other firms also make them. Although the emergency suspension took effect from the moment it was announced on 1 March, the companies can appeal to have it lifted. When the suspension issue is settled, "cancellation hearings" will begin, to determine whether the herbicides should be banned permanently. That will take years to decide. □

EPA disputes Dow claim

The Environment Protection Agency has disputed claims by Dow Chemical that some dioxin compounds found in the environment are the result of normal combustion processes. The claim was made by the chemical company last November as part of its defence against charges that pollution associated with its herbicide production plant at Midland in Michigan was resulting in trace elements in fish in the Tittabawassee River.

Dow claimed that, since it had found dioxins associated with a number of combustion sources including car exhaust and charcoal grills, dioxins were formed by normal combustion processes. But EPA says this claim was based on purely circumstantial evidence. It points out that evidence submitted by Dow to the EPA shows dioxin levels two to four times higher in Midland than in other locations checked. It also criticises Dow for using analytical techniques and procedures which have not yet been corroborated by other scientists. □

Dow admits 'poor' lab results

THE US Environmental Protection Agency (EPA) has not only been reviewing the safety of the herbicide 2,4,5-T; it is also engaged in a major collaborative programme with US scientists to compare laboratory measurements of 2,3,7,8-tetrachlorodibenzodioxin (dioxin) — a toxic contaminant present in the herbicide.

Central to the EPA's concern about dioxin is the poor reproducibility of dioxin measurements. In an attempt to find out which laboratories were reliable the EPA induced five labs to take part in a collaborative programme. The results of this collaboration were reviewed at a recent meeting in Washington organised by the agency.

The potential threat posed by 2,4,5-T is that its dioxin contaminant will enter the human food chain. US scientists claimed recently that dioxin had been detected in beef fat and human milk. The same two vehicles were therefore chosen by the EPA for its programme. Fat and milk samples were 'spiked' with dioxin in quantities ranging from 0—8 ppt (parts in 10^{12}) and extracts prepared suitable for analysis. The extracted samples, together with known standards—all prepared by the EPA Pesticide Monitoring Laboratory at Bay St Louis, Mississippi—were randomised and sent to the five participants: the Dow Chemical Company; Harvard University; the University of Nebraska; Wright State University, Ohio; and the EPA Health Effects Research Laboratory (HERL) in North Carolina.

If proof were needed that there is inter-laboratory variation, then this study provided it. Only two laboratories performed well in the study—those of Dr Michael Gross of Nebraska and Dr Matthew Meselson of Harvard. The EPA's own laboratory results were regarded as reasonable by scientists present at the meeting but those of the other two were felt to be poor—Dow's being the less accurate.

The fact that Dow Chemical performed badly in this collaborative programme has not passed unnoticed by some scientists in the field. They argue that it should have been Dow, a company with a long-standing interest in dioxin measurements, which came out at the top of this league table. Dr Warren Crummett, of Dow, confessed that his results were "poor". "They were worse than normal", he told *Nature*. According to Crummett, some of the blame lies with the method of dioxin extraction chosen by the EPA. Had Dow done its own extracting procedure, then, Crummett was convinced, his laboratory's results would have been much better.

Of the five laboratories, only Gross's performed well in identifying 'false positives' and 'false negatives'. Discon-

the earlier reviews, but with the difference that all sides have been claiming sufficient evidence to support their case. Mr Gary Jones, a spokesman for Dow Chemical told *Nature* in an interview before the EPA ban was announced that the company's view was that "if, with all the confidence we have on the safety of 2,4,5-T, we can't say it is safe, then we can't prove the safety of aspirin".

The company felt that the attack on 2,4,5-T is part of a campaign by environmental groups whose campaign will not stop with the banning of the herbicide. Dow sees itself as defending an attack on the chemical industry by environmentalists who, Jones said, "want to go back to windmills". Jones added that Dow was defending 2,4,5-T not because the herbicide is a large revenue earner—sales worth $12m represent only about 0.2% of the company's total annual income—but because it is "science which should be determining 2,4,5-T safety, not emotion".

The basis of Dow's argument is that dioxin at 0.1 ppm in 2,4,5-T presents no human health hazard. The company has been defending this claim not only before the EPA but also in a New York federal court. Dow and five other US manufacturers of 2,4,5-T are being sued for $10m by the estate of a 28-year-old Vietnam veteran, Paul Reutershan, who died in December last year of terminal cancer of the colon.

Reutershan, a helicopter crew chief in the Vietnam war, flew on several herbicide spraying missions during which Agent Orange was used. Ten years later when he was diagnosed as having cancer, Reutershan was convinced that dioxin was the cause. Following his death, a new suit was brought on his behalf as well as on that of "all American servicemen whose health has been damaged, or is likely to be damaged, because of contact with Agent Orange". The new suit has been filed by a veteran attorney of chemical contamination cases, Victor Yannacome Jnr, and is likely to prove a test case.

There is little comfort for the litigants, however, from the Veterans Administration (VA). The VA has reviewed some 500 claims from ex-servicemen—mainly from the Chicago area—that exposure to 2,4,5-T has damaged their health. But, a spokesman said, the administration has not been able to prove that "any of these claims are herbicide-related".

Environmental groups such as the Environmental Defense Fund insist that the very presence of dioxin renders the use of 2,4,5-T dangerous. For these groups the fact that dioxin has been shown in three separate studies to be a carcinogen, and that it is always present as a contaminant in 2,4,5T—albeit at a low concentration—is sufficient to proscribe its use in any circumstances.

Balancing these conflicting arguments was apparently a difficult exercise for the EPA. Before the ban was announced, the Agency admitted that it was practically impossible to do a "precise reckoning" of the risks and benefits of the herbicide. One official of the Agency confessed that the "political climate is terrific on this issue" and that it did complicate matters. However, as he saw it, the EPA's role was to review the evidence and if the Agency made both the environmentalists and industry unhappy then "we are probably doing our job".

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certingly the other four all failed to single out enough of these 'false' values. There was some agreement among those present at the Washington meeting that dioxin values close to the detection limit — regarded as being 9 ppt—did complicate matters and that perhaps some false positives and negatives were unavoidable.

In future, the researchers will probably abide by the gentleman's agreement practised so far that only values which are at least 2½ times greater than the noise levels will be regarded as true measurements. This decision could well eliminate some of the false predictions. Some scientists—notably those at Dow —feel that dioxin estimations lower than 9 ppt must, therefore, still be treated with scepticism. Others still disagree, and argue that it depends on the methods of estimation.

Contamination of the dioxin extracts by other chlorinated hydrocarbons—PCBs, for example—makes interpretation more difficult. Dow argue that this could be one reason for their poor results and that their extraction would produce a "cleaner" sample. However, contamination is not the only problem. There is still no measure of agreement between the practitioners on the methods to be used to estimate the recovery of the final dioxin sample.

Dioxin chlorinated with ^{37}Cl is used in most cases for this purpose: the tracer is normally incubated with samples before extraction, but there are still doubts in the minds of some of the researchers that this tracer 'equilibrates' with the natural dioxin to a sufficient extent so that estimates of the final recovery are indeed accurate.

There are doubts too about mass spectrometry readings and views differ as to whether two dioxin ions with a selected mass from natural dioxin (320 m/e, 322 m/e) should be measured and the results averaged or whether one mass reading is sufficient. The results in the EPA review are more or less independent of the method of measurement—good and poor results were recorded by both mass spectrometry methods.

Although some of these views have still to be resolved there was still general agreement at the meeting that the EPA should publish the results of this collaborative programme as soon as possible and that it should be subject to peer review. However, whether the reviewers agree with the consensus of opinion expressed at the meeting that dioxin analysis has become far better in the past few years remains to be seen.

What they will undoubtedly say is that there ought to be even more collaboration between laboratories to ensure greater reproducibility of results. As for the EPA, it will probably be given credit for initiating the first major stage in this collaboration.

Alastair Hay

Chemicals in food: new US framework proposed

A NEW framework for regulating toxic substances in food, which would give greater discriminatory power to the Food and Drug Administration, and allow the benefits as well as the risks of a particular substance to be taken into account, has been suggested by a study group of the National Academy of Sciences.

The proposal is made in a report published last Friday by the Academy's Institute of Medicine and National Research Council, prepared at the request of Congress following the controversy two years ago over whether or not saccharin is carcinogenic, and if so what should be done about it.

According to the panel of scientists, lawyers and public policy experts which prepared the report, the proposed framework—under which a substance could be placed in a category of high, moderate or low risk, with discrimination given to the FDA over handling substances in each category—would effectively separate the scientific assessment of risk from its social consequence.

In a letter submitting the report to Health Secretary Mr Joseph Califano, for example, Dr Philip Handler, president of the academy, says: "estimation of risk is a scientific matter, albeit not always readily feasible. Decision concerning the acceptability and management of a given risk is an intrinsically political question to be returned to the polity for determination."

Not all of the panel, however, agreed that the distinction is a tenable one. A minority report, disputing the suggestion that toxic food substances can be divided into three categories according to varying degrees of risk, says that there is "no scientifically defensible way" of doing this.

The statement, signed by five of the 37 members of the committees responsible for the report, says that "the ability of science to quantify human risk has not advanced sufficiently since the formulation of the Delaney Amendment [which banned all food additives shown to cause cancer in laboratory animals] to permit the construction of a scientific rationale for such a scheme."

The report forms half of a two-part study carried out by the NAS under the terms of an act passed by Congress in 1977, which placed an 18-month moratorium on a ban on saccharin following the disclosure that it had been found carcinogenic in laboratory animals. The first part of the report was published last November, and concluded that saccharin was indeed a potential human carcinogen, although its potency was probably low compared to other known cancer-causing agents, such as cigarettes.

The second report is concerned with the public policy implications of this and similar findings for the regulation of food safety. It recommends a single policy applicable to all foodstuffs, additives and contaminants, and says that regulatory agencies should be able to do more than simply ban or not ban a particular substance.

"This report suggests that a realistic policy would be to weigh the estimated level of risk of a substance in our food supply against the perceived benefits of its use, and to employ informed judgment as a basis for regulatory decisions," according to Dr David A. Hamburg, president of the Institute of Medicine.

A major problem presented by current law, the report says, is that most cases of both health and non-health benefits are excluded from regulatory consideration. "It is better to have benefits defined, evaluated and openly considered when that is possible", it says.

Speaking in Washington last week Professor Don K. Price, one of the panel members responsible for the report, denied that by shifting the focus of decision-making from Congress to a regulatory agency, the process would become more vulnerable to outside pressures. "The committee felt that the present scheme, which in theory asks the FDA to make a purely scientific decision, has not worked very well, and in many cases political and other considerations have been smuggled in—or, as in the saccharin case, have given rise to other problems", he said.

"This new system would require regulatory agencies to get a statement on the scientific aspects from a research institution, and the subsequent decision-making process can then be made clear, public and open, so that you can deal with it better than if you ignored outside pressure".

The committee made no particular recommendation for the marketing of saccharin, and the minority statement disagreed with the view of the majority that "a total immediate ban of saccharin would not be a sound regulatory step at the present time."

David Dickson

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