Head of Department
Professor D.B. Morgan

Department of Chemical Pathology
Old Medical School
Thoresby Place
Leeds
LS2 9NL
Telephone (0532) 36171 Ext. 4
(0532) 32799 Ext. 491

AH/AMS.

21 April, 1980.

Mr. Victor Yannacome, Jr.,
P.O. Drawer 109,
Papchoque,
New York 11722,
U.S.A.

MAY 1 1980

Dear Mr. Yannacome,

I am writing to ask if it would be possible to send me details about the Vietnam veterans you are representing in the suit against the chemical companies responsible for manufacturing 2,4,5-T.

My reason for writing is that I need more details about the veterans and their claims. I write for the scientific journal Nature on issues related to the chemical industry and safety at work. But I have made a fairly detailed study of the dioxin issue - some articles are enclosed - and I would like to know more about the veterans.

Any information would be useful, however there is some specific information I would welcome. Could you tell me how many GI.s now claim they were affected by the dioxin in 2,4,5-T. Can you tell me their symptoms and how many there are with a particular type of symptoms/condition. Could you also say how many veterans have or have had chloracne and what are their current symptoms in addition to the skin complaint. Lastly, could you tell me the proportion of the veterans who have chloracne.

I will be writing on this subject for Nature in the near future and I am also writing a book on dioxin. Any information would be useful for both projects. Details of your law suit and how you see it proceeding would also be helpful.

Perhaps I can reciprocate and send you some information in the future.

Yours sincerely,

Alastair Hay

Alastair Hay, Ph.D.
Lecturer.

Encl:

'Emergency' ban on 2,4,5-T herbicide in US

Clive Cookson reports from Washington on swift reaction to a study linking 2,4,5-T with an increase in miscarriages

THE US Environmental Protection Agency has taken emergency action to ban the use of the controversial herbicide 2,4,5-T, after receiving new evidence linking it to a high incidence of miscarriages in Oregon.

"Studies completed only days ago show a high miscarriage rate immediately following the spraying of 2,4,5-T in the forests around Alsea, Oregon," explained EPA deputy administrator Barbara Blum. "This alarming correlation comes at a time when seven million pounds of 2,4,5-T are about to be used to control weeds on power line rights-of-way and in pastures, and to manage forests across the nation".

These uses will be stopped immediately by "emergency suspension" —the most drastic action EPA can take against a herbicide or pesticide, and the first time it has ever been invoked. The closely related herbicide, Silvex, which is used primarily to kill weeds on suburban lawns, is also covered by the order. But the remaining legal uses of 2,4,5-T, on open ranges and rice fields, are not included and may continue, the EPA said, "because they appear at this time not to involve human exposure comparable to the suspended uses".

However, the Environmental Defense Fund has rejected this argument and petitioned EPA for a total ban on all uses.

2,4,5-T [2,4,5-trichlorophenoxyacetic acid] and Silvex [2-(2,4,5-trichlorophenoxy)propionic acid] are both contaminated with small amounts of 'dioxin' (TCDD), which produces birth defects, miscarriages and tumours in animals, even at extremely low concentrations. The dioxin is thought to be responsible for their ill effects on animals.

For eight years, US environmentalists have been fighting legal and administrative battles against the continued use of 2,4,5-T (which was applied as a military defoliant in Vietnam and was widely blamed for the high incidence of birth defects there). But the EPA claims that its latest study is the first to link the herbicide clearly to ill effect on humans.

The agency commissioned the study last year when nine women from Alsea wrote to say they had had miscarriages after the national forest there was sprayed with 2,4,5-T. Scientists from Colorado State University and the University of Miami medical school compared miscarriages in the Alsea basin (western Oregon) with a control population in rural eastern Oregon. They reported that:

- The miscarriage rate in the Alsea area was significantly higher than in the control area, where 2,4,5-T was not sprayed.
- The rate peaked dramatically in June in each of the six years studied, two or three months after the annual spring spraying. The spontaneous abortion index in June over the period 1972-77 was 130 per 1,000 births in Alsea and 46 per 1,000 in the control area.

Dr Blum said: "It's a remarkable correlation. While it is not proof of a cause and effect relationship, it is highly suggestive, particularly in light of animal data, and gives great cause for concern". She estimated that four million people across the United States would be protected by the emergency action.

The EPA claims that the short-term economic impact of the ban will be slight, because alternative herbicides are available for use on pasture and rights-of-way, and only 0.2% of the country's commercial forest area is sprayed annually. The long-term cost to forestry of a permanent ban could be $7m-12m a year, because other herbicides are less effective and more expensive.

Dow Chemical is the leading manufacturer of 2,4,5-T and Silvex. A few

Dioxin: the 10-year battle that began with Agent Orange

Alastair Hay traces the steps leading up to the EPA ban

EVER since the late 1960s when the herbicide 2,4,5-T was found to contain the extremely toxic contaminant 2,3,7,8-tetrachlorodibenzodioxin (dioxin), there has been much concern over its continued use. It has already been banned in some European countries.

According to Mr Frank Parsons of the EPA's Pesticide Programme, 2,4,5-T is the biggest single issue the agency has had to deal with so far. In April last year, the agency issued its "Rebuttable Presumption against Registration and continued Registration of Pesticide Products containing 2,4,5-T", and interested parties were given 45 days in which to submit evidence supporting or opposing the use. An additional 60 days grace was granted following a request from one of the major manufacturers for more time to present its case.

Parsons says that the EPA has received over 2,700 submissions on 2,4,5-T ranging from a 2,300-page memorandum from Dow Chemical—the major manufacturer of 2,4,5-T—supporting its use, to individuals claiming they were sprayed with the herbicide and their "hair dropped out". Asked how seriously the agency considered such comments, Parsons said that if enough of these claims are made "we can't ignore them." But the main protagonists in the debate are the chemical manufacturers and environmental pressure groups.

During the Vietnam war, Dow supplied most of the 2,4,5-T used by US forces in their defoliation programmes in Vietnam. It was used at that time in a 1 : 1 combination with 2,4 dichlorophenoxyacetic acid, called Agent Orange.

In 1969, Agent Orange was reported to be teratogenic (causing foetal abnormalities) in a study published by the US Bionetics Research Laboratory. Although it was subsequently shown that it was the dioxin contaminant—sometimes present in quantities in excess of 30 ppm—which was teratogenic and not 2,4,5,-T itself, the Bionetics study led the US Government to withdraw Agent Orange from Vietnam and to restrict 2,4,5-T use in the US to forestry and clearing rights of way.

It was the high dioxin contamination which marked 2,4,5-T as a teratogen. The EPA reasoned, therefore, that reducing this contamination to less than 0.1 ppm might render it safe. However, as more evidence about dioxin's toxicity accrued, the agency was forced to review the situation. In 1972, Dow obtained a temporary court injunction preventing EPA from taking further action against 2,4,5-T. The following year, this was overturned by the US Court of Appeal. When the first hearings were held by the EPA in 1974 they proved inconclusive: there was insufficient data supporting allegations that dioxin in 2,4,5-T presented a health risk, and an order proposing the cancellation of 2,4,5-T was withdrawn.

The latest evaluation of the herbicide has thus been a continuation of

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 of the 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 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. And for the EPA, it will probably be given credit for initiating the first major stage in this collaboration.

Alastair H

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 in 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 allows 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—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 on saccharin would not be a sound regulatory step at the present time.

David Dick

0028–0836/79/0278—0110$01.00

Chemical company suppresses dioxin report

WORKERS exposed to 2,3,7,8-tetrachlorodibenzodioxin (dioxin), between 1968 and 1971, during manufacture of the herbicide 2,4,5-T, at the Derbyshire site of the UK company Coalite and Chemical Products Ltd, could face an increased risk of developing cardiovascular complaints, according to confidential documents in *Nature*'s possession.

The documents — reports of detailed clinical and laboratory investigations on a number of dioxin-exposed workers at Coalite — suggest that the company has been falsely reassuring about the health of this particular sector of its workforce. According to a spokesperson for the Health and Safety Executive (HSE), the Executive also believes that the Coalite workforce has no long-term health problems. However, its view is based only on reassurances given by the company and not on a study of the medical reports which Coalite has not published and which the HSE is powerless, in law, to demand from the company because it no longer manufactures the product, 2,4,5-T.

Ironically, it was pressure from the HSE which forced Coalite to carry out the investigations in the first place shortly after the Séveso accident in 1976. Included in the study were 126 individuals, 41 of whom were known to have been exposed to dioxin, and showed symptoms of chloracne; 54 of whom might have been exposed to the chemical; and a supposed control group of 31. One of the studies compared the blood chemistry of the different groups. The author of the report of that study is Dr Jenny Martin, a lecturer in Occupational Medicine at the University of Manchester and a consultant chemical pathologist at Chesterfield Royal Hospital when the study was commissioned.

The results of that study show that the dioxin-exposed group has a greater incidence of impaired liver function as measured by the enzyme gamma-glutamyl transpeptidase. Furthermore when the results for serum cholesterol, triglyceride, high density lipoprotein etc were subjected to multivariant analysis — under the guidance of the Department of Probability and Statistics at the University of Sheffield — they showed a significant difference between the dioxin-exposed group and the controls. In the dioxin-exposed group, levels of serum cholesterol and triglyceride were higher and high density lipoprotein lower than in the controls. These are factors commonly held to imply an increased risk of cardiovascular disease.

None of this information is to be published, however. According to Martin, Coalite decided not to publish it on the advice of Dr Kenneth Crow, a consultant dermatologist at St Margaret's Hospital, Swindon. She claims that Crow had told her that he had advised Coalite not to publish on the grounds that he was not happy with the statistics used in the report.

Crow, one of the world's leading authorities on chloracne, was involved in the treatment of such cases at Coalite. When approached by *Nature* to comment on the study, he said that he did not know which study was being referred to and that he would have to see it before he could comment. However, he strongly denies ever having advised Coalite not to publish the results of any study. *Nature* has approached Coalite for its side of the story, but with no success. Coalite stopped talking to journalists shortly after the Séveso accident in 1976.

Some related information, however, has been published. Instead of using an age and occupation-matched control group, Coalite chose to bolster the number of controls by including management staff undergoing a regular lipid screen at the time. When the study was commissioned, Martin was unaware of the composition of the three study groups. When she later learnt that the control groups had not been properly matched, she arranged to re-examine eight of the Coalite workers suffering from chloracne and to compare their blood chemistry with a matched control group.

The results of this second investigation, published in a letter to the *Lancet* (24 February, 1979, page 446), also show increased serum cholesterol and reduced serum high density lipoprotein in the dioxin-exposed group. The differences were considerably more marked than in the original, larger study. However, they were not statistically significant, a point which Martin notes, but says is simply due to the small numbers of subjects involved.

Perhaps the most extraordinary aspect of the story, however, concerns a burglary at Martin's house. Shortly after publishing her letter in the *Lancet*, Martin's house was broken into and the detailed medical records of the eight Coalite subjects were removed from her filing cabinet. Martin reported the theft to the local police constabulary but as she had no idea why anyone would want to steal this information the police investigation never got off the ground. A police spokesperson at Macclesfield confirms that the theft had been reported, that the case was not closed, but that as there was no clues about the motives for the theft, it was unlikely that it would ever be solved.

Martin told *Nature* that she had been very distressed when she discovered th theft of the material for the second survey She has no duplicate copy so the work now lost.

She was surprised that *Nature* ha obtained a copy of her original Coali report, and having confirmed i authenticity said she was most unhapp that Coalite were not publishing the dat She said the company's decision was major reason for her carrying out a secor study and reporting it to the *Lancet*.

Coalite did, however, release a abbreviated form of the original report one of the unions involved with t workforce at its Bolsover complex — t Association of Scientific Technical a Managerial Staffs. The abbreviated repo is totally different from the original. addition to its selective reporting, t union version says there were statistically significant differences betwe the dioxin-exposed group and the contro a statement which is quite untrue.

The most worrying aspect of this aff however, is the position of the HSE. T Executive has said that it is satisfied th the Coalite workers have not been undu affected by their exposure to dioxin. Yet it has never seen the results of the clini investigations, how can it express such view? It says that it has to rely on the go faith of the company on this matt According to an HSE spokesperson, wh a product is no longer manufactured Executive has no legal powers to dema medical records of workers. It abundantly clear that if the Executive is do its job properly it should have acces this information and should be given legal powers to demand it. **Alastair I**

Unions want 2,4,5-T ban

THE UK Trades Union Congress has ca called for an immediate ban on the us 2,4,5-T, pending a thorough investiga into its effects by the Health and Sa Executive. The National Union Agricultural and Allied Workers already advised members not to handl 2,4,5-T is widely used by the Fore Commission in the UK, which has reje such alternatives as manual or mechan clearing as too costly. Two Cou Councils in England have also banned pesticide.

The Ministry of Agriculture's Pestic Advisory Committee has investig 2,4,5-T eight times, and stuck to its clusion that it is safe as long as handl accordance with instructions. The has condemned these enquiries inadequate.

0028-0836/80/10002-01501.00

Professor D. B. Morgan

Old Medical School
Thoresby Place
Leeds
LS2 9NL
Telephone 0532 32799 Ext 420/491
0532 36171 Ext 4

AH/AMS.

1st March 1982.

Mr. Victor Yannacone,
Yannacone & Yannacone,
Attorneys & Counselors at Law,
35 Baker Street,
P.O. Drawer 109,
Patchogue,
New York 11772,
USA.

Dear Victor,

Just a quick note to say how much I enjoyed our lunchtime meeting.

The food and conversation were just perfect and it is quite some time since I enjoyed a 'business' lunch so much.

I haven't been able to digest all the reading material you gave me. Unfortunately, for the trip back David Dean gave me a beautiful book of photographs of New York. I read this on the plane and then slept for the rest of the time. Sleeping on the way back is my own recipe for coping with jet-lag. It works, providing I get several hours of sleep.

How did your chemical warfare seminar go? Was the pamphlet of any use?

Regarding my book I have put your name on the list of people I have given to Plenum as potential customers. I should add, however, that if the mutagenicity data I was referring to would be of any help at the moment I would be pleased to send you the relevant pages from my manuscript.

With best wishes,

Yours sincerely,

Alastair

Alastair Hay.
Lecturer.

May 10, 1982

Dear Mr. Hay

Unfortunately I know of no one with the statistics you requested.

There was a fire in our computer over a month ago and we ~~are~~ will be shut down until the insurance company and the electric company settle their differences.

Head of Department
Professor D.B. Morgan

44 (U.K. code)

Department of Chemical Pathology
Old Medical School
Thoresby Place
Leeds
LS2 9NL
Telephone (0532) 36171 Ext. 4
(0532) 32799 Ext. 491

AH/AMS.

21 April, 1980.

Mr. Victor Yannacome, Jr.,
P.O. Drawer 109,
Papchoque,
New York 11722,
U.S.A.

MAY 1 1980

Dear Mr. Yannacome,

I am writing to ask if it would be possible to send me details about the Vietnam veterans you are representing in the suit against the chemical companies responsible for manufacturing 2.4,5-T.

My reason for writing is that I need more details about the veterans and their claims. I write for the scientific journal Nature on issues related to the chemical industry and safety at work. But I have made a fairly detailed study of the dioxin issue - some articles are enclosed - and I would like to know more about the veterans.

Any information would be useful, however there is some specific information I would welcome. Could you tell me how many GI.s now claim they were affected by the dioxin in 2,4,5-T. Can you tell me their symptoms and how many there are with a particular type of symptoms/condition. Could you also say how many veterans have or have had chloracne and what are their current symptoms in addition to the skin complaint. Lastly, could you tell me the proportion of the veterans who have chloracne.

I will be writing on this subject for Nature in the near future and I am also writing a book on dioxin. Any information would be useful for both projects. Details of your law suit and how you see it proceeding would also be helpful.

Perhaps I can reciprocate and send you some information in the future.

Yours sincerely,

Alastair Hay

Alastair Hay, Ph.D.
Lecturer.

Encl:

'Emergency' ban on 2,4,5-T herbicide in US

Clive Cookson reports from Washington on swift reaction to a study linking 2,4,5-T with an increase in miscarriages

THE US Environmental Protection Agency has taken emergency action to ban the use of the controversial herbicide 2,4,5-T, after receiving new evidence linking it to a high incidence of miscarriages in Oregon.

"Studies completed only days ago show a high miscarriage rate immediately following the spraying of 2,4,5-T in the forests around Alsea, Oregon," explained EPA deputy administrator Barbara Blum. "This alarming correlation comes at a time when seven million pounds of 2,4,5-T are about to be used to control weeds on power line rights-of-way and in pastures, and to manage forests across the nation".

These uses will be stopped immediately by "emergency suspension" —the most drastic action EPA can take against a herbicide or pesticide, and the first time it has ever been invoked. The closely related herbicide, Silvex, which is used primarily to kill weeds on suburban lawns, is also covered by the order. But the remaining legal uses of 2,4,5-T, on open ranges and rice fields, are not included and may continue, the EPA said, "because they appear at this time not to involve human exposure comparable to the suspended uses".

However, the Environmental Defense Fund has rejected this argument and petitioned EPA for a total ban on all uses.

2,4,5-T [2,4,5-trichlorophenoxyacetic acid] and Silvex [2-(2,4,5-trichlorophenoxy)propionic acid] are both contaminated with small amounts of 'dioxin' (TCDD), which produces birth defects, miscarriages and tumours in animals, even at extremely low concentrations. The dioxin is thought to be responsible for their ill effects on animals.

For eight years, US environmentalists have been fighting legal and administrative battles against the continued use of 2,4,5-T (which was applied as a military defoliant in Vietnam and was widely blamed for the high incidence of birth defects there). But the EPA claims that its latest study is the first to link the herbicide clearly to ill effect on humans.

The agency commissioned the study last year when nine women from Alsea wrote to say they had had miscarriages after the national forest there was sprayed with 2,4,5-T. Scientists from Colorado State University and the University of Miami medical school compared miscarriages in the Alsea basin (western Oregon) with a control population in rural eastern Oregon. They reported that:

- The miscarriage rate in the Alsea area was significantly higher than in the control area, where 2,4,5-T was not sprayed.
- The rate peaked dramatically in June in each of the six years studied, two or three months after the annual spring spraying. The spontaneous abortion index in June over the period 1972-77 was 130 per 1,000 births in Alsea and 46 per 1,000 in the control area.

Dr Blum said: "It's a remarkable correlation. While it is not proof of a cause and effect relationship, it is highly suggestive, particularly in light of animal data, and gives great cause for concern". She estimated that four million people across the United States would be protected by the emergency action.

The EPA claims that the short-term economic impact of the ban will be slight, because alternative herbicides are available for use on pasture and rights-of-way, and only 0.2% of the country's commercial forest area is sprayed annually. The long-term cost to forestry of a permanent ban could be $7m-12m a year, because other herbicides are less effective and more expensive.

Dow Chemical is the leading manufacturer of 2,4,5-T and Silvex. A few

Dioxin: the 10-year battle that began with Agent Orange

Alastair Hay traces the steps leading up to the EPA ban

EVER since the late 1960s when the herbicide 2,4,5-T was found to contain the extremely toxic contaminant 2,3,7,8-tetrachlorodibenzodioxin (dioxin), there has been much concern over its continued use. It has already been banned in some European countries.

According to Mr Frank Parsons of the EPA's Pesticide Programme, 2,4,5-T is the biggest single issue the agency has had to deal with so far. In April last year, the agency issued its "Rebuttable Presumption against Registration and continued Registration of Pesticide Products containing 2,4,5-T", and interested parties were given 45 days in which to submit evidence supporting or opposing the use. An additional 60 days grace was granted following a request from one of the major manufacturers for more time to present its case.

Parsons says that the EPA has received over 2,700 submissions on 2,4,5-T ranging from a 2,300-page memorandum from Dow Chemical—the major manufacturer of 2,4,5-T—supporting its use, to individuals claiming they were sprayed with the herbicide and their "hair dropped out". Asked how seriously the agency considered such comments, Parsons said that if enough of these claims are made "we can't ignore them." But the main protagonists in the debate are the chemical manufacturers and environmental pressure groups.

During the Vietnam war, Dow supplied most of the 2,4,5-T used by US forces in their defoliation programmes in Vietnam. It was used at that time in a 1 : 1 combination with 2,4 dichlorophenoxyacetic acid, called Agent Orange.

In 1969, Agent Orange was reported to be teratogenic (causing foetal abnormalities) in a study published by the US Bionetics Research Laboratory. Although it was subsequently shown that it was the dioxin contaminant—sometimes present in quantities in excess of 30 ppm—which was teratogenic and not 2,4,5-T itself, the Bionetics study led the US Government to withdraw Agent Orange from Vietnam and to restrict 2,4,5-T use in the US to forestry and clearing rights of way.

It was the high dioxin contamination which marked 2,4,5-T as a teratogen. The EPA reasoned, therefore, that reducing this contamination to less than 0.1 ppm might render it safe. However, as more evidence about dioxin's toxicity accrued, the agency was forced to review the situation. In 1972, Dow obtained a temporary court injunction preventing EPA from taking further action against 2,4,5-T. The following year, this was overturned by the US Court of Appeal. When the first hearings were held by the EPA in 1974 they proved inconclusive: there was insufficient data supporting allegations that dioxin in 2,4,5-T presented a health risk, and an order proposing the cancellation of 2,4,5-T was withdrawn.

The latest evaluation of the herbicide has thus been a continuation of

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 of the 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 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, agréed 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

0028–0836/79/0278—0110$01.00

Chemical company suppresses dioxin report

WORKERS exposed to 2,3,7,8-tetrachlorodibenzodioxin (dioxin), between 1968 and 1971, during manufacture of the herbicide 2,4,5-T, at the Derbyshire site of the UK company Coalite and Chemical Products Ltd, could face an increased risk of developing cardiovascular complaints, according to confidential documents in *Nature*'s possession.

The documents — reports of detailed clinical and laboratory investigations on a number of dioxin-exposed workers at Coalite — suggest that the company has been falsely reassuring about the health of this particular sector of its workforce. According to a spokesperson for the Health and Safety Executive (HSE), the Executive also believes that the Coalite workforce has no long-term health problems. However, its view is based only on reassurances given by the company and not on a study of the medical reports which Coalite has not published and which the HSE is powerless, in law, to demand from the company because it no longer manufactures the product, 2,4,5-T.

Ironically, it was pressure from the HSE which forced Coalite to carry out the investigations in the first place shortly after the Sèveso accident in 1976. Included in the study were 126 individuals, 41 of whom were known to have been exposed to dioxin, and showed symptoms of chloracne; 54 of whom might have been exposed to the chemical; and a supposed control group of 31. One of the studies compared the blood chemistry of the different groups. The author of the report of that study is Dr Jenny Martin, a lecturer in Occupational Medicine at the University of Manchester and a consultant chemical pathologist at Chesterfield Royal Hospital when the study was commissioned.

The results of that study show that the dioxin-exposed group has a greater incidence of impaired liver function as measured by the enzyme gamma-glutamyl transpeptidase. Furthermore when the results for serum cholesterol, triglyceride, high density lipoprotein etc were subjected to multivariant analysis — under the guidance of the Department of Probability and Statistics at the University of Sheffield — they showed a significant difference between the dioxin-exposed group and the controls. In the dioxin-exposed group, levels of serum cholesterol and triglyceride were higher and high density lipoprotein lower than in the controls. These are factors commonly held to imply an increased risk of cardiovascular disease.

None of this information is to be published, however. According to Martin, Coalite decided not to publish it on the advice of Dr Kenneth Crow, a consultant dermatologist at St Margaret's Hospital, Swindon. She claims that Crow had told her that he had advised Coalite not to publish on the grounds that he was not happy with the statistics used in the report.

Crow, one of the world's leading authorities on chloracne, was involved in the treatment of such cases at Coalite. When approached by *Nature* to comment on the study, he said that he did not know which study was being referred to and that he would have to see it before he could comment. However, he strongly denies ever having advised Coalite not to publish the results of any study. *Nature* has approached Coalite for its side of the story, but with no success. Coalite stopped talking to journalists shortly after the Sèveso accident in 1976.

Some related information, however, has been published. Instead of using an age and occupation-matched control group, Coalite chose to bolster the number of controls by including management staff undergoing a regular lipid screen at the time. When the study was commissioned, Martin was unaware of the composition of the three study groups. When she later learnt that the control groups had not been properly matched, she arranged to re-examine eight of the Coalite workers suffering from chloracne and to compare their blood chemistry with a matched control group.

The results of this second investigation, published in a letter to the *Lancet* (24 February, 1979, page 446), also show increased serum cholesterol and reduced serum high density lipoprotein in the dioxin-exposed group. The differences were considerably more marked than in the original, larger study. However, they were not statistically significant, a point which Martin notes, but says is simply due to the small numbers of subjects involved.

Perhaps the most extraordinary aspect of the story, however, concerns a burglary at Martin's house. Shortly after publishing her letter in the *Lancet*, Martin's house was broken into and the detailed medical records of the eight Coalite subjects were removed from her filing cabinet. Martin reported the theft to the local police constabulary but as she had no idea why anyone would want to steal this information the police investigation never got off the ground. A police spokesperson at Macclesfield confirms that the theft had been reported, that the case was not closed, but that as there was no clues about the motives for the theft, it was unlikely that it would ever be solved.

Martin told *Nature* that she had been very distressed when she discovered the theft of the material for the second survey. She has no duplicate copy so the work is now lost.

She was surprised that *Nature* had obtained a copy of her original Coalite report, and having confirmed its authenticity said she was most unhappy that Coalite were not publishing the data. She said the company's decision was a major reason for her carrying out a second study and reporting it to the *Lancet*.

Coalite did, however, release an abbreviated form of the original report to one of the unions involved with the workforce at its Bolsover complex — the Association of Scientific Technical and Managerial Staffs. The abbreviated report is totally different from the original. In addition to its selective reporting, the union version says there were no statistically significant differences between the dioxin-exposed group and the controls a statement which is quite untrue.

The most worrying aspect of this affair however, is the position of the HSE. The Executive has said that it is satisfied that the Coalite workers have not been unduly affected by their exposure to dioxin. Yet, it it has never seen the results of the clinical investigations, how can it express such a view? It says that it has to rely on the good faith of the company on this matter. According to an HSE spokesperson, when a product is no longer manufactured the Executive has no legal powers to demand medical records of workers. It is abundantly clear that if the Executive is to do its job properly it should have access to this information and should be given the legal powers to demand it. **Alastair Ha**

Unions want 2,4,5-T ban

THE UK Trades Union Congress has called called for an immediate ban on the use of 2,4,5-T, pending a thorough investigation into its effects by the Health and Safety Executive. The National Union of Agricultural and Allied Workers has already advised members not to handle it. 2,4,5-T is widely used by the Forestry Commission in the UK, which has rejected such alternatives as manual or mechanical clearing as too costly. Two County Councils in England have also banned the pesticide.

The Ministry of Agriculture's Pesticides Advisory Committee has investigated 2,4,5-T eight times, and stuck to its conclusion that it is safe as long as handled in accordance with instructions. The TUC has condemned these enquiries as inadequate.

0028-0836/80/10002 01501.00