



This will be just a brief sketch--an overview--of Monsanto's "dioxin" involvement.

So how did we get where we are today--with about 90 people working to get ready for two lawsuits, and another two dozen people working full or part time on problems occasioned by "dioxin"? We will spend something like \$xx million on "dioxin" this year, more if we lose or settle any big lawsuits.

Over the last 50 years Monsanto has numbered these among its many products--2,3,5-T, Penta, 2,4-DCP, Aroclors and TCC. Each is associated with a member of the "dioxin family." Penta and the Aroclors are in fact associated with half a dozen or more such compounds. For better or worse, we're deeper into "dioxin" than anyone, even though the public links them more to Dow.

Dow is more pugnacious.

You'll recognize these--except 2,4,5-T--as MIC products.

What brought the present activity to its present fever pitch is the lawsuits--Nitro, Agent Orange, Sturgeon--with others on Penta and PCB's waiting in the wings.

I'll come back to the lawsuits in a moment.

First, let me summarize what we know about dioxin. It's a lot more than you may think.

First, we know that 2,3,7,8-TCDD is the prototype of a large class of compounds with similar structure and similar properties. The class may number several hundred compounds. Some appeared on this first slide. Some others appear on this second one.

CONFIDENTIAL

CONFIDENTIAL ORDER

We know pretty well how to interrelate the properties of these compounds, their toxic effects, their metabolic clearance, their environmental fate.

Monsanto is working to improve understanding in this last area: We now have a validated mathematical model that describes vapor-phase movement of 2,3,7,8-TCDD within soil and its destruction by sunlight at the surface. We have planned experiments to understand the toxicity a little better.

This next chart summarizes our knowledge of human effects. There are some real peculiarities.

First, toxicity is only manifest several days after exposure. Sometimes it takes two weeks for anything to happen. Animals given massive doses take two to three weeks to die. In man, chloracne only appears a week or so after exposure.

The delay occurs because TCDD behaves like a hormone, turning "off" or "on" physiological processes that take time to manifest themselves. For the same reason, the toxic effects may vary strongly from one species to another.

TCDD is a potent drug, or poison, depending on how you look at it. That's because of its hormone-like activity coupled with its resistance to metabolic degradation. Typically hormones are inactivated by chemical change after they have done their thing, but TCDD is changed very slowly, and the molecules continue to act. Thus their effects are magnified, seemingly out of control.

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER

In man, the skin and liver seem to be the organs principally affected. Some other, not well-defined symptoms are reported after heavy exposure. These seem to go away.

Dr. Raymond Suskind has been studying workers from the Nitro plant since 1949. His most recent examination was 1979, thirty years after the incident that got him started. That examination showed two main things: One is that skin changes--chloracne and premature aging--are permanent in about half those who ever had chloracne. Presumably these people are either more sensitive or had the heavier exposure, or both.

The other is that those exposed to TCDD are otherwise quite healthy. Deaths from cancer and all other causes are in the normal range. This is 15 to 30 years after heavy exposure.

No one has died from TCDD poisoning. It seems plausible that a heavy enough dose might cause liver failure and death, but that's never been seen.

Yet it remains true that TCDD is quite toxic.

This next chart is an attempt to put that toxicity in perspective; by comparing dose needed to cause different effects.

The scale is logarithmic, with each unit representing a 10-fold increase in dose.

The units are grams of substance--dose--per kilogram of body weight per day.

At the top I've put daily food consumption--20 to 30 gm per kilogram. A voracious 17-year-old boy consumes about four pounds of food and drink per day. Most of us take in less.

CONFIDENTIAL

Other examples?

Here we are in the dose range for chloracne in 2,3,5-T workers. About one milligram per kg. However, we don't know if that's a one-shot dose, or continuous exposure or a cumulative exposure over a month or so.

What we can conclude from this is that TCDD is pretty nasty stuff, about as bad as cigarette tar, but a less potent carcinogen.

Nonetheless the government is being very cautious. They want to limit public exposure to this value down here-- 10 to the minus twelfth gm per kg per day--10 million times less than the "no effect" dose in man.

If TCDD were as potent a poison as CDC believes, everyone who worked at Nitro between 1950 and 1960 would already be dead.

To increase the absurdity, it now appears that our background exposure is about 100 times the "safe" dose. At the American Chemical Society meeting here in St. Louis two weeks ago, the Swedish chemist Christopher Rappe announced his proof of general human exposure to TCDD and related compounds formed by incinerators. His data imply that we are all taking in about 100 pico grams of TCDD every day, probably in our food.

The bottom line: TCDD is toxic, but it isn't magic. We don't have to worry as much as some are. Some, like CDC, treat it as some magical substance that kills almost at a distance. It isn't.

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

Now back to the lawsuits. Some of the particulars appear on this chart. These three sets of suits hold the key. If we win them all, there won't be others. If we lose them all, Katy bar the door!

Agent Orange. The Plaintiffs claim that we produced an unreasonably dangerous product--contaminated by TCDD--and that we should pay for past, present and future health care. There may be 10 million people eligible for some payment, if worse comes to worse. Eight quote representative unquote-- that's most sympathy-getting--victims have been selected to stand for the hordes in a trial now set to begin May 7 in Brooklyn. It will be quite a show. We contend that our product was not unreasonably dangerous, and that the injuries could not be related to AO exposure.

Nitro. Some 150 plaintiffs or their heirs claim we willfully injured them by forcing them to work in places we knew not to be safe. Furthermore they say we conspired to hide the guilty knowledge. A trial of one subset--seven living former 2,4,5-T workers--is set to begin May 15 in Charleston. Injury is not a question here: All seven had had chloracen, and all have received Workmen's Compensation for it. We believe that we acted responsibly, since we made continuing improvements at the plant to minimize harmful exposure, and carried out state-of-the-art safety and industrial hygiene programs. Our difficulty is having 1954 actions judged by 1984 standards--which are quite different.

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

Sturgeon. A series of cases resulting from the railroad accident in that town in January, 1979. For reasons best known to lawyers, they're being held in the friendly confines of Alton and Edwardsville, IL. One--15 involving residents--is going on now.

Several of us--Don Edwards, where are you?--will testify--for the plaintiffs! Paul Michael and Orville Hicks and George Brautigan, among others, have already done so.

We expect to lose this case, despite the evidence that the plaintiffs are not injured in any way. St. Clair County is too favorable to Mr. Carr, the plaintiffs' attorney. However, the Illinois Appeals Court has just ruled that the first Sturgeon case should have been tried in Missouri, not Illinois, and has thrown out the \$47 million damage award. This one should also be reversed on appeal, for the same reason.

There's a lot riding on these cases. Losses would open the way to many other plaintiffs, people who worked with 2,4,5-T, or Penta--such suits are already on file--than those who worked with 2,4-DCP or 3,4-DCA. Worst case, we're looking at hundreds of millions of dollars. However, we are optimistic that nothing like the worst will occur. We're confident that our massive efforts of the last year, and the outrage being expressed by respectable scientists over the outrageous claims made by the plaintiffs' whorish doctor, Bert Carnow, will eliminate most of the claims. We'll probably pay more than the plaintiffs deserve--we've already done that--but it won't break us.

CONFIDENTIAL
DO NOT TO BE RELEASED OR DISCLOSED

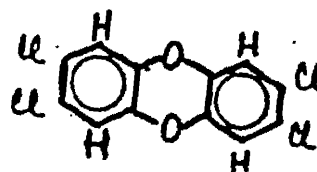
There are a couple of lessons to be drawn from these exercises.

First, we can't know too much about the chemicals we use or make. The plaintiffs say--and society agrees--"you should have known about the hazards, and warned us." Well, we knew some, and warned some, but we should have known more. Of course, hindsight has 20-20 vision, but the implication is clear: We need to study every product in enough depth to persuade the outside world that it is safe. We can't allow poor profits to postpone indefinitely necessary investigation. Chlorophenols didn't make much money, ever, and look what they're costing us now!

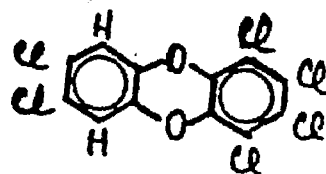
Second, we must build better bridges to the academic world, particularly the medical scientists. We need to have respected people who will defend what we do because they know what we do is right.

CONFIDENTIAL
ORDER.

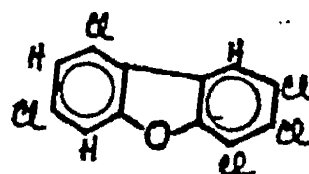
2,4,5-T



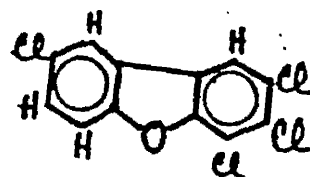
PENTA



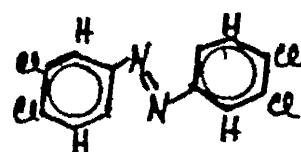
AROCLORS



2,4-DCP

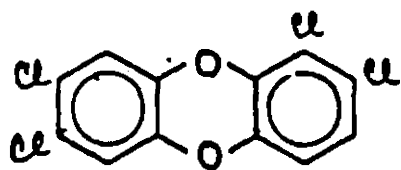


TCC
3,4-DCA



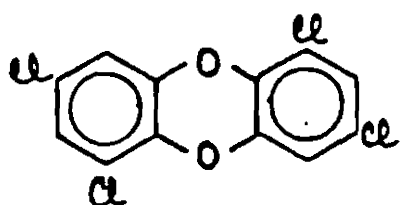
CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

A FAMILY AFFAIR

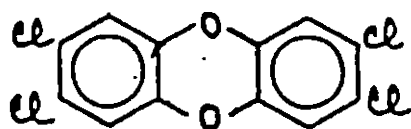


METABOLIC CLEARANCE

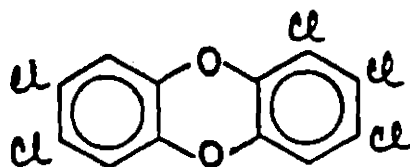
FAST



FAST



SLOW



SLOWER

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

EFFECTS

=

3-21 DAYS TO HAPPEN

CHLORACNE,

OTHER SKIN CHANGES

LIVER CHANGES

DEEP PAINS

WEAKNESS

WEIGHT LOSS

NEURITIS?

PORPHYRIA?

DEATH IN ANIMALS: .001 MG/KG TO 5 MG/KG

(LARGEST HUMAN DOSE PROBABLY 1 MG/KG)

POTENT PROMOTER OF SKIN CANCER IN ANIMALS

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

DOSE
1/kg

1

.001
(1 mg)

10^{-6}
(1 μ g)

10^{-9}
(1 ng)

10^{-12}
(1 pg)



(FOOD INTAKE)



ALCOHOL: LIVER DAMAGE

VCM: LIVER CANCER



CIGARETTE "TAR": LUNG CANCER



TCDD, HAMSTERS: DEATH

TCDD, MAN: CHLORACNE

TCDD, MONKEYS: CHLORACNE

TCDD, GUINEA PIGS: DEATH

TCDD, MAN: NO CHLORACNE

TCDD, RATS: LIVER TUMORS

TCDD, RATS: NO EFFECTS

"BACKGROUND" TCDD

TCDD: "SAFE"

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.