

1 My law firm represents the Dow Chemical Company in
2 this litigation. I just have a few questions for you,
3 sir.

4 As I understand it, your responsibilities
5 in connection with the Weldon Springs plant were to
6 review the drawings and design of the production
7 facility?

8 A. Right.

9 Q. Do you recall if there were any specific
10 design features with regard to protecting workers
11 from exposure to the herbicide to be manufactured?

12 A. No, not in the design of equipment.

13 Q. That would --

14 A. In other words, prevent an accident. It was so
15 designed that it was supposed to be foolproof.

16 Q. Was this an -- strike that.

17 In the designs of the production facility
18 that you reviewed, would the workers have manually
19 handled the herbicides?

20 A. No.

21 Q. Was this an enclosed --

22 A. It was all automatic into drums and tank cars
23 and trucks, but it was all done so that they never
24 would get exposed to the material.

25 Q. Do you recall any discussions during this

1 period that this automated system was necessary to
2 avoid potential adverse health effects to workers?

3 A. No. Workers, of course, other than plant
4 design, it never was mentioned in our work. That
5 would be more the operating.

6 Q. You also testified earlier that it became
7 necessary to change the design on the reactor?

8 A. The autoclave, yes.

9 Q. How did you change the design?

10 A. Well, it was changed. First of all, we had
11 several things that were done. The water supply
12 into the cooling system was taken and made gravity
13 flow from 150,000 gallon or 200,000 gallon tanks, so
14 we didn't have to use any pumps in case we had
15 electrical breakdown. This would give us all the
16 water we needed for cooling, in case reaction got
17 away from us.

18 Secondly, the agitator on the autoclave
19 was fixed and tied also into a direct diesel
20 generator for electricity, so that if we lost the
21 commercial power, the diesel would supply
22 electricity to the generator for agitating the batch.

23 Thirdly, the material in the reactor was
24 controlled so that if the slope of the curve, which
25 we designed for, seven degrees -- seven degrees per

1 minute, on the up slope got off the slope, then a
2 controller would automatically cut everything down
3 and apply cooling water immediately and open vents
4 and so on and this would prevent the reaction
5 getting away from us.

6 On top of that, auto alarms. Auto alarms
7 were put at the door of the room to the autoclaves
8 so that if a person in emergency had to push this
9 button, it would sound alarms all through the place
10 and also start the various systems that would decontrol
11 the reaction.

12 The reaction was supposed to have an up
13 slope from 100, oh, maybe from 90 degrees up to 150
14 degrees and if it got over that and got up to over
15 160, which was the temperature of reaction, then all
16 this would happen and the batch would be destroyed
17 or stopped.

18 Q. Who recommended these changes?

19 A. Edgewood Arsenal and the Edgewood Arsenal
20 people.

21 Q. Who specifically at Edgewood Arsenal?

22 A. Oh, perhaps the overseer was -- oh, started by
23 me and then Sig Eckhaus pushed it through the people
24 back there and was coordinated through all the
25 Edgewood Arsenal personnel in the Research and

1 Development Laboratories and Weldon Springs and all
2 these places.

3 Q. And why were these design changes made?

4 A. Well, because we had heard that there had been
5 explosions, and some of you people that represent
6 these other companies, before, and that some of you
7 had moved your autoclaves even outside.

8 One other thing we did do, too, we opened
9 up the roof at the peak so we'd have ventilation
10 directly to the outside on the autoclave section and
11 that was the only part of the design that we took
12 any extra special caution.

13 Q. In the early 1960s, were you involved in
14 the manufacture of Agent CS?

15 A. No.

16 Q. In the early 1960s, do you recall having
17 discussions with any Edgewood Arsenal personnel
18 concerning manufacturing problems in the manufacture
19 of Agent CS?

20 A. CS? No, that was a secret project at that time
21 and the Project Engineer would be the only one that
22 was knowledgeable in it.

23 Q. Thank you, I have no further questions.

24 EXAMINATION

25 BY MR. MAROTHY:

1 Q. Mr. Bushey, did Mr. Gurano send you any
2 information on Agent Orange other than what you
3 received from him through his newspaper clippings?

4 A. No, he had nothing to do with the project. He
5 just had the habit -- he was at one time, most of
6 the people that worked at Edgewood, he was one of
7 the big shots at Edgewood. He was high ranking
8 GSATs.

9 Q. Okay. Thank you.

10 A. And he -- anybody that worked for him, he sent
11 stuff out to.

12 Q. Thank you.

13 MR. CALEY: I have no questions.

14 MR. WHITE: I would like to have a
15 conference because I may have some questions based
16 on some of my co-counsel's questions.

17 MS ROTH. I'd like to ask one more
18 question if I may.

19 EXAMINATION

20 BY MS. ROTH:

21 Q. Mr. Bushey, when you learned that dioxin
22 might be a byproduct in the production of 2,4,5-T,
23 that was in 1968, is that correct?

24 A. Right.

25 Q. Who told you that?

1 A. Oh, I got it from all the reports I had to read
2 for the assumed take-over of the project.

3 Q. What reports were these?

4 A. Everything that Stearns-Roger had in relation
5 to the project.

6 Q. Were you given copies of these reports?

7 A. No.

8 Q. Where were these reports kept?

9 A. Stearns-Roger, they were their material.

10 Q. Do you know where these reports are, now?

11 MR. MORGAN: Objection.

12 A. No. Stearns-Roger is a different company, now.

13 Q. Does anybody speak with you about the
14 subject of possible contaminants in the production
15 of 2,4,5-T?

16 A. No, because we weren't interested in dioxin.
17 We were interested in an explosion.

18 Q. When you learned about the possible
19 contaminant in 2,4,5-T, is it your testimony this
20 was merely from written material?

21 A. Right.

22 Q. After you read this material, did you
23 discuss it with anyone?

24 A. Well, the -- I went over the autoclave reactor,
25 itself, and analyzed it from what they had, to see

1 if it would withstand these various things and
2 that's how all these special provisions were put in
3 there to prevent it ever happening.

4 Q. Did you discuss the possibility of a
5 byproduct in the manufacture of 2,4,5-T with anyone?

6 A. No, we didn't believe that there ever would be,
7 because if you have a good process, you keep it
8 under control, you aren't ever going to generate any
9 other chemicals.

10 Q. Thank you.

11 FURTHER EXAMINATION

12 BY MR. WHITE:

13 Q. When you learned that if the temperature
14 got above 160 degrees in the autoclave, that an
15 explosion could occur, did you know that when the
16 temperature reached 160 degrees and the explosion
17 occurred, that was at the point that dioxin was
18 created?

19 A. No, dioxin is not created at that temperature.
20 Dioxin is created at maybe 170 degrees.

21 Q. When an explosion occurs, did you learn
22 that dioxin could be released from the process?

23 A. If it was -- well, we had to assume that if you
24 had an explosion, a run-away reactor, that you would
25 possibly generate it.

1 Q. And as a result of an explosion or a
2 run-away reactor, did you learn that workers could
3 be affected with chloracne?

4 A. Well, we knew, yes, that they could get
5 chloracne, if it was in amounts that will cause it.

6 Q. You stated that you had heard that there
7 had been these explosions at various chemical plants.

8 A. Well, as I say, the material that was supplied
9 under various companies, that put out these reports,
10 we know that certain ones that these people here did
11 have trouble on explosions.

12 Q. You're referring to a run-away reaction.

13 A. Right, it had to be, that's the only way it
14 would generate dioxin. It means either you have
15 poor control -- and that's why ours had all these
16 safety features, that took this control away from
17 the operator and made it automatic, so it could
18 never happen.

19 Q. Do you know where you learned about these
20 prior run-away reactions in the other chemical
21 companies from?

22 A. Some of the data that was furnished by these
23 companies to the Government or that were on hand at
24 Stearns-Roger.

25 Q. When you say companies to the Government,

1 do you know if there was any specific agency of
2 Government that these companies supplied the
3 information to?

4 A. I would -- it would have to be the commodity
5 section of Edgewood, Ringenberg and his section.

6 Q. Do you recall seeing any documents on the
7 stationery of chemical companies that were written
8 to -- which you assume was probably commodity
9 management, reporting these prior run-away reactions?

10 A. No, I remember that distinctly because I often
11 wondered who this individual was that was speaking.

12 Q. I don't --

13 A. In other words, the writing was such that
14 sometimes the guy would use language in such a way,
15 he would say something, well, I think this is the
16 way this is going and so on, but his name was never
17 attached to the documents that I read.

18 Q. The documents that you read that reported
19 on these prior run-away reactions, were they
20 Government documents?

21 A. Well, there weren't too many run-away reactions.
22 There was, I think, one, and I think the Germans had
23 one in which they had to close down their operation.
24 But I think there was only about one in the United
25 States, I don't want to say which company it was,