumer against the purchase of an inferior product. Thus an economic poison or device is misbranded if its labelling bears anything false or misleading. Of greater interest from the point of view of the subject of this survey is the fact that an economic poison is also misbranded under the following conditions :

- (i) if its labelling bears any reference to registration under the Act;
- (ii) if the labelling accompanying it does not contain the necessary directions for use, which must be adequate for the protection of the public;
- (iii) if the label does not contain the necessary warning or cautionary statements, which must be adequate to prevent injury to man;
- (iv) if the label does not bear an ingredient statement in an appropriate position on the container;
- (v) if any word, statement or other information required by the Act does not appear on the label or labelling with the necessary prominence and is not in such terms as to make it likely to be read and understood by "the ordinary individual under customary conditions of purchase and use";
- (vi) if in the case of an insecticide, nematocide, fungicide or herbicide it is injurious to man or the person applying it, when used in conformity with the directions or with normal practice; or
- (vii) if in the case of a plant regulator, defoliant or desiccant it is injurious to man or the person applying it, when used in conformity with the directions.

The essence of the Act is contained in Section 3, which bears the heading "Prohibited acts". This makes it unlawful to distribute, sell or offer for sale in any territory or the District of Columbia, or to ship or deliver for shipment in interstate commerce, or to import or export :

1. any economic poison which has not been registered, or for which the claims made of the directions for use differ substantially, or the composition differs, from what was submitted with the application for registration;
2. any economic poison which is not in the registrant's or manufacturer's unbroken immediate container, and such container, and outside container or wrapper, does not bear a label stating, *inter alia*, the name and address of the manufacturer, registrant or person for whom manufactured, and the name, brand or trade-mark under which the product is sold;
3. any economic poison containing any substance or substances in amounts highly toxic to man, unless the label bears, in addition to the other matter required, the skull and cross-bones, the word "poison" prominently in red on a contrasting background, and a statement as to the antidote for the economic poison concerned;

4. the economic poisons known as standard lead arsenate, basic lead arsenate, calcium arsenate, magnesium arsenate, zinc arsenate, zinc arsenite, sodium fluoride, sodium fluosilicate, barium fluosilicate, and such other economic poisons in the form of white powders as the Secretary of Agriculture may designate, unless they have been distinctly coloured or discoloured, as provided by regulations made under the Act;

5. any economic poison or device which is misbranded.

It should be noted that no article is deemed to be in violation of the Act if it is intended solely for export to a foreign country and is prepared or packed according to the specifications or directions of the foreign purchaser.

When an application for the registration of an economic poison is submitted, the registrant must file with the Secretary of Agriculture a statement including :

(a) the name and address of the registrant, and that of the person whose name will appear on the label, if other than the registrant;

(b) the name of the economic poison;

(c) a complete copy of the labelling accompanying the economic poison and a statement of all claims to be made for it, including the directions for use; and

(d) if requested by the Secretary, a full description of the tests made and the results upon which the claims are based.

The Secretary may also require the submission of the complete formula of the economic poison.

In the Act as originally introduced, provision was made for the registration under protest of an economic poison by the Secretary where he was of opinion that certain changes were necessary to bring it into line with the requirements of the Act, but the registrant insisted that these changes were not required. This was a controversial feature of the Act, and was severely criticized on a number of occasions, e.g. in the 1963 hearings by a sub-committee of the United States Senate on the co-ordination of activities relating to the use of pesticides.<sup>7</sup> It was eliminated in 1964 by an amendment to the Act, which at the same time authorized the Secretary to require pesticide labels to bear a federal registration number.

The registration of an economic poison may be cancelled by the Secretary at the end of a period of five years following such registration, or at the end of any subsequent five-year period, unless the registrant, before the expiry of this period, requests that it be continued in effect.

Other provisions of the Act empower the Secretary of Agriculture to make rules and regulations under it. He is also authorized :

1. to declare any plant, animal or virus to be a pest, if it is injurious to plants, man, domestic animals, articles or substances;

2. to determine the economic poisons and quantities of substances contained in such poisons which are highly toxic to man; and

3. to determine standards of colouring or discolouring for economic poisons, and to determine which economic poisons in the form of white powders, other than those specifically mentioned in the Act, must be coloured or discoloured.

Certain exemptions from the requirements of the Act have been provided for; in particular, registration is not required for economic poisons intended solely for experimental use, but a permit may have to be obtained before such poisons can be shipped.

*Control under the Regulations for the enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act*

Regulations for the enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act were first issued in 1948, and have been amended subsequently on a number of occasions. They contain a much more comprehensive definition of the key term "economic poison" than does the Act itself. Thus they lay down that "economic poison includes all preparations intended for use as insecticides, rodenticides, nematocides, fungicides, herbicides, amphibian and reptile poisons or repellents, bird poisons or repellents, fish poisons or repellents, mammal poisons or repellents, invertebrate animal poisons or repellents, plant regulators, plant defoliants, and plant desiccants. A product shall be deemed to be an economic poison regardless of whether intended for use as packaged or after dilution or mixture with other substances, such as carriers or baits. Products intended only for use after further processing or manufacturing, such as grinding to dust or more extensive operations, shall not be deemed to be economic poisons. Substances which have recognized commercial uses other than uses as economic poisons shall not be deemed to be economic poisons unless such substances are : (1) specially prepared for use as economic poisons, or (2) labeled, represented, or intended for use as economic poisons, or (3) marketed in channels of trade where they will presumably be purchased as economic poisons."

In the same way, the Regulations also contain more comprehensive definitions of the terms "fungicide", "herbicide", "nematocide" and "plant regulator".

Detailed provisions are laid down in the Regulations as to the labels and labelling of economic poisons. These repeat the requirements laid down in the Act, but also impose many others. Among those of particular interest are the requirements as to the names of the ingredients of an economic poison which must appear in the ingredient statement on the label. Thus the Regulations prescribe that the "well-known common name" of each of the listed ingredients must be given or, in the absence of any such name, "the correct chemical name which conforms most closely with generally accepted rules of chemical nomenclature". In the absence of a common name, and if the chemical composition of the economic poison concerned is complex, the Director of the Pesticides Regulation Division of the Agricultural Research Service of the Depart-

ment of Agriculture may permit the use of a new or coined name, but a trade-mark or trade name may not be used as the name of an ingredient except when it has become a common name.

The Regulations also contain a definition of the expression "economic poisons highly toxic to man" which is of importance in view of the requirements imposed by the Act as to the labelling of such poisons. The definition is based on the results of tests on laboratory animals from the point of view of the oral toxicity, the toxicity on inhalation, or the toxicity by skin absorption, expressed in terms of the LD<sub>50</sub>. Human data, if any, take precedence over animal data if they indicate a toxicity greater than that determined from the animal experiments.

The warnings or cautionary statements on the labels of economic poisons must include the statement "Keep out of reach of children" (this requirement may be waived by the Director if he considers it unnecessary), and a signal word such as "Danger", "Warning" or "Caution". As far as economic poisons highly toxic to man are concerned, the Regulations repeat the requirements of the Act, with the difference, however, that it is laid down that the antidote statement on the label must include directions to call a physician immediately.

Apart from the Regulations as such, the labelling requirements applicable to economic poisons are also covered in detail by the Interpretations of these Regulations. Thus it is specified that the directions for use, which must appear on the label of every such poison, should include, *inter alia*, instructions on timing the application of the poison so as to avoid adverse effects, and any necessary limitation or restriction, such as the time required between application and harvest of food crops, and warnings against use on certain crops, animals, objects or in certain areas.

Particularly detailed information is given in the Interpretations of the Regulations as to the warning, caution and antidote statements required to appear on the labels of economic poisons. For this purpose, economic poisons are divided into four categories of toxicity, of which the first is the highly toxic class, as defined in the Regulations. The second includes formulations having toxicities down to one-tenth of the highly toxic class, the third includes products of toxicity down to about one-tenth of that of the second class, while the fourth class consists of products comparatively free of danger. The labelling requirements, of course, vary with the toxicity category. Those for highly toxic products have already been discussed, but the Interpretations add the requirement that they should bear instructions for handling to reduce chances of injury in use. Labels of products in the second category should carry warning statements equivalent to those required for highly toxic materials, but need not bear the skull and cross-bones, the word "Poison" or an antidote statement. Labels of products in the third category should carry only the word "Caution" and statements indicating the means of avoiding the principal hazards of use. No warning, caution or antidote statements are required for formulations in the fourth category, although unqualified claims for safety are usually not justified.

Although precautionary labelling is directed primarily towards the avoidance of hazards to the persons handling, applying or exposed to the economic poison in question, the Interpretations state, in addition, that "The manufacturer should recognize the possibility of injury of other types associated with the use of his product and the label should bear suitable directions for the avoidance of such injury". What is envisaged here, as the Interpretations make clear, is the possibility of the contamination of foodstuffs with harmful residues, unless certain precautions are taken. Examples are given of suitable label statements, in this connexion, such as "remove residues at harvest by...", "do not apply within... days of harvest", etc. In addition, in order to avoid contamination of milk or meat, the directions for the use of certain economic poisons must state that they are not to be used in dairy barns, on dairy animals or animals being finished for slaughter, or on forage crops to be used as feed for such animals.

Apart from the above, the Interpretations contain acceptable warning, caution and antidote statements for economic poisons containing specified ingredients. It is stated that the exact wording used in these statements is not obligatory, although the substance of all such statements will be required, unless it is unnecessary for some reason. The manufacturer must, however, add any further statements that may be necessary as a result of any special characteristics or uses of his formulation. There are, in addition, special Interpretations as to the labelling of household insecticides containing chlordane, thallium products for the control of insect and rodent pests in the household (an acceptable label statement in this case would be "For use by Government agencies only"), and liquid, powdered and pressurized household insecticides acceptable for general application and for depositing insecticidal and chemical residues. Another special Interpretation is concerned with claims for safety and non-toxicity on the labelling of economic poisons.

The requirement that all economic poisons must be registered was one of the major features of the Federal Insecticide, Fungicide, and Rodenticide Act, as compared with the Insecticide Act which preceded it. The Regulations, in turn, repeat the provisions of the Act as to the procedure to be followed in applying for the registration of such a poison. The Interpretations, however, provide additional information in this connexion. Thus they state clearly the principles on which registration is based, in the following terms: "Registration is a device to bring the economic poison to the attention of the Department of Agriculture and to furnish an opportunity to correct obvious faults in labeling... The shipper of the goods or the guarantor is responsible for the compliance of his labeling with legal requirements. Before placing the article on the market, he should have it thoroughly tested by experimentors competent to judge its effectiveness... If it is likely to cause injury to human beings... its limitations from these standpoints should be determined and adequate cautions placed on the label. Determination should be made as to whether it is highly toxic... and, if so, the label must bear the statements required with respect to highly toxic products. It is the purpose of the act to



protect the public before injury occurs rather than to subject the public to the dangers of experimentation and take action only after injury has occurred”.

The Interpretations point out that federal registration, under the Act, does not make state registration unnecessary, where this is required by state legislation.

As far as the registration procedure itself is concerned, the Interpretations state that every application for registration must be accompanied by two data sheets for the product which it is desired to register. The information given on each data sheet should include the name of the product, the name and address of the registrant and, if it does not appear on the label, a statement giving the name and percentage of each active ingredient and any pertinent information about the inert ingredients. Each data sheet should have attached to it a specimen of the label for the product and specimens of any leaflets, circulars or other advertising material accompanying the product. A rough draft of the labelling may be submitted by the applicant for comment, if he has doubts as to its legality. If substantial changes in the labelling of a registered product or changes in its formula are to be made, an amended or new registration is required. Printed or graphic matter directly associated with the marketing of an economic poison, such as counter or window displays, or handouts distributed with the product, is considered to be labelling and must be submitted with the application for registration.

The Regulations lay down that the Director may cancel the registration of a product, *inter alia*, when its labelling and the other material required to be submitted do not comply with the provisions of the Act, and the registrant, after a reasonable period of time, has not made the necessary corrections. In addition, the Director may refuse to register an economic poison, or its use for any specific purpose, if, in his opinion, directions and warnings cannot be written which will prevent injury to the public when the product is used as specified or in accordance with commonly recognized practices.

Further provisions of the Regulations deal with the colouration and discolouration of white economic poisons, adulteration and misbranding. As far as misbranding is concerned, it is laid down that an economic poison is misbranded, *inter alia*, if its labelling contains unwarranted claims as to its safety or that of its ingredients, including a statement such as “safe”, “non-poisonous”, “non-injurious” or “harmless”, with or without a qualifying phrase, such as “when used as directed”. The Director may, however, permit a statement such as “non-toxic to humans and pets” where he has determined that this statement is correct.

The Regulations also contain provisions as to the granting of temporary permits for limited shipments of economic poisons for experimental purposes.

#### *Control under the Federal Food, Drug, and Cosmetic Act*

Although the Food and Drug Administration had certain powers to control pesticides residues on raw agricultural commodities prior to

1954, these powers were revised and strengthened in 1954 by an amendment to the Federal Food, Drug, and Cosmetic Act. The way in which this came about has been described by Ward<sup>10</sup> in the following terms : "Right from the start of registration in 1948, it was recognized that one important feature in the review of directions for use of products used in food crop protection was to be sure that when the pesticide was used in accordance with the registered directions, the food would not be illegally contaminated. . . this meant that a pesticide would have to be used in a way which would not leave detectable residues, since there were practically no established tolerances. . . It soon became evident that many uses would leave extremely low residues of doubtful significance. It was soon found, however, that the only way to decide on the true importance of trace amounts, was to exchange opinions with the Food and Drug Administration on proposed uses where minute residues could actually be found or were suspected. Accordingly, early in 1949, arrangements were made to refer questionable ' no residue ' uses to the Food and Drug Administration for concurrence on whether or not the use would cause illegal contamination. This referral system was used thereafter whenever USDA chemists needed support in their opinions. This informal scheme worked very well for several years. . . In fact, the informal checking procedure proved its value so that it was continued on a formal basis in provisions of the Miller Pesticide Chemicals Amendment to the Federal Food, Drug, and Cosmetic Act in 1954."

The above-mentioned amendment to the Federal Food, Drug, and Cosmetic Act introduces a further definition of importance, namely that of "pesticide chemical", which is defined to mean "any substance which, alone, in chemical combination, or in formulation with one or more other substances, is an "economic poison" within the meaning of the Federal Insecticide, Fungicide, and Rodenticide Act as now in force or as hereafter amended, and which is used in the production, storage, or transportation of raw agricultural commodities".

The amendment then provides that any raw agricultural commodity may be condemned as adulterated if it bears or contains a pesticide chemical which is "unsafe". What is meant by the term "unsafe" is specified in detail in further provisions of the amendment, which lay down that a pesticide chemical not generally recognized by the appropriate experts as safe for use on raw agricultural commodities, is deemed unsafe unless :

1. a tolerance has been prescribed for the pesticide chemical in question by the Secretary of Health, Education, and Welfare, and the amount present is within the limits of this tolerance; or
2. the pesticide chemical has been exempted from the requirement for a tolerance by the Secretary.

The Secretary is empowered to promulgate regulations establishing tolerances for pesticide residues. In so doing, he must take into account : (1) the necessity for the production of an adequate wholesome and economical food supply; (2) the other ways in which the consumer may

be affected by the same pesticide chemical or by other related substances that are poisonous or deleterious; and (3) the opinion of the Secretary of Agriculture.

If the scientific data justify this, the Secretary of Health, Education, and Welfare may establish a "zero tolerance" for the pesticide chemical concerned, but according to Rohrman,<sup>5</sup> "Zero tolerances... have given way to outright denial of registration for those pesticides considered highly toxic to man and animals". The Secretary may also exempt a pesticide from the requirement for a tolerance when such a tolerance is not necessary to protect the public health.

From the procedural point of view, the amendment provides that any person who has registered, or applied for the registration of, an economic poison under the Federal Insecticide, Fungicide, and Rodenticide Act, may file with the Secretary of Health, Education, and Welfare a petition for the issue of a regulation establishing a tolerance for a pesticide chemical which is an ingredient of the economic poison concerned, or exempting this chemical from the requirement for a tolerance. This petition must contain the following data :

(a) the name, chemical identity and composition of the pesticide chemical;

(b) the amount, frequency and time of application of the pesticide chemical;

(c) full reports of investigations made with respect to the safety of the pesticide chemical;

(d) the results of tests on the amount of residue remaining, including a description of the analytical methods used;

(e) practicable methods for removing residue which exceeds any proposed tolerance;

(f) proposed tolerances for the pesticide chemical, if any;

(g) reasonable grounds in support of the petition.

The Department of Agriculture must then certify that the pesticide chemical is useful for the production of the crop or control of the pest in question.

In the case of a pesticide chemical for which an experimental permit has been obtained under the Federal Insecticide, Fungicide, and Rodenticide Act, the Secretary may establish a temporary tolerance for this chemical or temporarily exempt it from the requirement for such a tolerance.

It will be seen from the above that, as pointed out by Rohrman,<sup>5</sup> "The two basic federal statutes, the FIFRA and the Food, Drug, and Cosmetic Act, as amended, supplement each other and are inter-related by law and in practical operation". Furthermore, Rohrman states that "It has been the policy of the Department of Agriculture not to register any new pesticide unless either a tolerance has been established under the Miller Amendment or it has been shown adequately that no

residues will result from the proposed use of the product". According to Harris and Cummings,<sup>4</sup> however, "From a scientific standpoint, it is usually more difficult to demonstrate the absence of residues than to measure a finite residue. However sophisticated present techniques may be, methodology has certainly not progressed to the point where a chemical analysis can absolutely show zero residues, and the definition of 'technical zero' remains rather elusive." Furthermore, a series of events, described by Ward,<sup>10</sup> occurred in 1959 and subsequent years, which led to a modified attitude towards uses of pesticides based on "no residues" or "zero tolerances".

As a result, in 1964, the Department of Agriculture and the Department of Health, Education, and Welfare jointly requested the National Academy of Sciences and the National Research Council to set up a committee to consider the question of the concepts of "no residue" and "zero tolerance". The Committee then set up recommended, in its report, that these concepts should be abandoned, since improved analytical methods had made it impossible to reach valid conclusions that any use of a pesticide would result in complete absence of residue. As an alternative, the committee suggested that "A pesticide should be registered on the basis of either 'negligible residue' or 'permissible residue' depending on whether its use results in the intake of a negligible or permissible fraction of the maximum acceptable daily intake (MADI) as determined by appropriate safety studies". In fact, however, the MADI was not at that time available, even in a tentative form, for the vast majority of pesticides, and the amount of information required to make it available was such that immediate use of the committee's recommendations was impossible.<sup>10</sup>

In view of this situation, an agreement was signed between the two Departments concerned as to the procedure to be adopted, which is aimed ultimately at obtaining definite tolerances, even if very small, for all legal uses of pesticides on food. The "no residue" concept has been abandoned for all new registrations, and all old registrations effected on this basis were cancelled on 31 December 1967, unless they were covered by a tolerance before that date or if it could be assumed that a tolerance would be set. Under no circumstances can a "no residue" registration be extended beyond 31 December 1970, if the pesticide usage is such that a residue can reasonably be expected to result from it.

It is also of interest that, in 1964, an agreement was reached between the Secretary of Agriculture, the Secretary of the Interior, and the Secretary of Health, Education, and Welfare, providing for co-ordination in the review of pesticide registration applications. The Public Health Service of the Department of Health, Education, and Welfare, in accord with the Agreement, was assigned the responsibility to review labels submitted to the Department of Agriculture and advise the USDA on health aspects associated with the use of pesticide chemicals such as warnings against undue exposure to the population, especially in household applications and to field workers.

*Control under the Regulations for the enforcement of the Federal Food, Drug, and Cosmetic Act*

The Regulations made under the Federal Food, Drug, and Cosmetic Act repeat the definition of the term "pesticide chemical" given in that Act. In addition, however, they define "negligible residue" to mean "any amount of a pesticide chemical remaining in or on a raw agricultural commodity or group of raw agricultural commodities that would result in a daily intake regarded as toxicologically insignificant on the basis of scientific judgement of adequate safety data. Ordinarily this will add to the diet an amount which will be less than 1/2000th of the amount that has been demonstrated to have no effect from feeding studies on the most sensitive animal species tested. Such toxicity studies shall usually include at least 90-day feeding studies in two species of mammals."

The Regulations also list the pesticide chemicals generally recognized as safe for the purposes of the Act, and lay down provisions as to tolerances for related pesticide chemicals. They still refer to zero tolerances, in spite of the recommendations of the committee previously mentioned, and specify that such a tolerance may be established because, *inter alia* :

(a) a safe level of the pesticide chemical in the diet of two different species of warm-blooded animals has not been reliably determined;

(b) the chemical is carcinogenic to, or has other alarming physiological effects on, one or more of the species of experimental animals used;

(c) the pesticide chemical is toxic, but is normally used at times when, or in such a way that, raw agricultural commodities will not bear or contain it;

(d) all residue of the pesticide chemical is normally removed by good agricultural practice, or by weathering, etc., before the raw agricultural commodity is introduced into interstate commerce.

Detailed provisions are laid down as to the procedure to be followed in filing petitions for proposing tolerances or exemptions for pesticide residues, and for amending or repealing such tolerances or exemptions. Finally, specific tolerances are prescribed for a number of pesticide chemicals.

*Control under the Federal Aviation Regulations*

Until 1965, according to Childress,<sup>2</sup> agricultural aircraft operations were conducted under the authority of certificates of waiver or authorization issued by the Federal Aviation Agency. These granted permission for the requirements of certain sections of the Federal Aviation Regulations to be ignored, mainly with regard to minimum safe altitudes. No attempt was made to control the use of chemicals, and the Civil Aeronautics Administration, which preceded the Federal Aviation

Agency (now the Federal Aviation Administration of the Department of Transportation), considered that it had no authority to impose such control. Under the Federal Aviation Act of 1958, however, the Federal Aviation Agency was given the responsibility and the authority to protect persons and property on the ground from chemicals dispensed from agricultural aircraft.

In view of the fact that the use of a certificate of waiver was not entirely satisfactory, a new Part 137, entitled "Agricultural Aircraft Operations", of the Federal Aviation Regulations was adopted on 17 June 1965. This contains the following important provisions :

1. no person may conduct agricultural aircraft operations without a certificate;

2. a knowledge and skill test must be passed by the applicant for the certificate, or by the chief supervisor of agricultural aircraft operations; this test covers the safe handling of economic poisons, the proper disposal of used containers for such poisons, the general effects of economic poisons, the primary symptoms of poisoning, the appropriate emergency measures, and the location of poison control centres;

3. no material or substance may be dispensed from an aircraft in a manner such as to create a hazard to persons or property on the surface;

4. no person may dispense or cause to be dispensed from an aircraft, any economic poison registered with the Department of Agriculture under the Federal Insecticide, Fungicide, and Rodenticide Act :

(a) for a use other than that for which it is registered;

(b) contrary to any safety instructions or use limitations on its label;  
or

(c) in violation of any law or regulation of the United States.

As pointed out by Childress,<sup>2</sup> the rules of Part 137 do not relieve the agricultural operator of the responsibility of complying with any state or local laws relating to the dispersing of agricultural chemicals.

#### *Control by the Department of Transportation*

The Department of Transportation, which was established in 1967, is responsible for the control of the transport of dangerous articles, including poisons. For this purpose, poisons are divided into four classes, of which the second, class B, entitled "less dangerous poisons", includes a number of pesticides. Detailed provisions are laid down in the regulations issued by the Department of Transportation, as to the methods to be adopted for the packing of class B poisons.

The Department amended its shipping regulations for class B poisons on 21 December 1967, so as to prevent contamination of food by leakage. Poisonous materials in this class must not be transported in the same car as foodstuffs or any other materials intended for human

consumption which are not packaged in air-tight, impermeable containers. Every car which has been used to transport poisons must be inspected before re-use, and if leakage or spillage has occurred, the shipper must be asked for instructions as to the best methods to be used for decontamination. Similar provisions are laid down in respect of aircraft.

### *State legislation*

As already explained, the legislation of the individual state overlaps with the federal legislation in the fields of the registration of pesticides, tolerances for pesticide residues, and the aerial application of pesticides.

As far as the registration of pesticides is concerned, a considerable degree of uniformity in the state legislation has been achieved on the basis of the Uniform State Insecticide, Fungicide, and Rodenticide Act, drawn up by the Council of State Governments and modelled on the Federal Act of the same name. According to Rohrman,<sup>5</sup> more or less similar laws have been adopted by 47 of the 50 states. The laws themselves appear to be satisfactory, but Collins<sup>3</sup> has stated that they are poorly enforced in a number of states, and has commented that "Apparently some laws have been passed by legislatures under pressure from various groups or individuals, just as an appeasement gesture, with little thought given to subsequent enforcement and little inclination to proceed further in that direction".

It is of interest that state legislation may sometimes impose requirements which are stricter than those found in the federal legislation. Thus, in Florida, the Florida Pesticide Law requires the labels of all highly toxic pesticides to carry directions for the decontamination and disposal of empty containers, a provision not found in the federal legislation. The reason for this difference, as explained by Winterle, is that a number of deaths occurred in Florida as a result of the handling of empty parathion containers. The Florida Pesticide Technical Committee therefore agreed that the labels of all highly toxic pesticides should carry the above-mentioned directions. Then, according to Winterle,<sup>11</sup> "we were informed that the Pesticide Regulation Division of the USDA was working on a regulation of this type to be effective on a nationwide scale. In view of this information from USDA, the state regulation was held up about six months to allow for the USDA action. When it became apparent that industry resistance had blocked the proposed federal regulation, Florida proceeded to adopt the labeling regulations...".

In contrast with the situation as far as legislation on the registration of pesticides is concerned, the legislation governing the application of pesticides on the ground, a field in which control is entirely the prerogative of the states, presents a much more complex picture; a summary of the situation has been recently given by Rohrman,<sup>5</sup> who remarks that "some states have taken significant steps to insure generally ample licensing provisions, specific regulations as to the use of pesticides, inspection of equipment, etc., by way of custom applicators acts, pest con-

trol operators laws and aerial application regulations. Other states, however, either have no laws dealing with pesticide use or have what might be considered only partial coverage of the problem." He adds that "While the lack of uniformity is disturbing, such divergence can be explained in part by the varying needs and desires of people in different areas. However, certainly the greatest shortcoming in the field of pesticide laws today is the incomplete coverage within the states over the use and application of these potentially harmful substances".

According to Collins,<sup>3</sup> however, in spite of the diversity in the laws in the various states, there are also fundamental similarities, probably because many states have followed a model law, entitled "An Act Relating to Custom Application of Insecticides, Fungicides and Herbicides", drawn up in 1949. Section 3 of this model law contains important provisions laying down that : (a) no person may engage in the custom application of insecticides without a licence issued by the Commissioner (who would usually be the head of the Department of Agriculture of the state concerned), and each application for a licence must contain information as to the applicant's qualifications and proposed operations; (b) the Commissioner may require the applicant to show that he possesses adequate knowledge as to the use and application of insecticides, fungicides and herbicides, and the dangers involved and precautions to be taken in connexion with their application. Other sections provide that licensees may be required to keep records and submit reports concerning their operations, that the Commissioner has the power to make rules and regulations, to publish information regarding injuries which may result from the improper application or handling of insecticides, fungicides or herbicides, and the precautions which will help prevent such injuries, etc.

It is impossible, of course, in the space available, to provide a complete analysis of the state legislation on the control of the application of pesticides; such an analysis, for certain of the states, has been published, however, by Collins.<sup>3</sup>

An example of a fairly recent state law in this field is the Kansas Chemical Spray Law of 1963. This replaced an earlier Act of 1953 which provided only for the licensing of operators of agricultural aircraft. The new Act covers all forms of pesticide application and, in addition to giving the usual definitions of terms such as "herbicide", "insecticide", etc., also defines the term "dispersing equipment" to mean "agricultural chemical equipment or apparatus designed for, or susceptible for, use to disperse liquid sprays, dusts, aerosols, or fogs of either fungicides, herbicides, or insecticides from tractors, trucks, aircraft, or self-propelled units".

The Act then provides that no owner or operator of dispersing equipment may use or apply any insecticide, herbicide or fungicide unless he has first registered with the Secretary of the State Board of Agriculture as a registrant. The application for registration must state the name and address of the applicant, and the type of dispersing equipment for which he is registering. Non-resident applicants must furnish evi-



dence of qualifications to engage in the application of pesticides in their native state. Every registrant must keep records of his activities which must include : (1) the name of the registrant; (2) the name of the landowner or customer; (3) the legal description of the area treated; (4) the date of application of the spray or dust; (5) the kind of pesticide used; (6) the quantity used. The Act does not apply, *inter alia*, to a person operating his own or leased dispersing equipment on vegetation, land or livestock owned or leased by him.

It appears, according to the information collected by Collins,<sup>3</sup> that the Act has been satisfactory, except that there is no provision in it for the necessary personnel to police the spray operators. It was suggested that the Act might be improved by providing for more field staff to investigate complaints, check records, and perhaps serve in an advisory capacity to the chemical spray operators.

Other state legislation of interest includes the Custom Applicators Law of 1961 of Colorado, which provides that "licensed commercial applicators shall have, at each loading site, leakproof storage, mixing, loading and metering facilities and all prescribed safety equipment required for the handling of pesticides in accordance with their varying toxicity".

In Tennessee, the Pest Control Act of 1955 is fairly comprehensive in character, as compared with the legislation of other states. Thus it provides that every person who wishes to engage in pest control operations must have a licence. In addition, every person who is to be in charge of the operations for the application of a pesticide must be examined by a pest control licensing board, which issues certificates of two types, as follows : (a) first class certificates, awarded to persons qualified to design or recommend a treatment procedure (without supervision) and to direct and supervise; (b) second class certificates, awarded to persons qualified to give, under supervision, detailed directions and supervision to labourers and treating crews. The licensing board determines whether the qualifications possessed by applicants for certificates are adequate; in addition, the Act specifies that no applicant is eligible unless he has had at least two years' experience, or completed two years of study in a recognized college or university and has majored in subjects appropriate to the professional field in which he proposes to engage. Every applicant must specify the field or fields of pest control in which he desires a licence, and must be examined in any or all of the following subjects : general consulting entomology; general consulting plant pathology; structural, household, and storage warehouse pest control; fumigation; general agricultural pest and disease control; use of aircraft in agricultural pest and disease control; control of diseases affecting man and animals; horticultural spraying; rodent control. The applicant must show that he has a general knowledge of the pest and/or diseases he proposes to treat or advise treatment for, including the safety measures required.

In a general comment on the enforcement of the state legislation for the control of the application of pesticides, Rohrman<sup>5</sup> states that

"Pragmatically, it is difficult from a tactical point of view to enforce licensing, inspections, examinations and technical rules over the use of pesticides. Some states already have adequate means by which surveillance is maintained over custom applicators, pest control operators and the like. Other states have poorly enforced surveillance. Still others have no system through which control over these persons is maintained . . . However, one point is clear : a program of enforcement is only as effective and vigorous as the agencies who administer it. Having well-written laws is one thing, while adequate enforcement is quite another."

Another field in which the states would appear to have exclusive jurisdiction is that of the reporting of cases of poisoning among workers engaged in the application of pesticides, within the framework of the legislation governing the reporting of cases of occupational diseases in general, since no systematic scheme for reporting such cases on a national scale exists in the United States.

The Department of Health, Education, and Welfare published a statement<sup>8</sup> in 1963 in this connexion, which included the following remarks : "While the reporting of occupational diseases is compulsory in most States, various difficulties impede the collection and development of productive data. These include lack of uniformity in coverage of occupational disease by workmen's compensation laws and in the administration of the laws; no uniformity of State laws and regulations governing medical reporting of occupational diseases to health departments, labor departments, and industrial commissions, as well as reporting by employers; inability to enforce laws; and lack of uniform methodology . . . Of the 50 States, 28 have laws requiring reporting of occupational diseases by physicians, but only 3 States receive 100 or more reports per year . . . Only a few states require coverage of farmworkers under workmen's compensation". The statement concluded that "Many potential toxic substances are being used with inadequate knowledge of their long-term health effects. The toxicologic resources of industry and health agencies are inadequate to take care of new products and uses".

The situation in California, for example, was described by West<sup>9</sup> in 1963. In this state, about 80% of all industrial workers were then covered by the Workmen's Compensation Law, which requires what is called "Doctor's First Report of Work Injury". In agriculture, however, about one-third of the workers are not covered by this Law, generally because they are self-employed. The Agricultural Safety Orders of the State Division of Industrial Safety, issued in 1961, require all agricultural workers regularly exposed to organic phosphates to be subject to medical supervision. In addition, each employer must come to an agreement with a physician whereby the latter undertakes to deal with poisoning emergencies. In contrast, however, although the California Health Department has supported proposed legislation requiring the provision of sanitary and washing facilities, vital for first-aid purposes in cases of poisoning, for agricultural workers using pesticides, such legislation had not been adopted up to 1963.

*Proposals for changes in the legislation*

In 1963, the President's Science Advisory Committee published a report on the use of pesticides.<sup>6</sup> In its discussion of the role of Government in pesticide regulation, the Committee made the following remarks : " The FDA has responsibility only for setting tolerances which remain on foods. Decisions on all the other uses of these compounds and registration for all other compounds are the responsibility of USDA. Thus the Department of Agriculture regulatory staff evaluates and approves uses that bring pesticides into intimate contact with people, such as moth-proofing of clothes and blankets, and application to households, lawns, and gardens. The Panel believes that decisions on registrations, clearly related to health, should be the responsibility of the Department of Health, Education, and Welfare ".

More recently, legislation to strengthen existing regulations on the production of pesticides has been introduced by Senator A. Ribicoff.<sup>1</sup> This would contain, *inter alia*, the following provisions :

(i) every establishment engaged in the manufacture or processing of an economic poison must be registered with the Secretary of Agriculture;

(ii) every establishment in which economic poisons or devices are manufactured, and every means of conveyance of poisons, is subject to inspection;

(iii) an economic poison is deemed to be misbranded if it is manufactured in an establishment which has not been duly registered;

(iv) an economic poison is deemed to be adulterated if the manufacturing methods used do not conform to good practice.

In a comment on these proposals, Senator Ribicoff claimed that " Since pesticides are developing the attributes of drugs, it is appropriate that we provide drug-like controls over pesticide production and transportation ".

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VENEZUELA

Legislation on the control of pesticides in Venezuela goes back to 1936, when the Law on fertilizers, insecticides and fungicides for use in agriculture and livestock breeding, and food concentrates for animals, was promulgated. This Law was repealed in 1964, and replaced by one bearing the title " Law concerning fertilizers and other agents capable of having a beneficial effect on plants, animals, soils or waters ".

Regulations for the implementation of the original Law of 1936 were issued in 1952. They were followed, in 1954, by a Resolution of the Ministry of Health and Social Welfare, which made the operation of disinfection undertakings subject to the fulfilment of the requirements prescribed. In 1961, the Ministry of Agriculture and Livestock Breed-

ing issued a Resolution concerning the distribution, supply, packaging, storage, handling and use of insecticides, fungicides, and other toxic products used in agriculture. In the same year, a Resolution of the Ministry of Health and Social Welfare prohibited the sale, storage and use of highly toxic insecticides in establishments in which foodstuffs or beverages are stored, processed, or offered for sale. Four years later, in 1965, by virtue of a Resolution issued by the same Ministry, the notification of all cases of accidental poisoning was made compulsory.

In a report to the Third Venezuelan Congress on Public Health, held in 1966, Castillo et al.<sup>1</sup> analysed the health and social legislation of Venezuela and, in particular, that concerned with the various products used in agriculture, such as insecticides, herbicides, rodenticides, etc. They pointed out that, in spite of the legislation in existence in this field, the number of cases of poisoning by such products was increasing every year, and therefore called for suitable co-ordination so as to ensure that this legislation was enforced, especially in respect of the sale and domestic use of highly toxic products. In fact, one of the recommendations made by the Congress, as far as health legislation was concerned, was that legislation should be introduced to bring up to date the existing provisions on the control of insecticides.

This recommendation appears to have been accepted by the Government, since General Regulations on pesticides, made pursuant to the Law on fertilizers, etc., mentioned above, were issued in 1968. At the same time, all provisions contrary to or different from those of the Regulations were repealed; this would seem to include the Regulations of 1952, the Resolution of 1954, and the two Resolutions of 1961, previously mentioned.

The Law on fertilizers, etc. of 1964 applies to all "substances or agents capable of having a beneficial effect on plants, animals, soils or waters". The Ministry of Agriculture and Livestock Breeding is responsible for its enforcement, and hence for ensuring that all the substances and agents covered by the Law satisfy the necessary conditions from the point of view both of chemical composition and public health. For this reason, the Government may take measures for :

(a) ensuring that such substances and agents are of the correct chemical composition;

(b) preserving public health and the life of useful animals and plants, and the condition of land and water exposed to the incorrect use of such substances and agents.

The Government is empowered to make regulations as to the preparation, import, export, inspection, control, storage, purchase, sale, distribution and use of the substances and agents covered by the Law, and in particular of :

(a) fungicides, bactericides, insecticides, acaricides, nematocides, rodenticides and, in general, all other substances or agents intended for the prevention, extermination or mitigation of the diseases and pests which attack plants, parts of plants or plant products;

(b) herbicides, defoliants, hormones, antibiotics, etc., used in agriculture, and any other substances or agents capable of changing or having a beneficial effect on plants, animals, soils or waters.

The Law then makes the import, export, manufacture, distribution and sale of the substances and agents to which it applies subject to prior licensing by the Ministry of Agriculture and Livestock Breeding.

As already mentioned, the General Regulations for the implementation of the above Law were issued in 1968. These Regulations make clear the division of responsibilities in this field, as between the Ministry of Agriculture and Livestock Breeding on the one hand and the Ministry of Health and Social Welfare on the other. Thus they specify that the control of pesticides, in all matters affecting public health, is the responsibility of the latter Ministry, without prejudice, however, to those functions which are the responsibility of the Ministry of Agriculture and Livestock Breeding. Similarly, it is laid down that no pesticide may be produced, stored, transported, imported, exported, used or traded in any way whatsoever, without first having been licensed by the Ministry of Health and Social Welfare. This licence may not be granted, however, in the case of pesticides intended for use in agriculture or forestry, unless the approval of the Ministry of Agriculture and Livestock Breeding has previously been obtained. For the purposes of the Regulations, a pesticide is considered to be any substance designated as such by the Ministries of Health and Social Welfare, and Agriculture and Livestock Breeding, and intended for the control of organisms capable of harming man, animals, plants and inanimate objects.

The system of classification of pesticides according to toxicity adopted in the Regulations, and the colour of the band, occupying not less than one-fifth of the area of the packages in which pesticides are offered to the public, whereby such packages can be identified, are shown in Table 1.

**Table 1**  
*Classification and colour coding of pesticides*

<i>Classification</i>	<i>Median lethal dose by the oral route (acute toxicity) (LD<sub>50</sub>) (mg/kg body weight)</i>	<i>Colour of identification band</i>
Extremely toxic	1-100	Bright red
Highly toxic	101-250	Vivid yellow
Moderately toxic	251-1400	Vivid blue
Slightly toxic	> 1400	Vivid green

The experimental or professional use of pesticides is to be the subject of special provisions laid down jointly by the two Ministries just mentioned.

Every applicant for the licence prescribed by the Regulations must :

- (a) produce satisfactory evidence of his identity, or that of his representative;
- (b) prove to the satisfaction of the administrative authorities that he possesses the technical skill required for the proposed activities, and that the premises and equipment to be used are suitable for the purpose;
- (c) satisfy any other requirement imposed by law or by the administrative authorities.

The licence is granted for a period of two years, which may be extended, on request, for further periods of the same length.

The manufacture or storage of pesticides, or trade in such products, in premises or vehicles in which foodstuffs, beverages or pharmaceutical products are manufactured, supplied, transported or stored, or where there is a danger of the contamination of persons, animals or things, are prohibited, unless the safety measures considered necessary, in each individual case, by the Ministry of Health and Social Welfare, have first been adopted.

The regulations also call for the registration of all pesticides, whether imported or manufactured in Venezuela, by the Ministry of Health and Social Welfare. This requirement does not apply in the case of the import of samples of pesticides for purposes of research or for use in trials, subject to the prior approval of the Ministry of Agriculture and Livestock Breeding, if the pesticides are intended for use in agriculture or forestry. Every application for the registration of a pesticide, submitted to the Ministry of Health and Social Welfare, must be accompanied by :

- (a) the trade name or name of the product;
- (b) a description of the ingredients which make up the product, and its formula;
- (c) a statement of the materials used for the manufacture of the container or package for the product;
- (d) samples of the pesticide and, if it is produced abroad, documentary proof that a licence has been granted by the Ministry of Health and Social Welfare for the import of such samples into the country;
- (e) samples, in Spanish, of the labels and the publicity and informational material intended for the users of the product;
- (f) if the pesticide is produced abroad, documentary evidence, duly authenticated, that the competent authority in the country of origin has authorized the use of the product for purposes similar to those for which it is proposed to use it in Venezuela.

When an application for the registration of a pesticide has been received, the health authority classifies the pesticide, on the basis of its characteristics, and then arranges for its investigation by the competent technical agencies. In the case of a pesticide intended for use in agri-

culture or forestry, the application is forwarded, after the pesticide has been classified, to the Ministry of Agriculture and Livestock Breeding. The latter then proceeds to analyse the product and to carry out the necessary technical investigations, and informs the Ministry of Health and Social Welfare as to the results obtained; it also states whether or not it approves the entry of the product in the register, such approval being a necessary condition of registration. When the Ministry of Agriculture and Livestock Breeding has given its approval or, where such approval is not required, immediately on receipt of the application by the Ministry of Health and Social Welfare, the health authority proceeds to carry out the necessary investigations to determine whether or not the pesticide should be registered, from the point of view of public health. If registration is refused, the applicant may, within a period of 30 days, request that the decision should be reconsidered. Every product registered is assigned a number which must appear on all the containers used for it. When a product is entered in the register, the Ministry of Health and Social Welfare determines whether or not it shall be supplied only on production of a "technical order" [prescripción técnica], and fixes the tolerance limits [índice de tolerancia]. The corresponding statements must be printed clearly and legibly on the container.

As far as the use of pesticides is concerned, every undertaking which imports or produces pesticides which may be supplied only on production of a technical order must keep a register of the prescribed form, in which must be entered the quantity of each pesticide of this type imported or produced, the date of production or entry into Venezuela, as the case may be, the persons to whom such pesticides are sold or supplied, the date of the transaction, and the name of the technician responsible for such sale or supply. Establishments licensed to supply pesticides of this type must keep a register similar to that just described. Special forms, approved by the health authority, must be filled in quadruplicate whenever such pesticides are sold or supplied, one copy being sent to the health authorities, and one given to the supplier, one to the acquirer, and one to the technician who authorized the transaction.

Extremely toxic pesticides for use in agriculture or forestry may be acquired only on the basis of a written authorization from an agronomist or technician authorized to this effect by the Ministry of Agriculture and Livestock Breeding, or in commercial establishments licensed by this Ministry and having authorized agronomists or technicians on their staff. The sales form [formulario de venta] must state clearly the quantity and name of the product, the salesman responsible, the name of the technician who authorized the acquisition, the name of the person who acquired the product and the place or estate in which it is to be used. Such products may not be used for domestic or sanitary purposes, except in special cases and subject to authorization by medical officers and other technicians authorized to this effect by the Ministry of Health and Social Welfare. In the case of pesticides used in livestock breeding or forestry, the technical order may be drawn up by veterinarians or foresters [ingenieros forestales] respectively.

Recommendations for the use of pesticides in agriculture or forestry, and especially of insecticides and fungicides, must be based, other than in exceptional cases, on the prior visual inspection of the area concerned, and must take into account the existing or any future technical standards for the control of the pests and diseases of the different crops. The technician responsible for authorizing the acquisition of a particular chemical and for recommending the use of extremely toxic pesticides must draw up, in writing, the instructions for the correct handling and application of such products, and must warn the user, both in these instructions and verbally, of the dangers associated with them. Users, in turn, must strictly obey both the instructions given by the technician and the directions for use given on the container and the labels, and are responsible for any damage caused by the incorrect use or application of the products. The technician may authorize the use of extremely toxic pesticides only when, in his opinion, the same effect cannot be achieved by means of pesticides of lower toxicity.

Every person who applies pesticides must keep records as to the areas treated, the pesticides used, the date on which the operations were carried out, the persons concerned in carrying them out, and all other information as may be required by the health authority. Every such person must, in addition, inform, both verbally and in writing, all persons present, or who live or work, in the place in which he is carrying out his operations, as to the type of pesticide used, the antidote and the person or persons under whose technical responsibility the operations are carried out. The person who requests that pesticides should be applied, or whose property is treated, must, in turn, take all the precautions recommended.

Pesticides may not be applied in premises or establishments in which foodstuffs or pharmaceutical products are produced, stored, supplied or consumed, nor in educational or hospital establishments, unless the prior approval of the health authority has been obtained. The Ministry of Health and Social Welfare, either on its own initiative or at the request of the Ministry of Agriculture and Livestock Breeding, may specify other places, premises or establishments in which pesticides may not be applied without prior authorization by the authorities.

Every pesticide which may be supplied only on production of a technical order must be kept in containers approved by the Ministry of Health and Social Welfare. Each such container must be accompanied by an instruction booklet or sheet for its use, the text of which must also be approved by the Ministry, and which must be given to the purchaser; at the same time, the seller must warn him explicitly as to the hazards associated with the incorrect use of the product. In the case of products intended for use in agriculture or forestry, the containers and accompanying printed matter are approved jointly by the Ministries of Health and Social Welfare, and Agriculture and Livestock Breeding. Every container used for pesticides must be marked, in black and in a place where it is easily visible, with the class to which the product concerned belongs, the word "poison", the skull and cross-bones, and a warning notice



to the effect that the product must be kept out of reach of children; the container must also be marked with the commercial name of the product, the registration number, its classification formulation and, in such a way as to stand out clearly, the active ingredient(s), the antidote and such other information as may be necessary in the opinion of the health authority.

Other provisions of the Regulations require the wearing of personal protective equipment when extremely toxic pesticides are applied. In addition, every person professionally engaged in the application must be in possession of a medical certificate issued by the health authority; the period of validity of this certificate must be stated on it.

The Regulations further provide that the manufacture, formulation, transport, supply or application of pesticides may be subject to such inspections as are considered necessary by the health authorities; the latter, and the competent agencies of the Ministry of Agriculture and Livestock Breeding, may, whenever they consider this to be necessary, supervise or control any operations for the application of pesticides, and have the power to order their cessation if this is desirable.

All advertising of, or publicity for, pesticides is subject to the prior approval of the Ministry of Health and Social Welfare which, in the case of pesticides intended for use in agriculture or forestry, is in turn subject to the prior agreement of the Ministry of Agriculture and Livestock Breeding. The health authority is empowered to confiscate or prohibit all advertising matter which has not been duly approved.

The health authorities and the competent agencies of the Ministry of Agriculture and Livestock Breeding, whenever they find that pesticides have been used incorrectly, must immediately take the measures necessary for the protection of public health. They may also confiscate any object or animal suspected of being contaminated with pesticides and, if necessary, order its destruction. In addition, the Regulations provide that the health authorities may order the closure or evacuation of premises if the presence in them of human beings could give rise to contamination with pesticides in a manner dangerous to health.

Further provisions as to the co-ordination of the activities of the two Ministries concerned with pesticides are then laid down. It is specified, in fact, that these Ministries must co-ordinate the work which they carry out in the field of scientific research on the application of pesticides. The services of the two Ministries must also co-ordinate their activities, collaborate in carrying them out, and exchange information. All general administrative provisions concerning pesticides must be adopted jointly by these Ministries.

When this is necessary, for reasons of public health, the Ministry of Health and Social Welfare may restrict or suspend the use of any pesticide, either in the entire country in or a part of it. Similarly, it may at any time suspend or cancel any licence issued under the Regulations. In the case of products intended for use in agriculture or forestry, and licences issued jointly with the Ministry of Agriculture and Livestock Breeding, such decisions must be taken jointly by the two Ministries concerned.

As already mentioned, the notification of cases of accidental poisoning was made compulsory by a Resolution of 1965. This Resolution states explicitly that this measure was introduced because "the indiscriminate use of chemicals is a constant source of danger to health and of serious losses in the agricultural regions of the country". In addition, such notification would make possible a thorough investigation of the problem by providing reliable statistical data as to the mortality and morbidity resulting from the use of chemicals in agriculture.

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- Circular of 25 September 1961 of the Ministry of Agriculture on the authorization to trade in Class A or B products for the control of plant diseases, weeds and certain animal pests and for plant growth regulation
- Order No. 304 of 9 October 1961 of the Ministry of the Interior governing the use of certain poisons and substances harmful to health (see *ibid.*, 506)
- Order No. 305 of 9 October 1961 of the Ministry of the Interior on the production, supply and storage of poisons and substances harmful to health (see *ibid.*, 507)

**Denmark (continued)**

Circular of 21 June 1962 of the Ministry of the Interior on deratization

Circular of 30 October 1962 of the Ministry of the Interior on the supply of raticides containing coumarin derivatives (warfarin and similar products)

Directives of 1 January 1963 of the National Health Service on the labelling of poisons and substances harmful to health

Circular of 15 May 1964 of the Ministry of the Interior on orders for poisons

Order No. 318 of 2 November 1964 with regard to the notification of occupational diseases by physicians (see *ibid.*, 1965, 16, 502)

Order No. 80 of 13 March 1969 the Ministry of Labour on agricultural, forestry and horticultural work dangerous to children and adolescents

**France**

Decree of 10 July 1913 concerning the general protective and hygienic measures to be applied to all establishments subject to its provisions, as amended

Order of 15 September 1916 relating to insoluble and soluble arsenic compounds, as amended and extended by the Order of 16 February 1949

Order of 30 October 1934 establishing a Commission responsible for studying the problems posed by the use of poisonous substances in agriculture

Decree of 11 May 1937 embodying public administrative regulations for the implementation of the Law of 4 August 1903, as amended, concerning the prevention of fraudulent practices in trade in products used for the destruction of crop pests

Order of 20 July 1938 relating to hydrocyanic acid, as amended

Order of 1 August 1938 relating to arsenical compounds used in powder form, as amended by the Order of 23 March 1950

Law No. 525 of 2 November 1943 relating to the organization of the control of pest control products for agricultural use, as validated and amended by Ordinance No. 45-680 of 13 April 1945 and as amended by Law No. 63-762 of 30 July 1963

Order of 3 January 1947 relating to thallium salts, as amended by the Order of 23 March 1950 (*corrigendum* dated 17 January 1951)

Order of 25 February 1947 relating to dichlorodiphenyltrichloroethane (DDT), as amended by the Orders of 22 June 1948 and 23 March 1950

Order of 26 February 1947 relating to hexachlorocyclohexane and its sulfur derivatives (HCH), as amended by the Orders of 22 June 1948 and 23 March 1950

Circular of 18 July 1947 of the Ministry of Agriculture concerning the use of organic mercury compounds

Order of 23 July 1947 laying down the conditions under which showers must be made available to personnel performing unhealthy and dirty work, as amended

Order of 25 June 1948 concerning the use of thiodiphenylamine (phenothiazine) and its derivatives, as amended by the Order of 23 March 1950

Order of 28 June 1948 (*corrigendum* dated 9 July 1948) relating to the utilization of anthracene oils for the destruction of harmful insects and parasites, as amended by the Order of 23 March 1950

Decree No. 48-1805 of 19 November 1948 embodying administrative regulations relating to the importation, holding, and use of, and trade in, poisons (see *Int. Dig. Hlth Leg.*, 1950, 1, 515), as amended by Decree No. 52-405 of 12 April 1952

Decree No. 48-1895 of 10 December 1948 embodying public administrative regulations concerning the special hygiene measures to be applied

**France (continued)**

- in establishments where the staff are exposed to the danger of methyl bromide poisoning (see *ibid.*, 1950, 2, 80)
- Order of 10 December 1948 establishing the terms of the notice indicating the dangers of methyl bromide poisoning and implementing Decree No. 48-1895 of 10 December 1948 embodying public administrative regulations concerning the special hygiene measures to be applied in establishments where the staff are exposed to the danger of methyl bromide poisoning (see *ibid.*)
- Circular of 9 May 1949 of the Investigatory Commission on the Use of Toxic Substances in Agriculture concerning tetraethyl pyrophosphate
- Order of 15 July 1949 relating to trade in, and use of, nux vomica and strychnine and its salts, as amended by the Order of 1 February 1951
- Decree No. 49-1499 of 16 November 1949 embodying public administrative regulations concerning the special hygiene measures to be applied in establishments where the staff are exposed to contact with dust containing arsenic (see *ibid.*, 1951, 2, 414)
- Order of 17 November 1949 concerning the terms of the notice indicating the dangers of arsenic poisoning and the precautions to be taken to avoid such dangers (see *ibid.*)
- Recommendations of 18 November 1949 concerning the medical examinations carried out in pursuance of Section 13 of Decree No. 49-1499 of 16 November 1949 (see *ibid.*)
- Law No. 49-1531 of 1 December 1949 prohibiting the use of toxic gases in the disinsection, deratization or disinfection of premises (see *ibid.*, 586)
- Order of 9 March 1950 relating to trade in, and use of, zinc phosphide baits
- Order of 30 March 1950 relating to soluble inorganic arsenical compounds (baits)
- Order of 18 July 1950 (*corrigendum* dated 18 August 1950) relating to the utilization of nicotine and its salts for the treatment of plants
- Order of 7 October 1950 regulating the sale of products having a chloralose base
- Order of 15 November 1951 establishing the schedules making up the poisons list (Section I), as amended
- Order of 10 April 1952 relating to trade in, and use of, diethyl and paranitrophenyl thiophosphate and all thiophosphoric esters
- Decree of 27 November 1952 on the organization of industrial medical services
- Order of 2 March 1953 relating to trade in carbon tetrachloride and its use in agriculture for the destruction of pests (see *ibid.*, 1954, 5, 537)
- Order of 3 March 1953 relating to trade in carbon disulfide and its use in agriculture for the destruction of pests (see *ibid.*)
- Circular of 25 March 1953 of the Minister of Agriculture relating to the destruction of insects and other agricultural pests by diethyl and paranitrophenyl thiophosphate
- Order of 5 March 1954 relating to the application of pest control products (see *ibid.*, 1956, 7, 92)
- Decree of 17 June 1955 for the implementation of Article 1146 of the Rural Code
- Circular of 22 March 1957 of the Secretary of State for Agriculture concerning trade in, and use of, systemic pest control products employed in agriculture (see *ibid.*, 1958, 9, 701)
- Order of 24 September 1965 of the Minister of Agriculture, the Minister of Industry and the Minister of Public Health and Population modifying and adding certain entries in Schedules A and C of the poisons list (Section I)
- Order of 25 September 1965 of the Minister of Agriculture and the Minister of Public Health and Population lay-



**France (continued)**

ing down the conditions for the use of poisons in agriculture (see *ibid.*, 1966, 17, 479)

Order of 19 July 1967 of the Minister of Agriculture with regard to the conditions for the supply and agricultural use of chloropicrin (see *ibid.*, 1968, 19, 195)

**Germany (Federal Republic of Germany)**

Ordinance of 29 January 1919 on the control of pests by means of highly toxic substances (see *Bull. Off. int. Hyg. publ.*, 1921, 13, 909)

Law of 17 January 1936 on foodstuffs, in the version of 21 December 1958

Ordinance of 6 April 1936 on the use of phosphine for pest control

Ordinance of 25 May 1950 on plant protection products harmful to bees

Industrial Code, as revised on 1 June 1960

First Ordinance of 24 June 1960 on protection against the dangers associated with radioactive substances, in the version of 15 October 1965 (see *Int. Dig. Hlth Leg.*, 1966, 17, 885)

Ordinance of 4 August 1960 to lay down the list of establishments subject to licensing

Federal Law of 18 July 1961 on communicable diseases (see *ibid.*, 1962, 13, 100), as amended

Circular of 23 June 1965 of the Federal Minister of Health concerning preparations giving off phosphine, contained in sachets, for the control of pests of stored products

Ordinance of 30 November 1966 on plant protection products, pesticides and protective agents for stored products in or on foodstuffs of plant origin (see *ibid.*, 1968, 19, 638)

Plant Protection Law of 10 May 1968

Seventh Ordinance on occupational diseases. Dated 20 June 1968 (see *ibid.*, 1969, 20, 78)

Ordinance of 4 March 1969 on the testing and licensing of plant protection products

**Hesse<sup>a</sup>**

Law of 17 May 1961 on trade in poisons  
Police Ordinance of 16 October 1961 on trade in poisons

Police Ordinance of 16 October 1961 on trade in toxic plant protection products

Ordinance of 7 July 1964 to amend the Police Ordinance of 16 October 1961 on trade in toxic plant protection products

Third Police Ordinance of 17 March 1966 to amend the Police Ordinance on trade in poisons

**Netherlands**

Decree of 26 March 1921 to lay down the list of articles considered as "commodities" for the purposes of Section 1 of the Law on commodities of 1919, as amended

Law of 20 May 1922 on accidents in agriculture and horticulture, as amended, most recently by the Law of 22 March 1957

Law of 2 July 1934 on industrial safety, as amended

Decree of 19 November 1938 on safety in factories and workshops, as amended, most recently by the Decree of 20 September 1960

Law of 19 April 1947 on pesticides and fertilizers, as amended

Decree of 13 August 1948 on pesticides

General Decree of 11 July 1949 to implement the Law on commodities of 1935

Decree of 25 March 1950 on safety in agriculture, as amended

<sup>a</sup> A full list of the legislation on poisons and plant protection products in the different Länder is given by H. Tombergs in *Der Arzt des öffentlichen Gesundheitsdienstes* (1967), Stuttgart, Georg Thieme Verlag, pp. 280-320.

**Netherlands (continued)**

Law of 19 February 1959 supplementing the provisions of the Law of 1934 on industrial safety, and those of the Law on port undertakings, with particular reference to preventive medicine in undertakings (see *Int. Dig. Hlth Leg.*, 1961, 12, 415)

Law of 12 July 1962 on pesticides

Order of 16 July 1964 of the Minister of Agriculture and Fisheries and the Minister of Social Affairs and Public Health, prescribing exemptions from the Law on pesticides of 1962

Decree of 25 July 1964 embodying regulations for the implementation of Sections 13, 14 and 15 of the Law on pesticides of 1962 (see *ibid.*, 1965, 16, 721)

Order of 4 August 1964 of the Minister of Agriculture and Fisheries and the Minister of Social Affairs and Public Health on pesticides

Order of 15 March 1965 of the Minister of Agriculture and Fisheries and the Minister of Social Affairs and Public Health on residues, as amended by Orders dated 7 March 1967 and 9 January 1969

Order of 21 June 1967 of the Minister of Social Affairs and Public Health to implement Section 58 of the Law on diseases

**New Zealand**

The Health Act 1956. Dated 25 October 1956 (see *Int. Dig. Hlth. Leg.*, 1957, 8, 643)

The Apiaries Protection Regulations 1957. Dated 12 June 1957

The Pesticide Regulations 1959. Dated 8 July 1959 (see *ibid.*, 1961, 12, 795)

The Agricultural Chemicals Act 1959. Dated 21 October 1959. As amended by Act No. 73 of 23 October 1963 and Act No. 144 of 24 November 1967

The Civil Aviation Regulations 1953, Amendment No. 5. Serial No. 71 of 1960. Dated 1 June 1960

The Deadly Poisons Regulations 1960. Dated 24 August 1960 (see *ibid.*, 1960, 15, 796). As amended by Amendment No. 1 of 17 December 1963 (see *ibid.*, 1965, 16, 147) and Amendment No. 2 of 25 March 1968

The Animals Protection Act 1960. Dated 17 October 1960. As amended

The Fertilisers Act 1960. Dated 17 October 1960. As amended by Act No. 66 of 6 December 1962

The Poisons Act 1960. Dated 25 October 1960 (see *ibid.*, 1961, 12, 796). As amended by Acts No. 93 of 6 December 1962, No. 31 of 3 November 1964, No. 108 of 23 November 1967 and No. 147 of 24 November 1967

The Poison Licences Regulations 1961. Dated 17 April 1961 (see *ibid.*, 1963, 14, 87). As amended by Amendment No. 1 of 3 July 1963 (see *ibid.*, 1965, 16, 123)

The Stock (Insecticides and Oestrogens) Regulations 1961. Dated 30 August 1961 (see *ibid.*, 1963, 14, 87). As amended by Amendment No. 1 of 10 July 1963 and Amendment No. 2 of 23 December 1963

The Systemic Pesticides Notice 1961. Dated 25 September 1961

Reprint, certified on 14 March 1962, of the Stock Remedies Regulations 1947

Dairy Produce Regulations 1938, Amendment No. 21. Dated 25 March 1962 (see *ibid.*, 1964, 15, 122)

Reprint, certified on 8 December 1963, of the Food and Drug Regulations 1946 (see *ibid.*, 1965, 16, 125)

The Poisons Regulations 1964. Dated 6 May 1964 (see *ibid.*, 1966, 17, 564). As amended by Amendment No. 1 of 25 May 1966 (see *ibid.*, 1968, 19, 407), Amendment No. 2 of 15 November 1967 (see *ibid.*, 1969, 20, 271) and Amendment No. 3 of 26 May 1969

**New Zealand (continued)**

- The Meat Regulations 1940, Amendment No. 15. Dated 14 October 1964
- Reprint, certified on 12 May 1967, of the Noxious Substances Regulations 1954 (see *ibid.*, 1956, 7, 470)
- The Game (Packing and Export) Regulations 1967. Dated 15 May 1967 (see *ibid.*, 1969, 20, 269)
- The Fumigation Regulations 1967. Dated 27 September 1967 (see *ibid.*, 270)
- The Animal Remedies Act 1967. Dated 16 November 1967
- The Agricultural Pests Destruction Act 1967. Dated 24 November 1967
- The Agricultural Chemicals Regulations 1968. Dated 14 October 1968
- The Agricultural Chemicals Notice 1968. Dated 6 November 1968

**Sweden**

- Law No. 1 of 3 January 1949 on the protection of workers
- Crown Order No. 208 of 6 May 1949 to implement the Law on the protection of workers
- Crown Order No. 209 of 6 May 1949 to prohibit the employment of minors in certain dangerous types of work
- Crown Regulations No. 824 of 21 December 1951 relating to foodstuffs (see *Int. Dig. Hlth Leg.*, 1952, 4, 122)
- Law No. 243 of 14 May 1954 on insurance against industrial accidents (in the version in force on 25 May 1962)
- Crown Ordinance No. 702 of 14 December 1962 on poisons and other products dangerous to health (see *ibid.*, 1963, 14, 496)
- Crown Ordinance No. 703 of 14 December 1962 on pesticides (see *ibid.*, 501)
- Crown Order No. 706 of 14 December 1962 to amend Section 7 of Regulations No. 824 of 21 December 1951 relating to foodstuffs
- Crown Instruction No. 98 of 31 May 1963 with regard to the National Poisons and Pesticides Board (see *ibid.*, 1964, 15, 617)
- Crown Order No. 441 of 28 June 1963 to implement Crown Ordinance No. 702 of 14 December 1962 on poisons and other products dangerous to health (see *ibid.*, 627)
- Crown Order No. 442 of 28 June 1963 to implement Crown Ordinance No. 703 of 14 December 1962 on pesticides (see *ibid.*, 629)
- Crown Instruction No. 75 of 3 December 1965 with regard to the National Poisons and Pesticides Board
- Crown Instruction No. 787 of 3 December 1965 concerning the National Institute of Public Health (see *ibid.*, 1967, 18, 192)

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- Regulations No. 664 of 20 May 1938, promulgated by Order of the People's Commissar for Health of the USSR, concerning the receipt, storage and distribution of poisons in sanitary stations and disinfection establishments
- Circular No. 185-55 of 18 May 1955 with regard to prophylactic sanitary surveillance in the basic chemical, nitrogen fertilizer and insecticide industries
- Circular No. 329-60 of 25 May 1960 of the Deputy Chief State Sanitary Inspector of the USSR concerning the sanitary control of the use of poisonous chemicals in agriculture for the purpose of obtaining high quality foodstuffs and of ensuring that they undergo expert examination
- List of highly active poisonous substances subject to the procedures as to acquisition, sale and supply, storage, the keeping of records and transport, laid down by Decree No. 78 of 26 January 1938 of the Council of People's Commissars of the USSR (approved by the Deputy Minister of Health of the USSR on 16 December 1961 and by the Deputy

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Chairman of the State Committee for Chemistry of the Council of Ministers of the USSR on 21 December 1961)

Health Regulations No. 405-62 of 3 July 1962 of the Chief State Sanitary Inspectorate of the USSR concerning the construction and maintenance of undertakings for the manufacture of dichlorodiphenyltrichloroethane (DDT)

Instructions of 1962 concerning the use of personal protective devices in work with poisonous chemicals for the control of pests, plant diseases and weeds, and in the decontamination of containers, premises and vehicles in state and collective farms (approved by the State Commission on the Chemical Control of Pests, Plant Diseases and Weeds attached to the Ministry of Agriculture of the USSR, the Central Committee of the Agricultural Workers Union, and the Deputy Chief State Sanitary Inspector of the USSR)

Instructions No. 128-1/124 of 27 June 1963 for agricultural scientific research establishments as to the obtaining, sampling and forwarding for investigation in scientific hygiene establishments, of samples of foodstuffs which have been subjected to the action of pesticides (approved by the Chairman of the State Commission on the Chemical Control of Pests, Plant Diseases and Weeds attached to the Ministry of Agriculture of the USSR, and the Deputy Chief State Sanitary Inspector of the USSR)

Health Regulations No. 478-64 of 13 June 1964 of the Deputy Chief Medical Officer of the USSR concerning the construction and maintenance of plants for the manufacture of the herbicide 2,4-D. (the sodium salt of 2,4-dichlorophenoxyacetic acid)

Decree No. 428 of 5 April 1965 of the Council of Ministers of the RSFSR

concerning the measures to be taken for the protection of the health of the population in connexion with the widespread use in agriculture of chemical plant protection products

Health Regulations No. 531-65 of 10 June 1965 of the Chief Medical Officer of the USSR with regard to the storage, transport and use of poisonous chemicals in agriculture

Health Regulations No. 534-65 of 24 June 1965 of the Deputy Chief Medical Officer of the USSR with regard to the design, equipment and maintenance of premises for the storage of highly active poisonous substances

**United Kingdom**

The Protection of Animals Acts 1911 to 1927

The Pharmacy and Poisons Act 1933. Dated 28 June 1933

The Hydrogen Cyanide (Fumigation) Act 1937. Dated 6 July 1937

The Hydrogen Cyanide (Fumigation of Buildings) Regulations 1951. Serial No. 1759 of 1951. Dated 1 October 1951 (see *Int. Dig. Hlth Leg.*, 1953, 4, 788)

The Hydrogen Cyanide (Fumigation of Ships) Regulations 1951. Serial No. 1760 of 1951. Dated 1 October 1951 (see *ibid.*, 789)

The Agriculture (Poisonous Substances) Act 1952. Dated 30 October 1952 (see *ibid.*, 1954, 5, 149). As extended by the Agriculture (Poisonous Substances) (Extension) Orders of 1960, 1965 (see *ibid.*, 1966, 17, 988) and 1966

The Protection of Birds Acts 1954 to 1967

The Food and Drugs Act 1955. Dated 22 November 1955 (see *ibid.*, 1956, 7, 507)

The Agriculture (Safety, Health and Welfare Provisions) Act 1956. Dated 5 July 1956

**United Kingdom (continued)**

The Arsenic in Food Regulations 1959. Serial No. 831 of 1959. Dated 7 May 1959 (see *ibid.*, 1961, 12, 596)

The Arsenic in Food (Amendment) Regulations 1960. Serial No. 2261 of 1960. Dated 7 December 1960 (see *ibid.*, 1963, 14, 704)

The Lead in Food Regulations 1961. Serial No. 1931 of 1961. Dated 9 October 1961 (see *ibid.*, 1962, 13, 787)

The Agriculture (Poisonous Substances) Regulations 1966. Serial No. 1063 of 1966. Dated 11 August 1966 (see *ibid.*, 1967, 18, 897)

The Farm and Garden Chemicals Act 1967. Dated 14 July 1967 (see *ibid.*, 1968, 19, 884)

The Agriculture (Poisonous Substances) (Amendment) Regulations 1967. Serial No. 1860 of 1967. Dated 11 December 1967 (see *ibid.*, 890)

The Poisons List (No. 2) Order 1968. Serial No. 1682 of 1968. Dated 23 October 1968 (see *ibid.*, 1969, 20, 803)

The Poisons (No. 2) Rules 1968. Serial No. 1683 of 1968. Dated 23 October 1968 (see *ibid.*)

**United States of America**

The Insecticide Act of 1910. Dated 26 April 1910

The Federal Insecticide, Fungicide, and Rodenticide Act. Dated 25 June 1947

An Act to amend the Federal Food, Drug, and Cosmetic Act with respect to residues of pesticide chemicals in or on raw agricultural commodities. Dated 22 July 1954 (see *Int. Dig. Hlth Leg.*, 1959, 10, 168)

An Act to amend the Federal Insecticide, Fungicide, and Rodenticide Act so as to include nematocides, plant regulators, defoliants, and desiccants, and for other purposes. (The Nematocide, Plant Regulator, Defoliant,

and Desiccant Amendment of 1959). Dated 7 August 1959

An Act to amend the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, to provide for labeling of economic poisons with registration numbers, to eliminate registration under protest, and for other purposes. Dated 12 May 1964

Code of Federal Regulations, Title 14, Aeronautics and Space, Chapter I, Federal Aviation Administration, Department of Transportation, Part 137, Agricultural Aircraft Operations (Revised as of 1 January 1969)

Code of Federal Regulations, Title 49, Transportation, Subtitle B, Other Rules Relating to Transportation, Chapter I, Department of Transportation, Subpart G, Poisonous Articles; Definition and Preparation. Revised as of 1 January 1968 (account has been taken of the amendments introduced on 21 December 1967, which became effective on 10 January 1968)

Code of Federal Regulations, Title 7, Agriculture, Subtitle B, Regulations of the Department of Agriculture, Chapter III, Agricultural Research Service, Department of Agriculture, Part 362, Regulations for the enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act (revised as of 1 January 1969)

Code of Federal Regulations, Title 21, Food and Drugs, Chapter I, Food and Drug Administration, Department of Health Education, and Welfare, Subchapter B, Food and Food Products, Part 120, Tolerances and Exemptions from Tolerances for Pesticide Chemicals in or on Raw Agricultural Commodities (revised as of 1 January 1969)

**Venezuela**

Law of 15 July 1964 concerning fertilizers and other agents capable of having a beneficial effect on plants, animals, soils or waters

**Venezuela** (*continued*)

Resolution No. 2 of 17 March 1965 of the Ministry of Health and Social Welfare adding "all forms of accidental poisoning" to the list of diseases subject to compulsory notification included in group A of the Regula-

tions concerning diseases subject to compulsory notification (see *Int. Dig. Hlth Leg.*, 1968, **19**, 448)

Decree No. 1151 of 9 July 1968 embodying General Regulations concerning pesticides (see *ibid.*, 1969, **20**, 558)

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