

1
2 UNITED STATES DISTRICT COURT
3 FOR THE NORTHERN DISTRICT OF OHIO
4 WESTERN DIVISION

5 MARY A. DENDINGER, et al.,

6 Plaintiffs,

7 -vs-

Case No. C87-7117

8 THE B.F. GOODRICH COMPANY,
9 FIRESTONE TIRE & RUBBER
10 COMPANY, CONOCO, INC.,
11 UNIROYAL, INC., UNION
12 CARBIDE CORPORATION,
13 TENNECO, INC., TENNECO
14 POLYMERS, INC., TENNECO
15 RESINS, INC., OCCIDENTAL
16 CHEMICAL CORPORATION, and
17 MAXUS ENERGY,

18 Defendants.

19
20 Examination of CARL ZENZ, taken at the
21 instance of the Plaintiffs, pursuant to the provisions of
22 Section 804.05 of the Wisconsin Statutes, pursuant to
23 stipulation by respective counsel, before TERESE M.
24 SCHIEBENES, a Notary Public in and for the State of
25 Wisconsin, at the offices of Dorothy M. Wagner and Assoc-
iates, Court Reporters and Notaries Public, Suite 400,
135 West Wells Street, Germania Building, Milwaukee,
Wisconsin, on the 13th day of October, 1988, beginning
at 10:00 a.m.

DOROTHY M. WAGNER & ASSOCIATES
COURT REPORTERS
MILWAUKEE

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1
2 APPEARANCES:

3 MURRAY & MURRAY CO., L.P.A.
4 Represented by KIRK J. DELLI BOVI,
Attorney for the Plaintiffs.

5 FULLER & HENRY,
6 Represented by ROBERT A. BUNDA,
Attorney for the Defendants.

7
8 THEREUPON, the following proceedings were held:

9
10 CARL ZENZ, having been first duly sworn,
11 was examined and testified as follows:

12
13 EXAMINATION BY MR. DELLI BOVI:

14
15 Q Dr. Zenz, would you state your full name, please?

16 A Carl Zenz.

17 Q Your home address?

18 A 2418 Root River Parkway, West Allis, 53227.

19 Q What is your current occupation?

20 A I'm a consultant in occupational medicine.

21 Q Who do you consult to?

22 A I would consult to industry, attorneys sometimes,
23 private individuals, National Safety Council, and
24 others who have an interest in occupational health
25 matters.

1 Q And you have been a private consultant in occupational
2 medicine since 1977?
3 A Yes, sir.
4 Q How many times have you testified in court?
5 A Excluding worker's comp.?
6 Q Yes, sir.
7 A In what span of time?
8 Q Since 1977?
9 A I would say no more than a dozen times.
10 Q Did any of the worker's compensation cases in which
11 you testified involve occupational cancers?
12 A Yes.
13 Q Did any of the worker's compensation cases in which
14 you testified involve exposure to vinyl chloride?
15 A I don't recall for certain, but I don't think so.
16 Q In the worker's compensation cases in which you testi-
17 fied involving occupational cancers, what chemicals
18 were involved?
19 A I'll try to go back chronologically if memory serves
20 me well as far as I can go in this regard. Asbestos
21 fibers, a mixture of chemicals, of course, solvent
22 exposures such as trichloroethylene and similar solvents,
23 methylene chloride perhaps, silica exposure.
24 Q Silica dust?
25 A Silica dust, right. Nickel, nickel compound. I can't

1 really recall any specific substances.

2 Q In those worker's compensation cases in which you

3 testified that involved occupational cancers, who did

4 you testify on behalf of?

5 A It would be a mixture. In behalf of a worker or an

6 organization, an industry.

7 Q What about the asbestos case, who did you testify

8 on behalf of in that case?

9 A That was a worker.

10 Q The cases involving solvent exposure, the trichloro-

11 ethylene and methylene chloride?

12 A Also for workers.

13 Q The silica dust case?

14 A Let me reflect a moment on this.

15 Q Certainly.

16 A I think a few were for workers. The majority of silica

17 cases would have been for industry.

18 Q When you say a few were for workers, do you mean a few

19 of the silica dust cases or a few of the workers?

20 A A few of the cases.

21 Q And the case or cases involving nickel compounds?

22 A For the worker.

23 Q In those occupational cancer cases in which you

24 testified on behalf of the worker, was it your opinion

25 that the worker's occupational exposure to the chemical

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1 Most of the epidemiologic studies we look
2 at always talk about exposure, but never quantify.
3 That's the fault I see with all the documents in front
4 of me. With exceptions, exposures only indicate they
5 were working with something, and that's not enough for
6 me to go on.

7 Q Do you know what the cause was of the greater than 100
8 percent increase in observed versus expected cancers in
9 the job categories at Chrysler in which Dendinger and
10 Wallace were employed?

11 A Did I here 100 percent increase?

12 Q Yes, sir.

13 A Could you point that out to me again, please?

14 Q Sure. I'm going to hand you what's previously been
15 marked Plaintiff's Exhibit Dahl 3.

16 MR. BUNDA: This is the chart that you made up.

17 BY MR. DELLI BOVI:

18 Q From Dr. Shindell's data.

19 A I recall reviewing, just looking at it and thinking
20 about it, of course.

21 MR. BUNDA: I also object to the question on
22 the basis that it's a mischaracterization of evidence.
23 There is no 100 percent increase.

24 A That's the problem I have, too. This is really
25 incomplete data you're giving me.

1 medical and scientific literature?

2 A Of course.

3 Q Did you base your opinions in any of those worker's
4 compensation cases involving occupational cancers in
5 which you testified on behalf of the claimant solely
6 on the epidemiologic literature, or did you take all
7 of these factors into account in rendering your
8 opinion?

9 A All of these factors were the prime sources of my
10 opinion. However, when I began testifying, say in the
11 early '60's -- this is going beyond the 10-year period
12 you mentioned to me earlier -- epidemiology in
13 occupational medicine was an unknown science.

14 Q Is it your opinion that in order to render competent
15 medical opinions on the link or possible link between
16 an occupational exposure and a cancer is that all of
17 these factors you have listed must be taken into
18 account?

19 A Yes. And probably factors I haven't listed.

20 Q Are there any that you can recall for me that you
21 haven't listed that you feel should be taken into
22 account, and let me run through what you've testified
23 to already.

24 You talked about the medical history of
25 the individual, physical examinations, medical records,

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1 cases render an opinion to a reasonable degree of
2 professional certainty that the occupational exposure
3 to the chemical in question did not cause the worker's
4 cancer?

5 A Yes.

6 Q And in rendering that opinion, did you consider the
7 same list of factors that you've given to me that you
8 testified -- I don't mean testified -- that you took
9 into account in rendering your opinions on behalf of
10 the claimant in the other cases?

11 A Essentially yes. But I would have, of course, consid-
12 erable body of data collected by other people, other
13 professionals, either locally, nationally, or inter-
14 nationally, which I would, of course, had a chance
15 to review and study.

16 Q Is it your opinion, therefore, that in order to
17 render competent medical testimony as to the absence
18 of a causal connection between an occupational
19 exposure and a cancer in the worker that you likewise
20 have to consider all of the factors that you've
21 enumerated and cannot rely exclusively on one or two
22 of those factors?

23 MR. BUNDA: I'll object to the question on the
24 basis that it's vague.

25 BY MR. DELLI BOVI:

1 Q You can go ahead and answer.
2 A I'll try. Let me collect my thoughts on this. It's
3 a real complicated question you've tossed at me.
4 Q Certainly.
5 A Well, in this respect, let me say that if I were aware
6 of working conditions and had available the environ-
7 mental monitoring data by certified or noncertified
8 industrial hygiene people or other scientific persons
9 that made determinations of contaminants or exposure
10 levels in the work area or off the work area, hobbies
11 for example, and external causes away from work, and
12 these exposures were found to be far below any
13 internationally accepted norms or limit, guidelines, I
14 would base my opinion and judgment on these measurable
15 microscopic values that there could not be sufficient
16 quantity to cause a reaction in the body such as a
17 cancer.
18 Q Is it your opinion, therefore, that there is a no-
19 effects level of exposure to a carcinogen?
20 A Yes. Otherwise we wouldn't be here, any of us.
21 Q You believe that there is a level of exposure to a
22 carcinogen at which no individual will develop a
23 cancer?
24 A Probably, but I can't be 100 percent certain on that.
25 Q Have you ever expressed that opinion on any of your

1 publications?

2 A I'd have to refresh myself to answer that question.
3 That's a difficult memory retrieval matter.

4 Q Have you reviewed, in connection with this case, the
5 correspondence of Mr. Peterson to Dr. Shindell?

6 A Yes. I have seen that.

7 Q Are you aware from Dr. Peterson's letter to Shindell
8 of the airborne levels of vinyl chloride reported in
9 the Chrysler plant as the result of testing conducted
10 in and after April of 1974?

11 A I'm aware, but I would like to quickly refresh myself,
12 if I may, please?

13 Q Certainly.

14 A Thank you.

15 Q I'm going to hand you Peterson's April 7, 1987, letter
16 to Shindell. I would just like you to focus on, Dr.
17 Zenz as you're going through that, on the vinyl
18 chloride that's discussed about solvents. We'll get
19 into that later.

20 A I just found what I was trying to refresh myself on.
21 Thank you. I'm skipping the other solvents now.
22 Let me look at this graph presentation again. Thank
23 you. Appreciate the review again.

24 Q Certainly. You are familiar then with the findings
25 of Mr. Shindell that were reported of Mr. Peterson --

1 excuse me -- that were reported to Shindell in April
2 of 1987?
3 A Yes, sir.
4 Q Have you been furnished with any other information
5 regarding the airborne levels of vinyl chloride at
6 the Chrysler facility other than this document?
7 A Yes. I recall seeing documents prepared by the
8 hygienist from the Ohio Occupational Health Group.
9 Q Do you mean the Ohio Group or the Chrysler Industrial
10 Hygiene Group?
11 A Both, I think.
12 Q Do you know whether or not it was on the basis of his
13 analysis of that data that Mr. Peterson prepared his
14 April 7, 1987, letter to Shindell?
15 A Yes. I believe he did do just that.
16 Q You're aware then that in 1974, there was air monitoring
17 conducted at the Chrysler facility to determine the
18 airborne concentrations of vinyl chloride in atmospheres
19 that the Chrysler employees would be working in?
20 A Yes.
21 Q Have you seen prior to today what has been marked as
22 Exhibit Peterson 2?
23 A I don't recall seeing this. May I look at it, please?
24 Q Certainly.
25 A May I ask who derived this and prepared this?

1 Q Certainly. This was derived by Mr. Peterson. He
2 testified yesterday that he took the data that was
3 supplied to him by Mr. Bunda, determined arithmetic
4 and geometric means, and calculated standard deviations
5 from those figures.

6 A Based on air sampling analyses by other people such
7 as Chrysler Hygienists and Division of Health in Ohio?

8 Q I know it was based on Chrysler IH air sampling.
9 Whether it also included State of Ohio, I'm not sure,
10 but Mr. Peterson did testify yesterday that it was from
11 this data, that is, Peterson Exhibit 2, that was based
12 on the information supplied to him by Mr. Bunda that
13 he prepared April 7, 1987.

14 A I see.

15 Q Looking at Exhibit 2, which summarizes the data
16 collected from the Chrysler facility as a result of
17 air sampling in '74, is it your understanding that the
18 air sampling done in the blender/calender area
19 revealed airborne vinyl chloride monomer concentrations
20 as high as 29 parts per million?

21 MR. BUNDA: I'm going to object to that.
22 What you're asking is his understanding, and then
23 you're pointing to a number on Exhibit 2 which is
24 derived from other materials. I think that if you're
25 asking him to read that, that has no relevance to this

1 Q And is that one of the documents that was provided to
2 you by Mr. Bunda?

3 A Yes, I think so.

4 Q All right. For purposes of your opinions that you will
5 express in this case, did you assume that that was a
6 valid sample or an invalid sample?

7 A Looking at all of the findings, I assumed it was valid.

8 Q Now, let's go next to the receiving/storage area.

9 A Excuse me. May I have that previous document back with
10 Mr. Broady's name on it. I just want to check and see
11 who long -- whether there was a one-hour sample or
12 four-hour or eight-hours. It doesn't give that data,
13 here at all.

14 MR. BUNDA: That's an indication--

15 A This is incomplete. I only have Page 2.

16 BY MR. DELLI BOVI:

17 Q If we move down to the receiving/storage category,
18 do you see levels reported there in May and November
19 of 1974 of 29, 27, 22, 17, and 50 parts per million?

20 MR. BUNDA: Same objection. I think that we
21 ought to look at the underlying documents to understand
22 those figures.

23 A Within that same month, there are exposure levels
24 reported of 0.60 parts per million.

25 Q Yes, sir. I understand that.

1 case.

2 A That could be an analytic error if you look at the
3 whole picture.

4 MR. BUNDA: To be accurate, we need to go back
5 to look to the exposure levels.

6 A And figure how that figure came to be and what time of
7 the day and who did the analysis and so forth.
8 The sample could have been contaminated. It's a common
9 problem in collecting samples in working areas is
10 contamination.

11 MR. BUNDA: Especially since none of the other
12 exposures approach that.

13 A That's right.

14 BY MR. DELLI BOVI:

15 Q Did you assume, Dr. Zenz, when you reviewed the air
16 sampling that was done by Chrysler that the results
17 were valid or invalid?

18 A I had to assume that they were reasonably scientifically
19 valid, made by competent personnel.

20 Q Let me hand you Page 2 of a data sheet from the
21 Chrysler facility that refers to a sampling taken on
22 May 9 and May 10, 1974, and refers to a Jim Broady
23 loading/blender of 29 parts per million; do you see
24 that, sir?

25 A Yes, sir, I do.

1 A I'd have to look at all this in total.
2 Q Fine. Here it is.
3 A May I?
4 Q Sure. You were supplied with all those documents by
5 Mr. Bunda, correct?
6 A Yes.
7 Q Would you look at the data that reports these levels,
8 receiving/storage, May 10, 1974.
9 A (Witness complies.) Sampling rate was meteamin (phon-
10 etic), which is typical, and for the most part, ten
11 minutes duration. This is a report, a letter of
12 February 11, 1974.
13 This is what I'm trying to determine,
14 whether or not this is a peak instantaneous sample for
15 a short duration of time or a sample for the entire day.
16 That's very important to me.
17 Q Why would that be important to you?
18 A Well, any of us can be exposed to a spill, for
19 example, of isotone in the bathroom and have a heavy
20 exposure to 200 parts per million for minutes, and
21 that could be tested for and reported as heavy
22 exposure, but it would be just that one moment.
23 A ten minute test period from my point
24 of view is not good industrial hygiene technique.
25 Q Is it your opinion that the sampling that was done at

1 Chrysler in 1974 and thereafter is or is not represent-
2 ative of the employee exposures to vinyl chloride at
3 that plant?

4 A Fairly representative from what you've given me, from
5 what I've read. Considering the era, fifteen years
6 ago, I'm surprised at the good industrial workmanship
7 performed by Ohio and Chrysler. I'm pleased.

8 Q Are you aware of any sampling done by Chrysler or the
9 State or the Federal Government at the Chrysler facil-
10 ity prior to 1974 for vinyl chloride?

11 A Yes. In the documents provided by Mr. Bunda.

12 Q And where is that information?

13 A You've just given me a copy. Of course, dated in
14 1968. Unfortunately, I can't read all of the copies,
15 but I note that in December of 1968, vinyl chloride
16 was reported as a trace at all calendering stations.

17 Of course, I can't be aware of other
18 studies made at earlier dates at Chrysler Corporation;
19 that would be beyond the scope of my information.

20 Q Well, I'd like you to assume that Chrysler didn't
21 operate or own the facility prior to 1968. Are you
22 aware of any reported levels of workers exposure to
23 vinyl chloride at the Chrysler plant prior to the
24 data that was collected in and after 1974?

25 MR. BUNDA: I'll object. I think that that

1 was asked and answered. He's indicated they found a
2 trace in 1968.

3 BY MR. DELLI BOVI:

4 Q Are you aware of any other tracing between 1968 and
5 1974 of vinyl chloride levels in the Chrysler plant
6 other than that reported in 1968 correspondence?

7 A Well, the information given me has been directed for
8 this episode today antedates 1968. That's all I have.

9 Q Postdates 1968?

10 A Postdates, excuse me.

11 Q And my question is are you aware of any other sampling
12 other than that reported in the 1968 correspondence for
13 vinyl chloride at Chrysler between 1968 and 1974?

14 A I'd have to look at the Ohio documentation once again,
15 please, if I may?

16 Q Certainly.

17 A They stated in a report in February of '74 -- that is
18 the Ohio personnel, State of Ohio -- they made
19 previous studies in the '60's at Chrysler's request.

20 Q Does it refer to vinyl chloride?

21 A I'm hoping to find that. They mention other solvents,
22 of course. All right. Here we come to the main
23 production lines.

24 I would have to refer to the American
25 Conference of Governmental Industrial Hygienists

1 threshold limited values document of the '60's and
2 '70's. They are published annually, and if I recall,
3 at that time vinyl chloride probably was in the range
4 of 200 parts per million or above.

5 Q There was an ACGIH TLV for vinyl chloride prior to
6 '74 time frame of 500 parts per million.

7 A Thank you for refreshing me.

8 Q Certainly.

9 A In reviewing the documentation and studies of the plant
10 facility by the Ohio Health Personnel, State of Ohio
11 Health Personnel, they may have been more concerned
12 with other solvents than vinyl chloride at that time,
13 and this is why I find that this scant information on
14 vinyl chloride at present, but I must pursue this a
15 bit further, please.

16 Q Sure.

17 A No. I have no further information regarding studies
18 performed prior to 1968.

19 Q Or between 1968 and 1974?

20 A Only what has been provided by you or Mr. Bunda at
21 this point.

22 Q Other than the reference to vinyl chloride in the
23 correspondence in 1968, you were not aware of any
24 testing done at Chrysler to determine airborne levels
25 of vinyl chloride prior to April of 1974?

1 A No. That's not so. I mentioned moments ago that one
2 of the division of health from Ohio reported trace
3 levels.
4 Q In 1968?
5 A Yes, sir.
6 Q And that was recorded in correspondence in 1968?
7 A Yes, included with the recent materials.
8 Q Certainly. My question, Dr. Zenz, is except for that
9 reference, are you aware of any testing done at
10 Chrysler for airborne levels of vinyl chloride prior to
11 April of 1974?
12 A No.
13 Q Now, you indicated earlier that you regarded the
14 testing that Chrysler initiated in April of 1974 and
15 thereafter for airborne levels of vinyl chloride as
16 good industrial hygiene?
17 A Right. Yes, sir.
18 Q Was it good industrial hygiene not to test at all for
19 airborne levels of vinyl chloride at the plant between
20 1968 and April of 1974?
21 A It might have been, because they might have had good --
22 Perhaps for other materials, if we control the solvent
23 emission, say, for methyl ethyl ketone, by proper
24 industrial hygiene and engineering control, all other
25 solvents ought to be controlled simultaneously.

1 Q Is vinyl chloride a solvent?
2 A Yes, sir. Well, vinyl chloride monomer is gas.
3 Q Are you aware or have you been furnished with any
4 documentation indicating excessive solvent levels in
5 the Chrysler plant on the mezzanine level in the ink
6 room?
7 A I'd have to refresh myself, please.
8 Q Certainly.
9 A May I ask why you mentioned a mezzanine level?
10 Q Because that is an area of concern in this case.
11 A All right. Thank you. I could understand if you
12 asked me about the basement levels.
13 Q What I would like to do to speed it along is ask you
14 whether you've been shown any documentation of
15 citations to Chrysler in 1976 for excessive levels of
16 solvent exposure in the ink room or the mezzanine area
17 of the ink room?
18 A You say citations?
19 Q Yes, sir.
20 A By OSHA?
21 Q OSHA.
22 A In the '70's?
23 Q In 1976.
24 A I'm not aware of citations as such, sir.
25 Q All right. Are you aware of any testing for vinyl

1 chloride at the Chrysler facility that was ever done
2 on the mezzanine level of the ink room at any time?

3 A I don't recall that, no, sir.

4 Q You indicated earlier that one of the reasons that
5 there may not have been testing for vinyl chloride
6 prior to 1974 was because there were no reported
7 excursions of the TLV's for other materials, correct?

8 A Not entirely correct. What I meant was that other
9 solvents were of greater concern than vinyl chloride.
10 The main concern in those days against vinyl chloride
11 as an exposure was its inflammability and explosivity.

12 Q Is it your testimony here today that the only concern
13 of the PVC industry prior to 1974 relating to vinyl
14 chloride was with its explosivity?

15 A No. I didn't mean that.

16 MR. BUNDA: I'm going to object to the question.
17 I think it's an unfair question. We've been discussing
18 the conditions of the PVC fabricating plant of Chrysler.
19 Now, if you're going to expand it to all the PVC
20 industry including the monomer of vinyl chloride and
21 the manufacturing of polyvinyl chloride, then I think
22 the witness is going to have to recognize that you're
23 changing the scope of your question.

24 BY MR. DELLI BOVI:

25 Q Let's talk about Chrysler then. Is it your testimony

1 today that one of the reasons Chrysler may not have
2 performed testing for vinyl chloride monomer between
3 1968 and April of 1974 is because they had no reason
4 to be concerned about health effects relating to
5 vinyl chloride exposure other than explosivity?

6 A No, sir. I didn't say that, nor did I intend to give
7 that impression.

8 Q Well, I'd like you to assume they didn't between 1968
9 and April of 1974.

10 A If you wish me to, I can assume that, yes, sir.

11 Q You indicated that that may have been good industrial
12 hygiene practice not to have tested for vinyl chloride
13 during that six-year time frame?

14 A I might have been.

15 Q Why?

16 A In the processes of manufacturing these products,
17 many chemicals are used in great quantities far
18 exceeding that of vinyl chloride, like materials and
19 solvents that cause acute and rapid effects. If
20 these are controlled or were controlled, and I assume
21 that they may well have been controlled, then the
22 judgment of the industrial hygienist or the physician
23 in charge of the program would feel comfortable with
24 that in controlling the top-most irritative or toxic
25 materials would include the lesser and least dangerous

1 materials as well.

2 I can't very well go into a plant and say,
3 "test for everything, 400 substances." "I know you
4 are using 50 in this process, let's check out the most
5 troublesome areas first, and if these are under control,
6 fine."

7 Q What about chemicals that are used in a facility that
8 contain known or suspected carcinogens; is it good
9 industrial hygiene practice to test for the levels
10 of those known or suspected carcinogens?

11 A Yes. But I must back off to qualify my answer.
12 One would have to know the precise amount of the
13 substance present in that particular compound or mixture
14 first of all.

15 Q And where would one get that information, if you were
16 Chrysler? From the manufacturer of the product?

17 A If I were at that time with Chrysler, the first step
18 is to get the material safety data sheet from the
19 manufacturer, the provider of the product.

20 Q And you, in fact, in 19--

21 A But wait. I haven't finished. That material safety
22 data sheet may not be as thorough as I would have
23 wished at the time, because a supplier may not have been
24 the manufacturer, so I would go further and ask for the
25 manufacturer to give me the material safety data sheets

1 for all the ingredients put into those products, and
2 then I would have store analyses of the quantification
3 of the materials present.

4 This could involve one's own internal
5 laboratory in the research department, the quality
6 control laboratory, or to send a sample to an accredited
7 lab at a hospital or at a private laboratory and so
8 forth, and even ask the government people to use their
9 own laboratory for these tests.

10 These are the results I would then look at,
11 not singly, but there may be half a dozen of such data
12 sheets that I would be interested in.

13 I would order my own analyses and decide
14 what steps to take from there.

15 Q I want to put you in the shoes now, if I may, of an
16 occupational health physician or an industrial hygien-
17 ist at Chrysler between 1968 and the public announcement
18 of the Goodrich angiosarcoma deaths in early 1974.

19 Why during that '68 to '74 time frame would
20 you be requesting material safety data sheets from your
21 suppliers?

22 A I have a privilege of amplifying my answer, and I'll do
23 just that. I was the only physician present for the
24 NIOSH Consulting and Review Committee, which formulated
25 the material safety data sheets, so I was one of the

1 founders of that particular systematic process.

2 Q I understand that from your resume.

3 A Thank you. So I have a keen interest in good material
4 safety data sheets, and I know what needs to be done
5 to produce a good MSDS. I hope this helps in my
6 forthcoming answer.

7 Nevertheless, I do and would have relied
8 on laboratory data of direct analyses quantification of
9 a lab test, and I would request external verification
10 as I always have in the past from one or more labora-
11 tories.

12 Q What information does a material safety data sheet give
13 the recipient with regard to the hazards, health
14 hazards associated with the product that it refers to?

15 A Unfortunately, the worst scenario. We'd never
16 anticipated that.

17 Q What did you anticipate?

18 A I had anticipated an even-handed neutral report with
19 ample references and documentation to back up any
20 statements produced on these data sheets, good human
21 responses, good industrial hygiene responses to be
22 attached.

23 Unfortunately, and I must say this in
24 front of two attorneys who are dealing with these
25 matters nowadays, the material safety data sheets now

1 or for many years have had to state worst case obser-
2 vations, worst possibilities, and these are dictated
3 by corporate lawyers rather than scientific and even-
4 handed reports.

5 Q You were involved in 1975 as a consultant reviewing
6 the NIOSH criteria documents for the MSDS?

7 A Right.

8 Q Was it the intended purpose of the MSDS to make the
9 recipient of that document a full disclosure concerning
10 the potential health ramifications of exposure to the
11 product?

12 A Of course. Excuse me. It was before '74. That
13 involved over 456 compounds listed by the ACGIH,
14 and I probably reviewed one-third of those personally,
15 and I believe that period of time was in the early
16 '70's. I can't be precise as to the year, perhaps
17 '71, '72 through '74, '75.

18 Q Do you recall whether you reviewed vinyl chloride?

19 A I can't recall the specific materials, no.

20 Q Have you been provided by Mr. Bunda with any MSDS
21 authored by any PVC manufacturer prior to the public
22 announcement of the Goodrich angiosarcoma deaths?

23 A I havenot.

24 Q Have you ever seen any MSDS for any PVC resin published
25 prior to February of 1974?

1 A Widespread use of these data sheets didn't really take
2 place until after those dates in the mid to later
3 '70's, if I recall correctly. No, I was not.

4 Q Is it the responsibility of a manufacturer of a
5 chemical to disclose any of the material safety data
6 sheets, any of the hazardous components of that mater-
7 ial?

8 A Yes, it is.

9 Q Do you regard vinyl chloride as a hazardous material?

10 MR. BUNDA: You're talking about today?

11 MR. DELLI BOVI: Yes, today.

12 MR. BUNDA: Or 1974?

13 MR. DELLI BOVI: Let's talk about 1974.

14 MR. BUNDA: Well, you've got two questions.
15 Which do you want to talk about?

16 BY MR. DELLI BOVI:

17 Q Let's talk about 1974. In 1974, did you regard vinyl
18 chloride as hazardous material?

19 A If you tell me the concentrations and durations of
20 exposure, I can answer that.

21 Q Did you regard vinyl chloride in 1974 as a carcinogen?

22 A Yes. But that was based on heavy work exposures for
23 a long period, many years of high concentrations in
24 the thousands of parts per million.

25 Q If a manufacturer's product contains a known carcinogen

1 in measurable quantity, is the manufacturer obligated
2 in your opinion to disclose the existence of that
3 carcinogenic component in its MSDS?

4 A I'll try to answer that question based on the
5 present actions in the USA. I believe the concentra-
6 tion would have to be based on the suspect carcinogen
7 and the concentration of that substance or the amount
8 in that particular material, its component.

9 You may know the law better than I do.
10 It may be under one percent, if I recall, a mention
11 may have to be made on that material. But if we take
12 our children's plastic Lego toys or our grandchildren's
13 Lego toys, the components there individually would be
14 considered extremely dangerous.

15 Q What components?

16 A Butadiene, extirene (phonetic), to say nothing of the
17 lanolin dyes or other inorganic dyestuffs to color
18 these toys. And they are made by the billions each
19 year, and millions of children are playing with these
20 every day, every moment.

21 We couldn't very well say that these toys
22 contain such and such chemicals to produce these
23 beautiful colors and beautiful products. It would
24 scare the pants off everybody. No. You can't put
25 this down every substance, because it's no consequence.

1 The process of manufacturing may eliminate the
2 potential for any exposure.

3 Like this table top, for example, is a
4 styrene compound. It's harmless.

5 Q Have you seen any MSDS for any PVC resin published
6 after February of 1974?

7 A Probably, yes.

8 Q And did those MSDS published after February of 1974
9 that you've seen disclose the existence of residual
10 vinyl chloride monomer in the resin?

11 A Yes. They should have mentioned that.

12 Q Are you aware today of any documents published by
13 Goodyear, Conoco, Tenneco, Firestone, Union Carbide,
14 Uniroyal, or Diamond Shamrock disclosing to any of
15 its PVC resin customers prior to 1974 that the resin
16 contained inreacted vinyl chloride monomer?

17 A The reason I hesitate to answer you immediately and
18 so positively is that in reviewing material safety
19 data sheets, and I see these frequently, I may only
20 make a cursory glance at its source, for example,
21 whether it's Union Carbide or Occidental or Shell,
22 whatever it may be. And this does not stick in one's
23 memory, so I can't answer that. I don't know.

24 Q Let me ask it another way then. Are you aware of any
25 MSDS published by any PVC resin manufacturer prior to

1 February of 1974 disclosing that its resin contained
2 unreacted vinyl chloride monomer?

3 A I can't answer that. I don't recall that.

4 Q When were you first aware of any studies in animals
5 reporting the development of cancers following exposure
6 to vinyl chloride?

7 A I believe it would be when I heard of the forthcoming
8 publication by Johnson and Kretch (phonetic) on the
9 angiosarcoma cases which may have been in '74, '75,
10 something on that order.

11 Q How did you find out about that before their work was
12 published?

13 A I was on the editorial board of the Journal and, of
14 course, we had periodic meetings of the editorial
15 Journal Board of Occupational Medicine, and I also knew
16 Dr. Johnson personally.

17 Q How long were you on the editorial board of the Journal
18 of Occupational Medicine?

19 A At least ten years.

20 Q Prior to 1974?

21 A Yes. At least until '78 or '79.

22 Q So you had been on that board since the mid to late
23 1960's?

24 A Yes, sir.

25 Q And at no time prior to your communication with

1 Johnson, which occurred shortly prior to the publica-
2 tion of his article in JOM, were you aware of any
3 reports concerning the development of cancers in
4 animals exposed to vinyl chloride?

5 A I was not at the time.

6 Q So the first thing you knew as an editor of the Journal
7 of Occupational Medicine about the potential carcino-
8 genicity of vinyl chloride was Johnson's communication
9 regarding his findings concerning angiosarcomas among
10 the Goodrich work force?

11 A Yes, sir.

12 Q Do you know as you sit here today whether or not the
13 PVC resin industry, prior to Johnson's communication
14 to you was, in fact, aware of animal experimentation
15 revealing the generation of cancers in animals exposed
16 to vinyl chloride?

17 A Yes, sir.

18 (Pending question read.)

19 Q What do you know about that?

20 A Immediately his report generated extreme interest
21 and the literature searches were made and documents
22 were copied from journals and so forth.

23 Q And what did that reveal to you concerning the knowledge
24 that the PVC industry had prior to 1974 concerning
25 animal studies and vinyl chloride carcinogenicity?

1 A The industry as such had periodic meetings about many
2 matters, including this one I'm sure, for national
3 organizations. They probably had information
4 available published in the literature and oral
5 communication and so forth and the scientific meetings,
6 which may or may not have been published in transactions
7 later on, and of course, we all would have access to
8 that.

9 The interested industry representatives
10 would probably have access to some of the documents
11 perhaps a bit earlier than I would have had in some
12 instances. For example, when Viola made a report on
13 his animal study in Tokyo, I attended a congress.

14 I was the first to do human experimenta-
15 tion, and I presented that, but at that time I had no
16 interest in listening to his dissertation in rat
17 exposures. This would not a problem for six months to
18 a year later for general scientific dissemination.

19 Q So you were at the conference in Tokyo in '69?

20 A That was the National Congress of Occupational Health.

21 Q Occupational Health Congress?

22 A Right.

23 Q In 1969, July?

24 A September.

25 Q Where Viola presented the results of his experimentation

1 with rats in which he demonstrated the development of
2 cancer following exposure of vinyl chloride?

3 A Yes, sir.

4 Q Did you attend his presentation?

5 A I did not. I don't recall that at all.

6 Q Did you receive a copy of any written report of his
7 presentation?

8 A Not directly. I purchased several copies of the
9 complete transactions, including my own.

10 Q Do you still have those?

11 A I do.

12 Q Do you have a copy of that portion of that document
13 you purchased that relates to Viola's presentation?

14 A I would think so, but I would have to check the book
15 and the reference index.

16 Q Have you furnished a copy of that Viola presentation
17 to Mr. Bunda?

18 A I have not.

19 Q Would you kindly check for me either today or tomorrow
20 and see if you can find that reference, and if you
21 would forward a copy to Mr. Bunda--

22 MR. BUNDA: No, no. Wait a minute. You can
23 ask him questions here. We've gone through this whole
24 case and there have been question of witnesses to
25 present things. I've lost track of them quite frankly,

1 and I'd ask you to do a formal Request for them so
2 that that way it's on the record, and we can establish
3 what's record and what's not to be produced subsequent
4 to the deposition. I don't want to be accused later
5 of not producing something that I've simply forgotten
6 or not determined that we have to make a presentation,
7 because I haven't reviewed the deposition transcript.

8 MR. DELLI BOVI: I'll be glad to do it by
9 a formal Request. I just want to make sure Dr. Zenz
10 is agreeable to do that. I would be glad to pay you
11 for your time and photocopying expenses in collecting
12 that and transmitting it to Mr. Bunda.

13 MR. BUNDA: I don't think we have a problem.

14 BY MR. DELLI BOVI:

15 Q I'm just asking you because I've not been able to get
16 it from my other sources.

17 A I'm surprised, because of the beautiful Japanese
18 publication, they did an extremely fine job compared
19 to other country's reporting proceedings. I can get
20 that. I can see it on the shelf.

21 Please understand that during a conference
22 of this sort, there may be hundreds of papers presented,
23 and there are many interesting things to do and people
24 to meet, and it's impossible to cover all topics.

25 Q When did you first see a copy of Dr. Viola's article

1 that appeared in 1970 in March in Medicina De La Vora,
2 and I'll hand you a copy of that, a translation of that,
3 if you would like to take a look at that.

4 A I have a copy of this, and it was given to me by Mr.
5 Bunda. However, I was aware of this publication long
6 before I knew of Chrysler or you folks.

7 Q Were you aware of that publication prior to Johnson's
8 communication to you concerning the angiosarcoma deaths?

9 A You mean the Journal of Occupational Medicine form
10 report?

11 Q Yes, sir.

12 A No, I was not.

13 Q When were you first aware of the presentation that Dr.
14 Viola made to the International Cancer Congress in
15 Houston in May of 1970, and I'll hand you a document
16 that relates to that presentation?

17 A I'd like to clarify my answer. Probably in '73 or '74,
18 because at that time I was preparing a chapter for the
19 textbooks of Occupational Medicine on vinyl chloride,
20 and I probably submitted that chapter to the publisher
21 in '74, so it's sometime in '74, and I did have almost
22 all these references available to me.

23 Q Did you begin work on that publication prior to or
24 following Johnson's communication to you?

25 A That's a close one. Probably before, and of course,

1 when this was formally published in the literature,

2 I recall adding it to the chapter post haste.

3 Q What was your initial reason for preparing the chapter
4 on vinyl chloride?

5 A I was preparing the chapter on the occupational health
6 aspects of toxics in rubber manufacturing, and this
7 would have been one of the subjects included.

8 Q Was that study or that paper sponsored by anyone?

9 A Well, just a publisher, of course, medical text
10 publisher.

11 Q And were you aware when you started -- Were you not
12 aware when you started that work of the reports of
13 carcinogenicity in either humans or animals exposed
14 to vinyl chloride?

15 A That book contained thousands of references, and I
16 have copies of most of them, so I can't answer you.

17 I may have included some of these even
18 before the Johnson and Kretch report came out, as a
19 matter of complete necessity, for the sake of complete
20 necessity.

21 Q When were you first aware of the article published by
22 Viola in cancer research in 1971 entitled, "Oncogenic
23 Response of Rat Skin, Lungs, and Bones to Vinyl
24 Chloride"?

25 A It might have been in 1973, because at that I was

1 actively engaged in producing this textbook. Because
2 of the lead time required by the publisher to put
3 out a book at a certain date meant that I had to
4 prepare things in advance.

5 All of the contributors had to do that, so
6 it was in '73 and no more than '74.

7 Q Do you know whether it was before or after your
8 communications with Johnson?

9 A I can't be sure of that.

10 Q Did you regard Dr. Viola's presentation at the
11 International Congress on occupational health in 1969
12 as an important presentation?

13 MR. BUNDA: I'm going to object to that,
14 because I think he's already testified he doesn't
15 recall being there when the presentation was made.
16 Nevertheless, you can answer.

17 A I was not present at the conference.

18 BY MR. DELLI BOVI:

19 Q Did you read his paper?

20 A Well, perhaps some years later.

21 Q Do you have any recollection of reading Viola's paper
22 that was given at the 1969 conference in Tokyo prior
23 to 1973 or 1974 when you began work on that book
24 chapter?

25 A I can say with some certainty that I probably read

1 excerpts or abstracts. One would need to do that to
2 make certain the reference was worthy of including in
3 the chapter of a text.

4 Q Do you recall whether or not following your review of
5 Viola's presentation at the 1969 International
6 Congress on Occupational Health you regarded that
7 paper as an important one?

8 A Probably not.

9 Q What about his 1979 publication in Medicina De La
10 Vora?

11 A '79?

12 Q '70. I'm sorry.

13 MR. BUNDA: Well again, I'm not sure that
14 we've established that he read that publication, so I
15 think there's a lack of foundation.

16 BY MR. DELLI BOVI:

17 Q Well, have you read it?

18 A I glanced through it, of course. His studies, of
19 course, dealt with animals, rats, and so on, and
20 naturally we look at these things but they are not
21 high on my occupational health priority list. And
22 the animal experiments, these were done by the
23 thousands all over the world with thousands of
24 substances, and let me say this, that the smaller the
25 species of animal, the greater chance of finding

1 tumors without finding exposure to anything, just
2 during their natural short lifetimes.

3 Q Are you aware of the incidence of naturally occurring
4 cancers in rats?

5 A Not specifically, no.

6 Q What about Dr. Viola's presentation at the International
7 Cancer Congress in Houston in 1970, have you reviewed
8 that paper prior to today?

9 A Yes. I have reviewed that in the past months.

10 Q Do you recall reviewing either that presentation or
11 the Medicina De La Vora article in 1973 or 1974,
12 when you were working on that book chapter?

13 A I could better answer if I had the book in front of me.
14 I recall the Viola reference alphabetically, but I
15 can't say more than that.

16 Q Did you regard Viola's presentation in Houston after
17 you read it as an important presentation?

18 MR. BUNDA: You mean after he read it a
19 couple months ago?

20 BY MR. DELLI BOVI:

21 Q When you first read it?

22 A I can't answer that.

23 Q What about his publication in cancer research in 1971,
24 did you regard that as an important publication, an
25 important article?

1 A I would have to say that nearly all articles published
2 in that esteemed journal should be regarded with some
3 great value.

4 Q Why? And I want to focus specifically on Viola's
5 article. Why was that article, when it was published
6 in 1971, important?

7 MR. BUNDA: Well, I don't think that's what he
8 testified to. Let's back up for a second.

9 A If you want me to give a review of a paper, I could do
10 that, but this report is based to a large extent on his
11 earlier reports as many papers are. It's still with
12 rats. Heavy exposures-- Heavy exposures again.
13 Please rephrase your question, sir.

14 BY MR. DELLI BOVI:

15 Q Do you know who sponsored Dr. Viola's work?

16 A No. I would assume his institute bore his salary
17 and so forth and expenses.

18 Q Do you know whether his research dealing with vinyl
19 chloride exposure to rats was sponsored by the
20 European PVC industry?

21 A I couldn't be sure of that.

22 Q Have you reviewed prior to today Dr. Dahl's testimony?

23 A Yes, sir.

24 (Short recess taken.)

25 BY MR. DELLI BOVI:

1 Q Dr. Zenz, my question before the break was whether or
2 not you regarded Dr. Viola's 1971 article in cancer
3 research after you read it as an important article.

4 MR. BUNDA: I'm going to object to the question.
5 I don't think there's a foundation laid as to exactly
6 when he read it, and I guess my objection also goes to
7 the point in time. Did he consider it important when
8 he read it in view of everything else he knew, or did
9 he consider it important when it first came out in 1971,
10 looking for hindsight.

11 A Could we temporarily go off the record?

12 (Discussion off the record.)

13 A Assuming that I did review a summary and abstract or
14 excerpts of the Viola publication on animal experimenta-
15 tion, I probably considered it of importance, yes.

16 BY MR. DELLI BOVI:

17 Q But --

18 A But more so from the animal results that I could then
19 extrapolate to man. That was my concern throughout
20 my career as to the validity of animals transposed to
21 a worker, a human.

22 Q Obviously you can't do the exposure studies on humans
23 in terms of what Viola did. You can't put humans in
24 a chemical chamber exposing them to 30 parts per
25 million of PVC and see whether or not humans get cancer.

1 A It's an animal statistic level naturally.

2 Q So one of the tools that researchers use to determine
3 the potential carcinogenicity of chemicals in man is
4 to do animal research, correct?

5 A Certainly, with this admonition: I prefer to see
6 studies for occupational purposes done with animals
7 as large as possible, and that would include the
8 primates, which would include then dogs, young and
9 large adults, monkeys, all the way up and including
10 baboons, if available.

11 Q Are you aware of any study sponsored by any U.S. PVC
12 resin manufacturer or any trade association of U.S.
13 PVC manufacturers dealing with the exposure of any
14 animals to vinyl chloride?

15 A I'll have to clarify my response to your question in
16 this manner: In reading a paper of any type, which
17 includes some of my publications, often an acknowledg-
18 ment footnote is present either in the beginning of
19 the first page or at the end of the text matter for
20 the references. We would say this study was supported
21 in part by the St. Luke's Hospital Research Foundation,
22 this study was supported in part by the American
23 Cancer Society or the Red Cross.

24 But, again, when I read these reports and
25 put them into my mental memory bank, we tend not to put

1 that portion of the report in one's mind, so I'm not
2 aware of the sponsorship of many of the scientific
3 reports published in the literature.

4 It may have been a cursory glance where it was
5 presented or sponsored in part or all of it, and this
6 is my explanation to your question.

7 Q Let me ask the question then, Doctor, in a broader
8 context. Other than the studies done by Viola and
9 Maltoni and prior to 1974, are you aware of any
10 studies conducted anywhere in North America in which
11 rats or other animals were exposed to vinyl chloride
12 in an attempt to determine whether or not the material
13 was carcinogenic?

14 A I've refreshed myself. Yes. I was aware of these
15 studies, and prominently among these would be one of
16 my friends who is probably still with Dow Chemical as
17 their chief toxicologist.

18 They did many animal, and listing refer-
19 ences of these documents you've given me and others
20 that I've seen, his animal experimentations stand out
21 prominently. So yes, I was aware, but not in great
22 detail or for your purposes today.

23 Q I'd like to read you a question and answer from Dr.
24 Dahl's deposition, and ask you if you agree with his
25 answer to the question:

1 MR. BUNDA: I'm going to object to this on the
2 grounds that it's irrelevant and improper. First of
3 all, I'm also going to object on the basis that it's
4 a vague question. Are you asking him whether he's
5 agreeing that you read the question correctly?

6 MR. DELLI BOVI: No. I'm asking whether or not
7 he agrees with the answer Dr. Dahl gave to the question.

8 BY MR. DELLI BOVI:

9 Q "Q Do you regard those documents, Dr. Dahl,
10 and that refers to these three Viola papers
11 that you have before you, as documents
12 calling into serious question the
13 carcinogenicity of vinyl chloride?

14 A I regard the one in 1971 in cancer research
15 as so doing. The others I regard as
16 preliminary reports, and I think one would
17 be unwise to draw any conclusions, any
18 important conclusions from them, but the
19 paper in 1971 by Viola, Maltoni, and Kaputa
20 is certainly an important paper to which
21 attention should be made."

22 Do you agree with Dr. Dahl's assessment of Dr. Viola's
23 1971 article?

24 A I can hardly disagree. He's the world's most prominent
25 epidemiologist in the field, and I've listened to his

1 lectures, and I know of him. He's the foremost
2 epidemiologist in the broad sense.

3 I'm not certain what experience he has in the
4 occupational medical sense directly. He probably has
5 reviewed more papers than I have on tumors, cancers.
6 I would have to go along with his assessment, of course.

7 Q Is there any testimony that you recall reading in
8 Dr. Dahl's deposition with which you disagree?

9 MR. BUNDA: Again, I'm going to object.
10 Dr. Dahl's deposition took over three hours. If you
11 want to point him to a specific passage, I think
12 that's perfectly reasonable, but to ask him to agree
13 with the entire deposition, I think is unfair.

14 BY MR. DELLI BOVI:

15 Q All right. Would you prefer that I do it that way,
16 Dr. Zenz?

17 A If I have a choice, of course, I'd insist that you
18 would, please.

19 Q Do you recall Dr. Dahl testifying -- and this is Page
20 107 of his deposition. I'll be glad to give you that
21 reference if you would like.

22 A I may have to refer to it because it took me over
23 three hours to go through it, and I can't recall all
24 the numerical sequences of the questions and answers.
25 If I may say so, this is a complete seminar on

1 epidemiology.

2 MR. DELLI BOVI: I move to strike the answer
3 as non-responsive.

4 BY MR. DELLI BOVI:

5 Q The testimony on Page 107, beginning at Line 7:

6 "A The working rule is to assume that there is
7 an effect proportional to dose down to vanish-
8 ingly low levels, given that the material is
9 a mutagen. If it is not a mutagen, then my
10 working rule would be that is probably not the
11 case and there would be a threshold below
12 which it had no effect."

13 Q Vinyl chloride is a mutagen?

14 A Yes.

15 Q Therefore, your working rule is what?

16 A My working rule is that you would assume there
17 was an effect proportional to dose down to
18 vanishingly small levels, a vanishingly small
19 effect, but an effect."

20 Do you agree with Dr. Dahl's testimony in that regard?

21 MR. BUNDA: I'm going to object to the question
22 because it unfairly characterizes Dr. Dahl's opinion
23 on this. If you were to show him on Page 106 where
24 the question was asked about whether he has an opinion,
25 I think you also have to read to Dr. Zenz the fact

1 that Dr. Dahl indicated that he does not have an
2 opinion, and he wished he could. Rather, he has a
3 working rule that he goes on until he gets additional
4 information which permits him to form an opinion.

5 So Dr. Zenz, why don't you read 106 in conjunc-
6 tion with 107. I think that will more fairly character-
7 ize it.

8 A On through the question to Dr. Dahl was:

9 "Q Is it your opinion that for any human
10 carcinogen including vinyl chloride, there is
11 a safe level of exposure at which no potential
12 carcinogenic effects will occur?

13 A That is something that I wish I could answer.
14 I really have not got an opinion on that.
15 In cancer research, we work on the assumption
16 that unless there are strong reasons otherwise,
17 we postulate that an effect is produced
18 proportional to dose down to vanishingly
19 small levels.

20 Whether this is so or not is a matter of
21 great debate, and which we really have no firm
22 scientific evidence one way or another. We
23 act on the assumption in the same way as we
24 are acting on the assumption now that other
25 people's tobacco smoke in a room will cause a

1 risk to all the people who are not smoking.
2 But the scientific proof that this is so is
3 such that I really have not got an opinion.
4 I have a working rule, but not an opinion."

5 BY MR. DELLI BOVI:

6 Q Is it your opinion that for any human carcinogen,
7 including vinyl chloride, there is a save level of
8 exposure at which no potential carcinogenic effects
9 will occur?

10 A I certainly do. This is true for most substances
11 used known to man, including ionizing radiation, and
12 I can't argue with Professor Dahl. He's the most
13 eminent authority.

14 My only puzzlement with his expression is the
15 vanishingly small levels for man so precise that it
16 struck me as rather odd, but to me, that would be
17 parts per billion I would assume he's discussing.

18 Q So it's your testimony today that at least at levels
19 above parts per billion--

20 A I'm sorry. Parts per million, correct, parts per
21 million. Not for any specific material, however.

22 Q Let's talk about vinyl chloride. Is it your opinion
23 that there is a safe level of exposure to vinyl
24 chloride at which no potential carcinogenic effects
25 will occur?

1 A Yes. And there is strong support for my opinions.

2 Q And what is your opinion as to that level of exposure
3 to vinyl chloride below which no potential carcinogenic
4 effects will occur?

5 A Naturally I can't give you a precise level. However,
6 I can amplify my answer and refer to the established
7 documents provided by the American Conference of
8 Industrial Hygienists, the ACGIH, NIOSH, and other
9 eminent institutional reports worldwide.

10 When guidelines or standards are set, what
11 we determine threshold limit values or allowable
12 concentrations for workers per shift, per week, per
13 year, or per lifelong exposure, the safety factors are
14 built into these levels. The safety factors for
15 adults may very well be four to ten to one hundred
16 times above that published figure. So in the event
17 that we have a fifty parts per million exposure,
18 allowable mean exposure for a lifetime of work with
19 vinyl chloride, that is a very, very low figure,
20 for safeness, which would not produce any pathologic
21 findings in a worker day in and day out.

22 So my answer is yes, that there are safe
23 levels established, and I feel very comfortable that if
24 these are followed by industry, tumors will not be
25 produced in man.

1 Q Are you aware of reports by Maltoni of the generation
2 of tumors in rats exposed to concentrations of vinyl
3 chloride at the 50 parts per million level?

4 A Yes, sir. I'm also aware of other unpublished studies
5 where baboons exposed to 20 parts per million for
6 long periods of time and liver biopsies were made
7 and no changes were found.

8 Q How large a study was that?

9 A Well, considering baboons are such troublesome creatures,
10 so expensive, I would say a dozen baboons for a
11 period of a couple years, but I can't tell you
12 more than that.

13 Q Who was the author of the study?

14 A An eminent physiologist who was the consultant for
15 the Chambers of Mines of South Africa, who is now
16 retired. He's well known to Professor Dahl and all
17 the people in the field.

18 I'm not sure if the study was published.
19 It could have been. I could search for it, but I
20 recall visiting his experimental laboratory and
21 seeing these animals exposed to vinyl chloride.

22 Q Well, can you tell me either the name of the author
23 or the title of his publication or the journal in
24 which that publication occurred?

25 A I can't instantaneously, but let me think about it.

- 1 Q Certainly.
- 2 A I'm sorry. His name just doesn't come to me right now.
- 3 MR. BUNDA: We'll supply you with that informa-
- 4 tion.
- 5 A He's published many, many articles. Now, whether or
- 6 not this baboon study was published, I can't answer
- 7 that without checking the literature.
- 8 Q Have you read the paper that he authored?
- 9 A No. I heard him give a presentation on the subject
- 10 while I was visiting his institute.
- 11 Q Do you know whether or not a paper reporting his work
- 12 exists?
- 13 A I can't answer that, don't know.
- 14 Q When was his work conducted?
- 15 A '82, '83, '84.
- 16 Q And your understanding is that he exposed twelve
- 17 baboons to vinyl chloride concentrations of 20 parts
- 18 per million?
- 19 A Yes. Many baboons and 20 parts per million.
- 20 Q So in order for him to generate any cancer in any of
- 21 those baboons, the vinyl chloride at 20 parts per mill-
- 22 ion would have to be capable of generating cancer in --
- 23 Strike that. The one in eight percent at minimum of
- 24 those baboons exposed at that level?
- 25 MR. BUNDA: I'm sorry. I don't understand that.

1 A To some extent I do. Probably, but don't hold me to
2 that.

3 BY MR. DELLI BOVI:

4 Q Do you know of any material that has been established
5 to generate cancers -- Strike the question.

6 I want to go back to my prior question that dealt with
7 safe level exposure to vinyl chloride. What is your
8 opinion as to the level of exposure to vinyl chloride
9 below which no potential carcinogenic effects will
10 occur?

11 MR. BUNDA: I'll object. That's been asked
12 and answered.

13 MR. DELLI BOVI: All I want is a number or a
14 range of numbers.

15 MR. BUNDA: I think he gave that to you in his
16 previous answer.

17 MR. DELLI BOVI: I never received a number.

18 A I couldn't give you -- In fact, it was probably in
19 the thousands of parts per million for many years
20 exposure.

21 BY MR. DELLI BOVI:

22 Q Why did OSHA set it-- Do you know what the current
23 OSHA TLV for vinyl chloride is?

24 MR. BUNDA: Actually it doesn't set TLV's.

25 A That's using the ACGIH level of '69, '74, but it's

1 probably in the order of 50 parts per million, if I
2 recall, but that has a huge safety factor, as I
3 mentioned earlier.

4 Most of the TLV's do consider the factor
5 safety into their considerations deliberation. It's
6 not a precise figure. These are merely guidelines.

7 BY MR. DELLI BOVI:

8 Q Let me talk about current OSHA permissible exposure
9 limits on a time weighted average basis for vinyl
10 chloride. What is your opinion as to what that level
11 or permissible exposure limit is?

12 A It's about ten parts per million right now.

13 Q Have you reviewed any studies reporting the induction
14 of liver angiosarcomas in employees working in PVC
15 fabrication facilities?

16 A Yes.

17 Q Have you reviewed, prior to today, any reports of liver
18 angiosarcomas in people living in neighborhoods adjacent
19 to PVC production facilities?

20 A Yes. I've seen these reports, but I must add that
21 angiosarcomas were found in the general population
22 long before vinyl chloride was known to man, which
23 came about sometime in the '30's or '40's.

24 Q Do you have an opinion today as to what the rate of
25 liver angiosarcoma cancers are in the general population?

1 A In the U.S. and approximation, yes. It would be
2 exceedingly rare in the cases per millions of people.

3 The figures I've seen are something on
4 the order of -- I can't recall. It varies so much
5 from person to person. It's an exceedingly rare type
6 of tumor, probably one of the rarer forms.

7 Q Do you have an opinion as to the number of parotid
8 gland cancers in the U.S. in terms of per hundred
9 thousand or per million people?

10 A No. I don't have that.

11 Q Is parotid gland cancer a rare cancer?

12 A That's more commonly seen. I'd have to check the tumor
13 registry or local hospitals which are published annually,
14 but I've not looked for that specifically.

15 Q Do you have an opinion as to what the levels of exposure
16 to vinyl chloride were in the Chrysler plant prior to
17 1974?

18 A I can make a guess based on my experiences in the
19 various industries that I've visited. I'll make this
20 attempt: Since they didn't manufacture vinyl chloride
21 monomer and purchased materials made by other manufac-
22 turers, I would imagine the exposures were very lower,
23 below acceptable standards as we regard them today.

24 Q Have you been furnished with any data indicating
25 the concentrations of residual vinyl chloride monomer

1 in the resins produced by the PVC manufacturers who
2 are defendants in this case prior to 1974?

3 A No, I have not.

4 Q Do you have an opinion as to whether the levels of
5 residual vinyl chloride monomer in PVC resins were
6 higher after 1974 than they were before 1974, were
7 lower after 1974 as opposed to prior to 1974, or were
8 the same after 1974 as opposed to prior to 1974?

9 A I think I can answer that with some degree of certainty.
10 When the polyvinyl chloride plastics are produced and
11 stored, shipped, packaged, and so forth, the concen-
12 trations of residual monomer, VC monomer, would be
13 probably the same today as they were in the mid-'70's
14 and when it was produced first in the '50's and '60's.

15 The chemical physical characteristics
16 of the substances cannot be altered by one, two, three,
17 four, five years in packaging, storage, shipping,
18 so forth.

19 Q Well, is it your opinion today that the levels of
20 vinyl chloride, of residual vinyl chloride monomer
21 in the PVC resins produced by the defendants in this
22 case were the same in the '70's, the late '70's and
23 the '80's as they were in the early '70's and '60's?

24 A I'd have to ask you if the factory in any way changed
25 its procedures or methods of getting materials.

1 I assume everything was stable at the factory?

2 Q I just want to know what your understanding is and
3 what you now, coming into this deposition today, what
4 your understanding or what your assumption is?

5 A Probably the same, that is, very low concentrations.

6 Q Have you ever reviewed the article published by R. N.
7 Wheeler in Environmental Health Perspectives in 1981,
8 dealing with the residual vinyl chloride monomer concen-
9 trations in certain PVC resins, and I'll hand you a
10 copy of his article.

11 A Thank you. Yes. I think so. Before I met Mr. Bunda,
12 that was probably part of my general reference
13 collection for my chapters on the plastics industry.

14 Q Thank you. Have you reviewed the deposition testimony
15 of any witness in this case or any party in this case
16 other than Dr. Dahl?

17 A Yes. There was a physician who I did. Was it you
18 or Mr. Bunda that questioned? I forget his name.

19 Q Dr. Kelly?

20 A Yes.

21 Q Whose testimony have you reviewed other than Dr.
22 Dahl's and Dr. Kelly's?

23 A Did you provide me with the worker's testimony?
24 I've forgotten now. I've got so many cases to review
25 with depositions, I have to refresh myself in all

1 these things.

2 MR. BUNDA: In this material, I think there was
3 a summary of the testimony of the workers.

4 A Let me see the comments again, please. I must say,
5 yes, I have, but it's been many, many months ago that
6 I did this.

7 Q My question, Dr. Zenz, is not whether you reviewed
8 summaries prepared by Mr. Bunda or his office of the
9 testimony of the witnesses or parties, but whether
10 you reviewed their actual testimony? Now, did you
11 rewi-w the testimony of Dr. Kelly and Dr. Dahl, or
12 did you review a summary?

13 A I reviewed the actual typed pages, yes.

14 Q What about any other witnesses or party to this case
15 other than Dr. Dahl and Dr. Kelly?

16 A Dr. Peterson, Dr. Shindell.

17 Q Well, you couldn't have--

18 A This entire document was reviewed by me at one time,
19 but I can't recall the authors of each chapter here.

20 Q You couldn't have reviewed Dr. Peterson's testimony,
21 because that was just given yesterday.

22 A Not his testimony, his report.

23 Q I'm asking about testimony, questions and answers under
24 oath? Whose testimony have you reviewed other than
25 Dr. Dahl and Dr. Kelly?

1 A Then I've not other than deposition summaries.
2 Q So when you refer to Dr. Shindell, you reviewed his
3 epidemiologic study?
4 A Yes.
5 Q But not his sworn testimony?
6 A No, sir.
7 Q And the same is true with Dr. Peterson, you reviewed
8 his two letters?
9 A Yes, sir.
10 Q But not his sworn testimony?
11 A Right.
12 Q You have not reviewed the sworn testimony of either
13 of the plaintiffs in this case, either Mr. Dendinger
14 or Mr. Wallace?
15 A I have not.
16 Q You haven't reviewed the testimony of Mr. Fergeson at
17 Chrysler?
18 A No, sir.
19 Q Or Mr. Schloter, the chemist at Chrysler?
20 A No.
21 Q Can you tell me today, Dr. Zenz, in what areas of the
22 Chrysler plant Mr. Dendinger or Mr. Wallace worked?
23 A The -- Let me see if I can give you exact terminology.
24 If memory serves me right, the plastics fabrication
25 area where they made the internal components for some

1 of their vehicles, and the finishing area, where they
2 probably were prepared for shipment out. I'd have to
3 review the documents to give you the exact terminology
4 of the company's areas.

5 Q Have you ever visited the Chrysler plant?

6 A No. I have not.

7 Q Have you reviewed the work histories of Mr. Dendinger
8 and Mr. Wallace?

9 A I have.

10 Q Are you aware from your review of their work histories
11 of their occupational exposure to any carcinogens
12 other than vinyl chloride?

13 A I'm not.

14 Q Have you reviewed what you referred to early in your
15 testimony as genetic factors for either Mr. Wallace
16 or Mr. Dendinger?

17 A That would be guess work on my part. I have not.

18 Q I take it that you have reviewed certain medical
19 records and laboratory histological and pathological
20 reports relating to both Mr. Dendinger and Mr. Wallace?

21 A Yes, sir.

22 Q So you know the type of cancer that Mr. Dendinger died
23 from and the type of cancer Mr. Wallace died from?

24 A Yes. I'd have to go back and recollect the pathologist's
25 report, of course.

1 Q Did you attempt to determine prior to today what type
2 of respiratory protection was provided either to Mr.
3 Dendinger or to Mr. Wallace?

4 A Yes, indeed. I looked for that almost immediately
5 when I was given the Peterson report.

6 Q And what type of respiratory protection was provided
7 to either Mr. Wallace or Mr. Dendinger at any time
8 that they worked at the Chrlyser facility?

9 A I'd like to refresh myself, because I have some
10 impressions I could give you if I could please see the
11 documents.

12 Q You would like Peterson's letter?

13 A Please, thank you. I would also need to refresh myself
14 with the State of Ohio's reports, please.

15 Q Certainly.

16 A Yes. 1968 report from the Health Division of the State
17 of Ohio indicates that the company did provide self-
18 breathing equipment, and this is the reason I had to
19 dig into the document, because it's obscure in the
20 report. And also that their conclusion was that no
21 health hazards due to vinyl chloride exposure were
22 found.

23 Q What year?

24 A '68.

25 Q When did Mr. Wallace first begin working at the Chrysler

1 plant?

2 A I can't answer that precisely.

3 Q What type of respiratory protection does that letter

4 refer to?

5 A Self-contained breathing apparatus, self-breathing

6 equipment. That would be an air supply tank or a hose

7 connected to a safe source of air.

8 Q Do you have any evidence or have you seen any evidence

9 that Mr. Wallace or Mr. Dendinger ever wore an air-

10 supplied respirator or were ever given an air supplied

11 respirator?

12 A I would suspect not, because they had sufficient

13 engineering exhaust control measures in this plant,

14 judging from the Division of Health reports and Depart-

15 ment of Health. And, of course, I look for these

16 details rather early when I review a report of this sort.

17 Q Were you aware of the 1976 OSHA citation for excessive

18 solvent levels?

19 A No, I'm not.

20 Q Were any of the levels reported as a result of Chrysler

21 testing in 1974 above the current PEL for vinyl chloride

22 exposure on a time weighted average basis?

23 A PEL?

24 Q Yes.

25 MR. BUNDA: I'm going to object to the question,

1 because I think we've already established that these
2 readings of -- what were they, ten minute readings --
3 and the permissible exposure limit is one part per
4 million on an eight-hour time weighted average, and
5 I'm not sure you can make that correlation. I'm
6 objecting to the question.

7 BY MR. DELLI BOVI:

8 Q Are you aware of any attempts made in or after 1974
9 to determine the time weighted average exposures of
10 Dendinger and Wallace as to vinyl chloride?

11 A Only what you've provided me, or what I have been
12 provided by you gentlemen. These were rather short
13 periods of measurements, and I would not say they
14 represent actual PEL's.

15 MR. BUNDA: Kirk, do you mean other than that
16 '5 parts per million that Wallace showed?

17 BY MR. DELLI BOVI:

18 Q No. I mean anything. Are you aware of any attempt
19 by Chrysler or any attempt by anyone in or after 1974
20 to determine the time weighted average exposures of
21 Wallace and Dendinger to vinyl chloride?

22 A Yes. The hygienists, of course, routinely make TWA,
23 time weighted average reports.

24 Q And are any of these reports that you've been furnished
25 with time weighted average reports?

1 A For short periods, yes.

2 Q Do you believe that that data can be extrapolated
3 to determine a time weighted average concentration
4 over an eight-hour work day?

5 A In view of the general spectrum of low level analytic
6 results presented to me, yes. These are more studies
7 than industry normally performs for this sort of
8 operation. They amount to hundreds, if I just cursorily
9 add this up, and this gives me a good picture of the
10 lack of exposure I see in this particular operation.

11 Q Is it your opinion or do you have an opinion as to
12 whether or not Wallace and Dendinger were exposed to
13 vinyl chloride monomer during the course of their
14 employment at Chrysler?

15 A Yes. They probably had a lower level exposure as did
16 most of the workers there.

17 Q Is vinyl chloride a mutagen?

18 A In some animal systems, yes, some organisms, yes.

19 Q Do you have an opinion as to whether there is a level
20 of exposure to a mutagen below which no mutations will
21 occur?

22 MR. BUNDA: You're speaking specifically of
23 vinyl chloride or generally?

24 A That troubles me, because I knew you were asking for
25 general, and these could run from analine to zirconium.

1 I'm trying to give you an answer to this vexing
2 question that everybody wants to know the answer to.

3 I'll try to answer this by using a very
4 contemporary and current example. Astronauts going
5 into outer space are bombarded by heavy neutrons and
6 other extreme gamma radiation. Ionizing radiation
7 pass right through the body, through vital organs.
8 And these actions damage cells and the contents of
9 human cellular components, but due to the regeneration
10 capabilities of man, nothing will happen.

11 And this is something that humans are
12 exposed to from conception on. I can't answer this
13 question. I don't think anyone can answer it today.

14 There are a thousand substances one could
15 look at substance by substance, and the answers would
16 vary from negative to positive, and depending on the
17 species of the creature examined.

18 Q Dr. Dahl was asked on Page 107 of his deposition,
19 "Is vinyl chloride a mutagen?" His answer, "Yes."

20 Do you agree with his testimony?

21 A Yes, I do.

22 Q Why do you regard Viola's 1971 publication in cancer
23 research as an important paper?

24 A Well, for many reasons, and on reflection now with
25 everything recently behind us and present and so forth,

1 it was accepted by an eminent journal, so it had to be
2 reviewed by experts in the field, and his institute
3 is quite well regarded in the world. Exposed the ani-
4 mals for 12 months, which is quite a lengthy exposure
5 for rats. It's difficult to do. He made a nice report.

6 It was readable, and timely, I should say.
7 And at the concentrations he used, almost all the
8 animals developed bone tumors. And in his discussion,
9 he indicated that there are some questions even in
10 his mind about which is a susceptible system in the
11 animals.

12 But furthermore, in closing on this brief
13 review of his paper, it set people to thinking about
14 related studies that should be done.

15 Q Now, let me put you back in the position of an industrial
16 hygienist and a corporate occupational health physician,
17 but this time for a PVC resin manufacturer.

18 In 1971, would you as an industrial hy-
19 gienist and an occupational health physician for PVC
20 resin manufacturer want to know about the existence
21 of this article?

22 A Yes.

23 Q Do you know whether or not the U.S. PVC manufactuers
24 and the Manufacturing Chemists Association were aware
25 in 1971 of this article by Viola?

1 A I can't speculate, but I would hope so.

2 Q You were not aware of it, however, in 1971?

3 A No.

4 Q Let me go back again and put you in the shoes of the
5 occupational health physician for the PVC manufacturers.
6 Why would you have wanted to know in 1971 about the
7 existence of that article?

8 A Now you're talking to me? Because in my natural
9 curiosity to have complete information as to the
10 work I'm doing, and also in view -- and looking back-
11 wards now as you're asking me to do -- the tremendous
12 usage of these compounds worldwide and in factories,
13 and the exposure levels reported in the '40's and '50's.

14 And I would, of course, be concerned with
15 control measures and therefore, all information we
16 would constantly -- I would have been literature
17 searches manually probably in those days, as I did in
18 my work, by the way, when I was in the era that you
19 are presenting to me.

20 Q You know today that PVC resin in the '60's and in the
21 '70's -- at least the first half of the '70's --
22 contained residual levels of vinyl chloride monomer?

23 A Yes, I do know.

24 Q Now, I'm going to switch your hat again and have you put
25 on the hat of a corporate occupational physicial and

1 industrial hygienist for a user of PVC resin. Would
2 you in that capacity have wanted to know about this
3 article in 1971, when it was published?

4 MR. BUNDA: You're asking him as a user of the
5 resin?

6 BY MR. DELLI BOVI:

7 Q Yes.

8 A But in an industry, I take it?

9 Q Yes.

10 A As a medical director or hygienist for the corporation?

11 Q Certainly, yes.

12 A Yes, I would. You're speaking to one individual in
13 the field, and my method of work was different than
14 many of my counterparts elsewhere.

15 Q What I'm asking you today about is your opinions and
16 your beliefs.

17 Dr. Zenz, why as an occupational health
18 physician and an industrial hygienist with PVC resin
19 customers would you want to know about the existence
20 of Dr. Viola's 1971 article?

21 MR. BUNDA: I'll object on the basis of
22 speculation.

23 A Well, typically in a larger manufacturing organization
24 of sufficient size to employ me as physician or
25 hygienist to give advice regarding occupational health

1 and working conditions and improvement and also
2 maintenance of a good health for workers, I would
3 be asking the librarian to provide me with pertinent
4 documents from time to time as they come across in
5 the journals.

6 I'd probably subscribe to -- In fact,
7 I have until this date subscribed to many of the
8 journals that you've given me references for, but not
9 to cancer research as such.

10 I would have said, "Look, any materials
11 that we're handling, our workers are working with, I
12 want to be aware of published reports."

13 Q Now, you're not aware of any document prior to 1974,
14 disclosing to the PVC resin customer that there was,
15 in fact, residual monomer in the resin, are you?

16 A I can't recall that for certain, no, sir.

17 Q Would that be, again, putting your hat on as working
18 for the PVC resin customers, important for you to have
19 known in 1971 that there was, in fact, residual vinyl
20 chloride monomer in the resin that your company was
21 receiving?

22 A Yes. But equally important would be other materials
23 as well. I was always interested in the composition
24 of materials and the conditions under which they are
25 used, whether it's under extreme heat or cold or high

1 humidity or lack of ventilation or hard, heavy
2 muscular work on the part of the men, and the extent
3 of the working hours, whether it would be eight hours
4 a day, ten hours a day, six days a week. All of these
5 factors would have been and are of great interest to
6 me in the proper protection of workers' health.

7 Q Would you and do you rely on the-- Strike that.

8 Do you serve as a consultant to companies that use
9 raw materials furnished to them by supplies accompanied
10 by MSDS?

11 A Yes.

12 Q How long have you been doing that?

13 A At least ten or twelve years.

14 Q Do the companies that you work for rely on the MSDS
15 supplied to them by the suppliers and the manufacturers?

16 A Many of the smaller concerns naturally must. Many of
17 the larger concerns re-review documentation submitted
18 to them internally.

19 So there is a broad mixture of response
20 to the material safety data sheets. More and more
21 the data sheets are more detailed. Often they, in the
22 past, have been rather loosely prepared and vague.

23 I've helped, of course, prepare data
24 sheets for employees, say, in agricultural chemical
25 manufacturing to make them understandable to the

1 worker, and we give them to all workers. It is a
2 rule we have that nothing is to be kept from a worker.

3 I have been doing this for some of the
4 companies at least since 1977.

5 Q Do you have an opinion as to whether or not the PVC
6 resin manufacturers, assuming they were aware in 1971
7 of this article by Viola, had an obligation No. 1,
8 to tell their resin customers that there was residual
9 vinyl chloride monomer in the resin; and 2, to inform
10 those customers of the research and the report done by
11 Dr. Viola?

12 MR. BUNDA: I'm going to object on the basis
13 that it calls for a legal conclusion, but you can go
14 ahead and answer.

15 A I'll try to answer this in the context that these
16 types of documents and reports were published, probably
17 in the numbers of thousands of different substances,
18 materials, combinations of materials on animals
19 throughout the world. Short and long reports.
20 That would have been insufficient evidence for me to
21 say you've got to put this on your material safety
22 data sheet.

23 It would be insufficient. It would have
24 been insufficient for me, so my answer to you regarding
25 the question whether industry should have reacted

1 immediately to this would be that I think industry
2 responded rationally and began studies, I'm sure,
3 throughout the country and initiated and requested
4 epidemiologic studies, animal studies to verify some
5 of these things.

6
7 The intent of a scientific report of this
8 sort is to get other people to become interested and
9 continue studies and take off from what has been
10 reported and perhaps evaluate other avenues, go in
11 different directions, not necessarily on the same
12 substances and the same techniques. But it stimulated
13 the people to say, "Why don't we look at our workers
14 and do a broad scale study here and there?"

15 Q Do you have an opinion as to whether or not, assuming
16 that PVC resin manufacturers were aware of Viola's
17 1971 publication as to whether or not they had an
18 obligation to disclose to their customers that there
19 was residual vinyl chloride monomer in their resins?

20 MR. BUNDA: I'm going to object to the question,
21 because it presumes that the customers didn't know that,
22 and I think that's an improper statement.

23 A I can't answer that question of jurisdictional authority
24 on this question about whether they had an obligation.

25 BY MR. DELLI BOVI:

Q Do you have an opinion as a physician in occupational

1 health and a consultant in occupational health with
2 the background in industrial hygiene as to whether they
3 had an obligation?

4 A In some instances, yes. But I would have to be
5 alerted to the quantification of the potential residual
6 components.

7 Q Well, you've seen R. N. Wheeler's article that dealt
8 with that issue, have you not?

9 A Yes, sir.

10 Q Have you been furnished with any document that indi-
11 cates to you that the PVC industry and its trade
12 organizations were aware in 1971 of Dr. Viola's work?

13 A Yes. I was given some copies of documentation of who
14 were representatives of some of the industries who were
15 present. I've forgotten the dates of that, but that
16 was sometime in the mid-'70's.

17 Q Did you receive any-- I'm going to hand you a document
18 consisting of six pages authored on November 23, 1971,
19 by R. N. Wheeler. Do you know R. N. Wheeler?

20 A No, I don't.

21 Q You've never spoken to him at all? He worked for
22 Union Carbide.

23 A I may have met him. He's a hygienist or toxicologist,
24 I think.

25 Q Would you take a look at this November 23, 1971 memo of

1 R. N. Wheeler and tell me whether you've ever seen that
2 document before today?

3 A You provided that document to me, Mr. Bunda, in the
4 batch of materials, I believe.

5 MR. BUNDA: That comes as a surprise to me,
6 but if you've seen it, you've seen it.

7 A Let me go through this again.

8 MR. BUNDA: I think where you might have seen
9 it is in Dr. Dahl's deposition.

10 A That's where I saw it, yes. But I would not have
11 seen this in the '70's, I can say that.

12 Well, something struck me in this document,
13 and I'd like to bring out, if I may please, and it's
14 very important and germane to our discussion today and
15 the things you're asking me.

16 The industry has a responsibility to its
17 employees and customers to take any necessary action
18 to protect them. Union Carbide's corporation is a
19 responsible name of that industry and will bear its
20 share of cost.

21 Union was one of the leaders in the
22 occupational medical affairs, at least it had been up
23 until now.

24 Q Can you tell me or cite--

25 MR. BUNDA: Wait a minute.

1 BY MR. DELLI BOVI:

2 Q Are you finished?

3 A No.

4 Q Please go ahead.

5 A To answer your question, I have seen this document only
6 recently in the past weeks, but I would not have seen
7 this document in my career ten years ago or five years
8 ago, no.

9 Q So the first time you saw that document was when it
10 accompanied the copy of Dr. Dahl's deposition that
11 you received?

12 A Yes, sir.

13 Q And that was within the last couple of weeks?

14 A Yes, sir. I should also remind you that the Manufac-
15 turing Chemists Association as well as the Chemical
16 Manufacturer's Association, the Plastics Association,
17 the American Petroleum Institute, there are many,
18 many so-called institutes including the Formaldehyde,
19 constantly has ongoing committees, and I've attended
20 some of these committees, and they're based on sub-
21 stance to substance, material to material, and their
22 intent is to provide documentation on data, education
23 and information to the body of people concerned with
24 all of these materials.

25 Q Including their customers?

1 A That's right.

2 Q Can you cite me any document or any piece of evidence
3 prior to the public announcement of the Goodrich
4 angiosarcoma deaths indicating that any PVC manufacturer
5 ever told Chrysler, No. 1, that there was residual
6 vinyl chloride monomer in the resin; No. 2, that the
7 RVCM concentrations in the resin were; or 3, of the
8 work done by Viola published in 1971; or 4, of any
9 research indicating the potential carcinogenicity of
10 vinyl chloride?

11 MR. BUNDA: I'm going to object to the form
12 of the question on the basis that it presumes that
13 there was some duty-- Dr. Viola's article was published
14 and open to the public including the question about
15 whether residual vinyl chloride monomer levels were
16 exposures is a complex question, which I don't think
17 legally gives rise to a duty, and I think the
18 presumption that it does is an improper one, and I'll
19 object on that basis.

20 BY MR. DELLI BOVI:

21 Q Go ahead and answer. Are you aware of any such
22 disclosures by the PVC industry to Chrysler?

23 A I'll take the prerogative that you tossed upon my
24 shoulder in the area of being in the corporate
25 medical director hygienist's shoes. I would hope that

1 out of scientific curiosity and good practice that the
2 air sampling would have included the containers when
3 they were open and dumped and shipped throughout a
4 factory of materials that are purchased and used,
5 and that industrial hygienist would look at all aspects
6 of materials within his jurisdictional domain.

7 Therefore, I would have hoped that in my
8 industry, we would have looked at residual components
9 emanating from a substance such as plastics, whether
10 they are coming in fresh from the boxcar or drums
11 or cardboard boxes or cloth bags, and so forth. One
12 should know whether or not there are leakages of mater-
13 ials, whether they are solid, liquid, or gaseous or
14 vapor.

15 I would hope that, but I have no documenta-
16 tion what a company did ten or fifteen years ago if
17 I had not been present.

18 I would assume they had some ideas of all
19 their components of the materials and exposure level.
20 If they had hygienists in duty, that's their duty to
21 determine these things, but I can't answer for them now.

22 (Lunch break taken.)

23 BY MR. DELLI ROVI:

24 Q Dr. Zenz, one of the publications of your's that Mr.
25 Bunda has given me is entitled "Occupational Cancer

1 Risks": is that correct?

2 A Yes, sir.

3 Q And in what book did that particular article appear?

4 A This chapter 52 appeared in the book called Occupation-
5 al Medicine Principles and Practical Applications,
6 2d, 1988 by Year Book Medical Publishers of Chicago.

7 Q And you were the editor of that book?

8 A I was the editor of that book, yes, sir.

9 Q Thank you. This particular article did not deal with
10 vinyl chloride in particular, did it?

11 A No, sir.

12 Q Have you ever authored any scientific or medical
13 journal articles dealing in particular with vinyl
14 chloride and the risks associated with exposure to it?

15 A Yes, I did. In 1974, as I mentioned earlier for
16 Occupational Medicine, 1st edition.

17 Q That was in JOM?

18 A No. That was the Year Book Medical Publishers text-
19 book on occupational medicine.

20 Now, I co-authored that chapter, the
21 earlier one with the senior industrial hygienist for
22 the United Rubber Worker's Union.

23 Q Who is Vernon Doddson? (phonetic)

24 A Professor of Medicine and Preventative Medicine at the
25 University of Wisconsin.

1 Q In the summary to your article, you indicate, "It is
2 believed that a high proportion of all cancers are
3 caused by 'extra genetic' factors, including personal
4 behavior patterns (e.g. cigaret smoking, alcohol and
5 drug use, and sexual activities) and toxic environmental
6 exposures in the work place and the community."

7 Is that your opinion?

8 A Essentially, yes.

9 Q Do you have an opinion as to the proportion of total
10 cancers that are caused by extra genetic factors?

11 A I do, and I'll give you this approximation.

12 It's in the order of for the U.S.
13 population as a whole, probably less than three percent,
14 non-occupational.

15 MR. BUNDA: I'm sorry. We're getting confused
16 here.

17 A 97 percent are non-occupational. That's what I meant
18 to say.

19 BY MR. DELLI BOVI:

20 Q But I'd like you to answer my question. My question is
21 what is your opinion as to the proportion of all cancers
22 caused by extra genetic factors?

23 A Oh, excuse me. May I see that paragraph again in
24 its total context, please?

25 Q Certainly.

1 A Thank you. This is already Page 928, so let me quickly
2 look at this.
3 Q Well, it's 828 of the text, it's not 928 of this
4 article.
5 A Thank goodness. Okay, thank you.
6 Please rephrase your question or have it read to me
7 again.
8 Q Certainly. What is your opinion as to the proportion
9 of all cancers caused by extra genetic factors?
10 MR. BUNDA: Your first question was percentage,
11 you're changing it to proportion.
12 BY MR. DELLI BOVI:
13 Q Percentage or proportion, however you want to express
14 it.
15 A It's very small.
16 Q Why do you use the term "high proportion" in your
17 summary?
18 MR. BUNDA: Well, let's let him see what
19 you're reading from.
20 BY MR. DELLI BOVI:
21 Q Sure.
22 A Yes. We emphasize cigaret smoking, alcohol/drug use,
23 and so forth.
24 Q Those are all extra genetic factors?
25 A Yes, sir.

1 Q What makes up the whole set of cancers other than extra
2 genetic factors? What else is there?

3 Is there genetic and extra genetic?

4 A Sometimes they are mixed, of course. A typical example
5 being cigaret smoking and lung cancer and asbestos.

6 Q Let me ask the question another way then. What is your
7 opinion as to the total percentage of total cancers
8 caused by genetic factors?

9 A As far as is known today, probably very high. I can't
10 give you an exact figure.

11 Q And in order to assess for any given individual
12 whether or not his cancer might be genetically
13 caused, what would you look to?

14 A We would look to in as much detail as physically
15 possible the familiar characteristics as far back as
16 possible.

17 There are some unknown diseases, of course,
18 that are truly genetic in origin. We would look at
19 population studies, of course, where there is a stable
20 population unchanged, unmixed is another way to do it.
21 But in general, to state that something is environmental
22 or genetic or occupational, are, I would say, broad
23 guesses.

24 Q Have you prior to today attempted to determine whether
25 or not the cancers from which Mr. Wallace and Mr.

1 Dendinger died were genetically caused or had a genetic
2 etiology?

3 A These identical thoughts occurred through my mind as
4 I was reading through the materials, but it would be
5 impossible to anyone to say today what the cause of
6 their cancer was. I couldn't say.

7 Q Do you have a range of percentages as to the percentage
8 or proportion of all cancers that are genetically
9 caused?

10 A I do not.

11 Q If you don't have a range of percentages as to the
12 percentages of cancers genetically caused, how can you
13 determine a range of percentages of total cancers that
14 are extra genetically caused?

15 A By looking at the present documentation as refined in
16 past literature, in recent literature, which includes
17 many epidemiologic studies in the past ten, twenty
18 years. By looking at medical records of cancer
19 registries in the various areas of the country and
20 nationally and internationally. And then we end up
21 with a good scientific intuitive guess.

22 And I'm not speaking only for myself, but
23 I'm sure some of my colleagues would share my thoughts.

24 Q You indicate-- What is your opinion as to the percen-
25 tage of total cancers that are occupationally caused or

1 result from occupational exposures?

2 A I've indicated that's approximately three percent
3 more or less. Again, this would vary from country to
4 country and place to place.

5 Q What about the United States?

6 A About that.

7 Q Now, in your article you published this year--

8 MR. BUNDA: Again, it's not an article, but a
9 chapter from a book.

10 BY MR. DEILI ROVI:

11 Q Chapter you published this year, you report, do you
12 not, that the "despite the shortcomings, various
13 attempts have been made to estimate the proportion of
14 cancers related to occupation. These estimates span
15 a broad range from less than four percent to more than
16 20 percent. While these estimates were imprecise,
17 little doubt remains that certain occupational factors
18 are significantly related to an increased risk of
19 cancer.

20 Moreover, in certain groups of workers
21 exposed to specific carcinogens, the proportion who
22 ultimately develop occupational cancer may be large."

23 Is this what you wrote in your chapter
24 this year?

25 A Yes, sir, I did.

1 Q Do you personally side with the four percent group
2 rather than the 20 percent group?
3 A Yes, sir, less than four percent as a matter of fact.
4 In the past many decades, this figure has been
5 becoming increasingly smaller from 40 percent, 30
6 percent, now down to under five percent.
7 Q Why is that?
8 A Quite honestly, occupational cancers are becoming very
9 rare.
10 Q Why?
11 A Why? Because of educational processes and control
12 measures, good industrial hygiene, good occupational
13 medicine and so forth. Also, aging of the population,
14 other cancers come out.
15 Q Is it your opinion then in past decades, the percentage
16 of occupationally related cancer was higher than it is
17 today?
18 A Yes, sir.
19 Q You cite twice in your chapter on occupational cancer
20 risks articles published by Thomas Mankuza (phonetic)
21 of the University Pittsburg School of Public Health?
22 A Yes, sir.
23 Q Have you worked with Dr. Mankuza before?
24 A No. But I know him, and I've attended some of his
25 lectures, and he has spent many years in the field of

1 epidemiology and occupational health.

2 Q Do you regard him as an authority in that area?

3 A I do, yes.

4 Q Now, one of the citations you make to Dr. Mankuza is

5 testimony that he gave at the Department of Labor

6 hearings on vinyl chloride in 1974?

7 A Yes, sir.

8 Q I take it that prior to citing that reference, you

9 read his testimony before the Department of Labor in

10 1974 on vinyl chloride?

11 A I can't recall that, sir. No, I can't be that precise,

12 sir.

13 Q I would like to read you, Dr. Zenz, and excerpt from

14 Dr. Mankuza's testimony at those hearings and ask you

15 whether or not you agree with it.

16 "Further, the skin tumors frequently

17 develop near the ear and submaxillary or the same

18 areas as the salivary glands. It was postulated by

19 original investigators that vinyl chloride may enter

20 the salivary gland system.

21 If this is subsequently confirmed, it

22 raises the question whether tumors of the parotid

23 gland can also occur as has been demonstrated in the

24 rubber industry, and this has been confirmed now by

25 the testimony this morning that cancer of the parotid

1 gland has been observed in animals."

2 Do you share Dr. Mankuza's opinion as I've

3 quoted it from those hearings?

4 A I might if I could see his references that he alludes

5 to in that paragraph.

6 Q I don't have with me his references.

7 MR. BUNDA: They don't exist.

8 MR. DELLI BOVI: Well, you may argue they

9 don't exist, Mr. Bunda.

10 MR. BUNDA: You've never been able to show us

11 that they have created cancers in the parotid glands of

12 animals.

13 BY MR. DELLI BOVI:

14 Q Do you agree or disagree with the opinions expressed

15 by Dr. Mankuza at those hearings?

16 MR. BUNDA: Why don't you show him the opinion,

17 because I'm not quite sure the opinion that he's

18 expressing.

19 A Before I do that, I'd like to see something as I look

20 at references. I might have to use a system here.

21 MR. BUNDA: This is Dr. Dahl's deposition.

22 A Okay. I'm not looking at Mankuza's stuff then?

23 BY MR. DELLI BOVI:

24 Q No.

25 A I'm sorry.

1 Q I didn't bring the OSHA hearings with me because
2 they are 4,000 pages long, and physically I couldn't
3 carry them, so I'm referring you to Dr. Dahl's testi-
4 mony that you reviewed several weeks ago.

5 MR. BUNDA: There's no opinion being expressed
6 there. He's reporting on what he did.

7 A Are you asking me a similar question you asked Dr.
8 Dahl about whether or not this can happen?

9 BY MR. DELLI ROVI:

10 Q Yes.

11 MR. BUNDA: I just want the question to be
12 clear about what opinion you're discussing. What
13 opinion was expressed by Dr. Mankuza?

14 A The opinion that's stated there.

15 BY MR. DELLI ROVI:

16 Q Do you agree with Dr. Mankuza's statement as I've
17 quoted it from his testimony at the OSHA hearings?

18 MR. BUNDA: I'm going to object. He apparently,
19 Dr. Mankuzo is making a reference to some studies that
20 Dr. Viola did.

21 A This is what my impression was, too. But may I say
22 something, sir, about Dr. Mankuzo's testimony in this
23 particular paragraph expression? The salivary gland
24 system is an excretory gland constantly excreting
25 saliva, and it's not an operative type situation.

1 It's an excretory gland constantly excreting fluid,
2 so it's not a gland that will take up something.

3 It is the intent of the gland to excrete
4 salivary material to help digestion processes.

5 Q What feeds the salivary glands?

6 A You mean feeds the salivary glands?

7 Q Sure. What makes them operate?

8 A The circulatory system, the lymphatic system, as all
9 are.

10 Q Do you have an opinion as to whether or not vinyl
11 chloride enters the human circulatory system?

12 A It does. Can.

13 Q And the circulatory system feeds, in turn, the parotid
14 gland?

15 A Goes to the brain, heart.

16 Q Do you know whether or not Dr. Villa, when he started
17 doing his research in Italy, began working with
18 primates?

19 A I can't answer that. I don't know what animals he
20 began working with.

21 Q Is one of the reasons for working with mice and rats
22 rather than primates of the cost involved?

23 A Partly the cost and convenience, life span, short
24 life span.

25 Q Have you worked on any cases involved in litigation

1 with Dr. Shindell?
2 A Yes. As the opposing physician.
3 Q Did you do any work in the Sterling versus Velsicol
4 case in Tennessee?
5 A I was consultant to Velsicol, but I was not involved
6 with the Sterling case, and I believe that was
7 environmental contamination. I was not called in to
8 give an opinion on that.
9 Q Who hired you as consultant from Velsicol?
10 A The Director of Environmental Health and Hygiene at
11 the time with the approval of the present chairman.
12 Q And who was that at the time?
13 A I can't recall the names. That was in '77 or '78.
14 Q Have you had any correspondence concerning this case
15 with Dr. Shindell or Mr. Peterson?
16 A Today's case may I ask?
17 Q In relationship to this case?
18 A Not with Dr. Shindell. Only in the fact that I saw
19 his report, part of the documents provided me by Mr.
20 Bunda, and the report provided by Mr. Peterson in
21 his report to Mr. Bunda.
22 Q There has been no exchange then of correspondence
23 directly between you and Dr. Shindell and Mr. Peterson?
24 A No, sir.
25 Q Prior to--

1 MR. RUNDA: Dr. Peterson.

2 BY MR. DELLI ROVI:

3 Q Prior to appearing today, what studies have you
4 reviewed concerning PVC fabrication workers as opposed
5 to PVC resin manufacturing workers or vinyl chloride
6 monomer manufacturing workers?

7 A To separate this in my mind, in other words, the
8 manufacturer of polyvinyl monomer from the raw
9 materials into polyvinyl chloride plastic, and
10 thereafter into plants that fabricate goods from the
11 plastic?

12 Q That's correct.

13 A It's a separation of two processes, two industries.

14 Q Yes, sir. And my question is what studies have you
15 looked at prior to today that concern PVC fabrication
16 workers?

17 A First, I should add that I visited various factories
18 in different parts of the world that make a vinyl
19 chloride monomer in plastic, and also have visited and
20 inspected factories that make a variety of plastic
21 products.

22 One could not say those are studies as
23 such to be published, but add to my general knowledge
24 of these materials. But I have seen the vast body of
25 literature pertaining to workers engaged in these

1 processes.

2 Q Can you cite me as you sit here today one study that
3 you've reviewed epidemiologic study of workers in the
4 PVC fabrication industry as it relates to vinyl
5 chloride exposure?

6 A If my memory serves me correctly, it might have been
7 the Shindell study that we have present before us today
8 as one example.

9 Q Would you regard that as the most relevant epidemiologic
10 study to this case?

11 A I would regard it as relevant to this case, if not
12 highly relevant, but I cannot say it's the most
13 relevant, because there are many other reports in the
14 literature besides Dr. Shindell's report.

15 Q Are you aware of any other epidemiologic reports
16 covering the facility in which Dendinger and Wallace
17 were employed?

18 A Not necessarily identical factories, but similar in
19 many respects, yes. I've seen these reports, and they
20 were generated by people in Sweden, England, Germany,
21 USA.

22 I recall the editor of the Journal of
23 Occupational Medicine was Dr. Tabershaw, when he was
24 on the editorial board and he was active in making
25 epidemiological surveys for either the industry or

1 The Plastics Association.

2 Q My question is whether you're aware of any other
3 epidemiologic studies of the Chrysler plant and the
4 Chrysler work force in Sandusky, Ohio other than Dr.
5 Shindell's?

6 A Yes. I think the Environmental Health Associates in
7 San Francisco or Oakland, Dr. Marton's group made the
8 study, I believe, of the Chrysler Corporation plant.

9 Q Have you seen that?

10 A Isn't it in the group that you've given me, Mr. Bunda?

11 Q If you are familiar with that, Dr. Zenz, I would
12 like to see it?

13 MR. BUNDA: But one, are you referring to the
14 Tabershaw study, Cooper study? He's trying to draw
15 an artificial distinction here. Just a study of the
16 Chrysler plant.

17 A Perhaps I have it mixed up with another series of cases.
18 Excuse me just a minute, please.

19 BY MR. DELLI BOVI:

20 Q I know it's not in there, Dr. Zenz.

21 A Then it came to mind somewhere else.

22 Q I don't want to confuse you.

23 A That's easy to do under the circumstances, Mr. Delli
24 Bovi. Give me a while to reflect on your question.
25 I'd like to say that I read practically everything

1 Tabershaw and Cooner et al. have published and probably
2 have the copies of the publications.

3 I've read considerable publications by
4 Leonard Chiazi whom I know. And, of course I have
5 read the report in 1984 by Heldus. (phonetic) He's
6 a Norwegian investigator. I'm familiar with Dr.
7 Gustov Muleana. I know him personally. We studied
8 in Sweden.

9 Yes. I've read these records, indeed
10 I have. But what can I say about them?

11 Q My question isn't about those reports. My question is
12 whether you're aware of any epidemiologic study
13 concerning workers at the Chrysler plant in Sandusky,
14 Ohio other than that conducted by Shindell?

15 A My apologies, sir. The question is clear to me now.
16 No, I'm not.

17 Q What was that study or that name you had given me
18 before?

19 A W-h-o-r-t-e-n. He's the physician associate with the
20 Environmental Health Associates in Oakland, and they
21 do many studies for industry, countrywide. I may have
22 confused his study with some other work I'm doing,
23 so I'd like to retract that, please. I don't want to
24 further confuse us.

25 Q You've never seen anything published by Whorten?

1 A For the Chrvsler plant?

2 Q Or relating to vinyl chloride in general?

3 A Yes, I have, but it has nothing to do with Chrysler.

4 Q What did you see from Whorten? Is it in those mater-
5 ials?

6 A I was in error. I'm sorry about that. I was in error.
7 I'm sorry. That had nothing to do with your work.

8 Q Did it have anvthing to do with vinyl chloride?

9 A Yes, I think so.

10 Q Where did you get the document from?

11 A I could have gotten it from Whorten directly sometime
12 ago.

13 Q Do you have the document?

14 A I think so.

15 Q Was it an epidemiologic study?

16 A Yes, sir.

17 Q Did it involve vinyl chloride?

18 A I think so, but I'm not certain.

19 Q Was it conducted within the last two years?

20 A I can't be sure of that date.

21 Q Was it conducted within the last five years?

22 A Probably, yes.

23 MR. DELLI BOVI: Mr. Bunda, can you tell me
24 whether or not any of the defendants in this case have
25 retained Whorten to conduct any studies relating to

1 vinyl chloride or the work force at the Chrysler
2 facility in Sandusky?

3 MR. BUNDA: For the purposes of this case?
4 No. I have no knowledge of his study at any time.
5 I don't know whether they've retained him for something
6 else or not. I've got nine defendants that I've been
7 representing, and they've got lots of plants. I've
8 never heard of the study, however, I'm interested to
9 see them.

10 BY MR. DELLI BOVI:

11 Q Would you make a copy of that study?

12 A Yes, sir. If I can find it, I'll be pleased to do that.
13 But please understand it's not unusual to have copies
14 of reports and papers mixed with something else.

15 Q What is this individual's full name?

16 A Donald Whorten.

17 MR. BUNDA: Again, we'll supply it, if a
18 formal request is made.

19 BY MR. DELLI BOVI:

20 Q And who does he work for?

21 A He works as a consultant. It's called Environmental
22 Health Associates, and he's one of the leaders in the
23 field. I regard him very highly.

24 Q And Environmental Health Associates is based in Oakland,
25 California?

1 A Yes, sir. I don't have the exact address.
2 Q Have you had any discussions in the last two years --
3 Is this Dr. Whorten?
4 A Yes, sir, M.D.
5 Q --with Dr. Whorten concerning vinyl chloride in general
6 or the Chrysler facility in particular?
7 A I have not.
8 Q Have you been in communication or had any communication
9 directly with any representatives of any of the
10 defendants in this case other than Mr. Bunda and
11 members of his firm?
12 A None whatsoever. Excuse me, but I have met with Mr.
13 Peterson.
14 MR. BUNDA: His question was have you had any
15 contact with defendants.
16 A Defendants, no, I have not.
17 Q Have you had any meetings with Dr. Shindell?
18 A No.
19 Q When did you meet with Dr. Peterson regarding this
20 case?
21 A A week ago or something.
22 MR. BUNDA: For the record, let's be accurate
23 on this, Dr. Zenz. We didn't meet with Dr. Peterson
24 for purposes of this case. We got together for lunch.
25 A I met him because I hadn't seen him for many, many

1 years. It was a social visit. I'd like to make that
2 very clear.

3 BY MR. DELLI BOVI:

4 Q You have had no discussions concerning this case either
5 with Peterson or with Shindell?

6 A I have not.

7 Q Would you tell me what the basis is upon which you're
8 rendering services in this case?

9 A You mean my fee?

10 Q Yes, sir.

11 A I don't know what that is at the moment. It would be
12 a fee for services as a private practitioner.

13 Q Do you do that on an hourly basis?

14 A No, sir.

15 Q How is your fee determined?

16 A It is determined on the time involved and complexity
17 and the stress I'm put under and how much material I
18 need to review and how much time away from home.

19 Q Have you rendered any bill yet to Mr. Bunda or his firm
20 or any of his clients for services rendered to date?

21 A I think I probably sent out one bill to Mr. Bunda's
22 firm.

23 Q Do you recall when that was or what the amount was?

24 A The amount was about \$800, and I don't recall when it
25 was.

1 Q Would you explain to me, Dr. Zenz, exactly what you
2 have been asked to do in this case by Mr. Bunda in the
3 way of rendering opinions or giving testimony?

4 MR. BUNDA: I'm going to object to that.
5 That gets into attorney work product privilege, and
6 I'm going to object.

7 BY MR. DELLI BOVI:

8 Q What is your understanding, Dr. Zenz, as to what--
9 I'll ask the question another way. Assuming this case
10 was set for trial tomorrow, what opinions would you
11 anticipate giving at the trial?

12 A I'd be glad to try to answer that immediately. That
13 the tumors found in these workers couldn't have been
14 caused from their work exposures, if indeed there was
15 such exposure to vinyl chloride as such. That would be
16 my answer to you.

17 Q And what assumptions have you made regarding the levels
18 of exposure that Mr. Wallace and Mr. Dendinger were
19 subjected to during their employment at Chrysler?

20 A They were very low.

21 Q Below the present TWA PEL for vinyl chloride?

22 A Yes.

23 Q At all times during their employment?

24 A Essentially, yes.

25 Q What is your opinion as to the latency period for

1 occupational cancers?

2 MR. BUNDA: I'm going to object to that on the
3 basis that it's overbroad and vague.
4 Can you answer that for all cancers?

5 A That's impossible.

6 BY MR. DELLI BOVI:

7 Q Well, did you say in the summary of your chapter,
8 "Occupational cancer usually becomes evident long after
9 initial exposure to the carcinogen. This interval
10 may vary from five years to more than forty years."

11 A That's right.

12 Q Is that your belief?

13 A Yes, sir. That's very general, however.

14 MR. BUNDA: I'm inserting an objection on the
15 record. This case involved claims of cancer arising
16 from vinyl chloride. Questions as to all cancers are
17 irrelevant. If you want to address your cancers to
18 vinyl chloride, I'm sure Dr. Zenz will be happy to
19 answer.

20 BY MR. DELLI BOVI:

21 Q Do you have an opinion as to the latency period as
22 to vinyl chloride-induced cancers?

23 A Yes.

24 Q What is your opinion?

25 A The inducement is dependent on massive heavy long-term

1 exposures, and by that I mean thousands of parts per
2 million for many years, and this would not occur in
3 all workers.

4 Q And what is your opinion regarding the latency period
5 for vinyl chloride-induced cancers?

6 A Probably 15 to 20 years under those conditions of
7 continued heavy massive uncontrolled exposure.

8 Q And is it your opinion that all of those individuals
9 who have developed angiosarcomas while employed in the
10 PVC resin industry have been subjected to continued
11 massive uncontrolled exposures to vinyl chloride?

12 A Very likely.

13 Q What about those employees who developed angiosarcomas
14 working in the PVC fabrication facilities? Do you
15 believe, or is it your opinion that those employees
16 were subject to continued massive uncontrolled exposures
17 to vinyl chloride?

18 MR. BUNDA: I'm going to object. What
19 employees are we talking about here?

20 MR. DELLI BOVI: Those covered by the Molene
21 article in 1984.

22 MR. BUNDA: If you understand the specific
23 reference then to the Italian article.

24 A There was a Swedish study, even though Molene was
25 Columbian and Mexican, but I have a feeling that was

1 only one factory.

2 BY MR. DELLI BOWI:

3 Q I'm talking about the article published in 1984 in
4 the American Journal of Industrial Medicine entitled
5 "Two Cases of Liver Angiosarcoma Among Polyvinyl
6 Chloride Extruders of an Italian Factory Producing
7 PVC Bags and Other Containers."

8 A That's Maltoni.

9 Q Would you like to answer my question now?

10 A Would you read it please?

11 (Pending question read.)

12 A If I had been the editor or reviewer of that article,
13 I would not have accepted it for publication as
14 submitted, as it gives no idea whatsoever of the
15 history. One worked in the laundry for a period, and
16 it also gives not the vaguest idea of what the
17 exposures happen to be in terms of quantity other
18 than to say that was an extruding operation, and that
19 is not enough for me to form my opinions.

20 That paper should have been expanded.
21 Measurements should have been made in the factory.
22 They had ample time to do that. There's no reason why
23 the inspectors couldn't have repeated that extrusion
24 operation and made air samples.

25 Q Do you subscribe to the American Journal of Industrial

1 Medicine?

2 A Yes. It's not high on my list of journals, but it's
3 being published.

4 Q We've discussed the workers compensation cases in which
5 you've testified. What other non-worker's compensation
6 cases have you given expert testimony in?

7 A In chlordane exposures in homes, the use of respirators
8 in hazardous waste sites, decontamination of hazardous
9 waste sites, chlordane, again, environmental exposures
10 to chlordane, dioxin exposures, general environmental
11 contamination, formaldehyde exposures for mobile
12 homes and homes. That's about it in recent years.

13 Q Did Dr. Shindell do work for Allis Chalmers while you
14 were employed there?

15 A No.

16 Q If you are doing an epidemiologic study to determine
17 whether or not a particular work force is contracting
18 cancers at a higher rate than the general population
19 because of exposure to vinyl chloride, what is the
20 significance of incorporating into that study workers
21 who have been employed by that factory for as little as
22 three months prior to the cut off date of the study?

23 MR. BUNDA: I'm going to object to the question.
24 I'm not offering Dr. Zenz as an epidemiologist. We're
25 going to have three epidemiologists testifying on this.

1 A You'll get three different answers, too.

2 If you insist, I'll try and answer that.

3 MR. BUNDA: You can go ahead and answer the
4 question. I think he's making specific reference to
5 the Shindell study.

6 A I'm not going to say I disagree with Professor or
7 Dr. Shindell or anyone else. Let's just say for the
8 sake of convenience, the longer the interval one
9 chooses for a beginning point, the easier the study is.

10 There are a great bulk of employees who
11 work less than a year because of personal reasons.
12 They quit, and it makes a vast study population of
13 movement. It's difficult to trace people down in our
14 country. We don't have very accurate registries in
15 the United States, and I'm familiar with the State
16 of Wisconsin Registers because I've been on the
17 committee for two years or so.

18 The shorter interval of time from onset
19 of employment for selection, the more difficult the
20 study will be and the more uncertain the exposures are
21 of any type. So I would prefer to see a little longer
22 period of time, say six months, nine months, or a year
23 for long-term studies. But that's subject to
24 epidemiologic discussion and arguments worldwide.

25 Q What effect does a latency period of five years or

1 ten years or more have on a study that encompasses
2 workers who worked at a particular factory for as little
3 as three months before the cutoff date of the study?

4 MR. BUNDA: Do you understand that question?

5 A I'll try.

6 MR. BUNDA: I don't, but if you do--

7 A It's a difficult question you asked me.

8 BY MR. DELLI BOVI:

9 Q Let me ask the question another way. If the latency
10 period for a particular cancer is ten years or more
11 and you include in your study a significant number of
12 of employees who prior to the cutoff date have had
13 less than ten years elapse between initial exposure and
14 that cutoff date, what effect does that have on the
15 study as a whole?

16 A It could have a big effect. It may not, though.

17 MR. BUNDA: Let me interpose an objection here.
18 I don't think that the question makes any sense, and
19 I think he's confusing the terms latency period and
20 exposure period, but I'm not going to tell him how to
21 answer his question. I'm objecting on the basis that
22 it's a nonsensical question.

23 BY MR. DELLI BOVI:

24 Q Do you understand the question, Dr. Zenz?

25 A I think so. Let me reflect on your question just a

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1 moment more, please.

2 See, most epidemiologic studies for
3 occupational purposes are fraught with many, many
4 errors. This is in contrast to studies of, say,
5 ineffective processes such as T.B. malaria, and so on
6 and so forth, the classic studies of the past.

7 There are so many other factors involved
8 besides one organism, and I'm getting to the point
9 where we're very much concerned about quantities and
10 doseages of exposure. If you send workers to work in
11 a foundry or a factory that they have to shovel
12 silica sand in enclosed spaces without ventilation or
13 protective equipment, they may develop silicosis
14 within a year or could. And if they quit their jobs,
15 they may not develop it forever.

16 Now, if you consider young fellows in a
17 similar situation with no occupational exposure who
18 are heavy smokers, and you disregard that, that's
19 another factor of latency. So you're giving me a
20 question containing latency, but I'm interested to
21 know the components or the make up of the substances
22 or the materials as well as the potential dose or
23 exposure during that period which to me are most
24 important components rather than exactly the cutoff
25 date.

1 Most of the epidemiologic studies we look
2 at always talk about exposure, but never quantify.
3 That's the fault I see with all the documents in front
4 of me. With exceptions, exposures only indicate they
5 were working with something, and that's not enough for
6 me to go on.

7 Q Do you know what the cause was of the greater than 100
8 percent increase in observed versus expected cancers in
9 the job categories at Chrysler in which Dendinger and
10 Wallace were employed?

11 A Did I here 100 percent increase?

12 Q Yes, sir.

13 A Could you point that out to me again, please?

14 Q Sure. I'm going to hand you what's previously been
15 marked Plaintiff's Exhibit Dahl 3.

16 MR. BUNDA: This is the chart that you made up.

17 BY MR. DELLI BOVI:

18 Q From Dr. Shindell's data.

19 A I recall reviewing, just looking at it and thinking
20 about it, of course.

21 MR. BUNDA: I also object to the question on
22 the basis that it's a mischaracterization of evidence.
23 There is no 100 percent increase.

24 A That's the problem I have, too. This is really
25 incomplete data you're giving me.

BY MR. DELLI BOVI:

Q Let's take the job category of Dendinger and Wallace.
You see those?

A Yes, sir, coating and finishing and inspection.

Q And determine the total number of cancers on those two groups. Does that yield the total of 14 observed cancers in the two job categories in which Mr. Wallace and Mr. Dendinger were employed?

A Apparently with this admonition, that we don't know the total number of workers or the total time span or how old they were and so forth and their exposure.

Q That's because you haven't seen Dr. Shindell's raw data?

A That's right.

Q But you're aware from reviewing his report that in the job categories in which Wallace and Dendinger would have been, there was a total of 14 observed cancer deaths?

A So reported.

Q Versus an expected number of cancer deaths of 6.99?

A Seven. So this is why you confront me with the term 100 percent.

Q Yes.

A Thank you.

Q Is that a fair characterization?

A It's a common finding in these types of studies

1 worldwide.

2 Q Do you have any opinion as to the reason why there were
3 14 cancer deaths in the job categories in which Wallace
4 and Dendinger worked versus the 6.99 expected deaths?

5 MR. BUNDA: Again, I'm going to object to the
6 question as being an inaccurate characterization.

7 A I can't answer that.

8 BY MR. DELLI BOVI:

9 Q Do you know whether or not Dr. Shindell was ever asked
10 to account for that difference?

11 A I can't say that. I don't know.

12 MR. DELLI BOVI: That's all I have, Dr. Zenz.
13 Thank you.

14
15 EXAMINATION BY MR. BUNDA:
16

17 Q You were asked some questions about residual chloride
18 monomer in the polyvinyl chloride resin used at the
19 Chrysler Sandusky plant. Do you recall those questions?

20 A To some extent, yes.

21 Q And you were asked some hypothetical questions or at
22 least some questions about whether you knew the level
23 of residual vinyl chloride monomer before and after
24 1974 used at that plant. Do you recall those questions?

25 A Yes, sir.

1 Q Doctor, I'd like you to presume for purposes of my
2 question that the residual vinyl chloride monomer
3 found in some of the PVC resin used at that plant in
4 1974 was higher than the residual vinyl chloride
5 monomer level which may have existed in those resins
6 after 1974, and I'd also ask you to presume that the
7 exposure levels that you saw in the industrial
8 hygiene surveys which were done in 1974 of the workers
9 at the Chrysler plant came as a result of using that
10 resin that had the higher residual vinyl chloride mono-
11 mer levels.

12 Given those presumptions, is your con-
13 clusion that you've expressed the same concerning the
14 low levels of exposure at the plant?

15 MR. DELLI BOVI: I'm objecting to the question.
16 You go ahead and answer, Doctor.

17 MR. BUNDA: Basis of your objection?

18 MR. DELLI BOVI: The basis of my objection is
19 that I don't believe your question contains facts that
20 are supported or will be supported by the evidence.

21 BY MR. BUNDA:

22 Q Okay. You can go ahead and answer the question.

23 A To simplify the answer to a complex question, I would
24 say that in my mind, the exposure levels under both
25 circumstances are very low.

1 Q All right. You expressed some impression earlier that
2 the residual vinyl chloride monomer levels may have
3 remained constant on or before 1974.

4 Regardless of whether or not that's
5 true, the exposure levels that you saw in 1974 to
6 the workers were consistent with your opinions expressed
7 concerning the fact that they were low exposures; is
8 that right?

9 A Absolutely.

10 Q Also to clarify one other thing. You expressed an
11 opinion that the permissible exposure level for
12 exposure to vinyl chloride today is ten parts per
13 million. Is that your understanding that that's
14 incorrect?

15 A That was my error. We were talking about so many
16 numbers. It should be one.

17 Q One part per million?

18 A Yes.

19 Q Thank you.

20
21 EXAMINATION BY MR. DELLI BOVI:
22

23 Q And you discussed those matters that Mr. Bunda just
24 inquired during your lunch with him, did you not, sir?

25 MR. BUNDA: Objection, sir. Don't answer that.

1 That's an inquiry into discussion between the attorney
2 and his expert, and you don't have to answer.

3 BY MR. DELLI BOVI:

4 Q Doesn't make any difference whether it's a subject
5 between the discussion you and he. I want an answer
6 to that question. Did you discuss those matters with
7 Mr. Bunda over lunch and change your opinions as a
8 result of those discussions?

9 A I didn't change my opinions of anything.

10 Q Your opinion this morning was that the PEL for vinyl
11 chloride at the present time was ten parts per million.

12 A I must have erred. PEL is different than TLV.

13 Q I understand that you testified this morning it was
14 ten.

15 A Yes.

16 Q You testified this afternoon that it's one?

17 A Yes.

18 Q What caused you, between this morning and this after-
19 noon to change your opinion?

20 MR. BUNDA: I think he just explained for the
21 record.

22 A It was an error. I apologize for that error.

23 BY MR. DELLI BOVI:

24 Q And that was something you discussed with Mr. Bunda over
25 lunch hour, and it was as a result of that discussion

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that you're changing your answer?

A No.

MR. BUNDA: I'll instruct this witness not to answer.

MR. DELLI BOVI: Fine. Then we'll come back and get an answer later.

BY MR. DELLI BOVI:

Q I take it, Dr. Zenz, that you're going to follow Mr. Bunda's instruction and not respond to my question?

A Right.

Q And if you are instructed by the court reporter to respond, you will follow Mr. Bunda's recommendation and not answer the question?

MR. BUNDA: That's right.

A Yes.

MR. DELLI BOVI: All right. Thank you.

* * *

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2 STATE OF WISCONSIN)
3) SS.
4 MILWAUKEE COUNTY)

5 I, TERESE M. SCHIEBENES, a Notary Public
6 in and for the State of Wisconsin, and a Certified
7 Professional Reporter, do hereby certify that I sat in
8 the offices of Dorothy M. Wagner and Associates, Court
9 Reporters and Notaries Public, on the 13th day of October,
10 1988, and was attended by Kirk J. Delli Bovi, Attorney
11 for the Plaintiffs, and Robert A. Bunda, Attorney for the
12 Defendants, in the foregoing entitled matter, taken
13 pursuant to the provisions of Section 804.05 of the
14 Wisconsin Statutes.

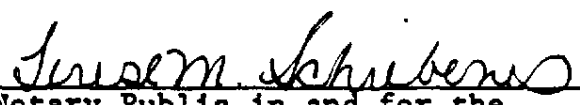
15 That before the examination was commenced,
16 the witness was duly sworn by me to testify the truth, the
17 whole truth, and nothing but the truth, relative to
18 said cause.

19 That as a Certified Professional
20 Reporter, with offices located at Suite 400 Germania
21 Building, 135 West Wells Street, Milwaukee, Wisconsin,
22 I hereby certify that I took in machine shorthand the
23 foregoing proceedings and the same is true and correct
24 as contained in my original machine shorthand notes
25 taken at said time.

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That I am not a relative or employee
or attorney or counsel of any of the parties, nor am
I a relative or employee of such attorney or counsel,
nor am I financially interested in the action.

Dated this 12th day of November, 1988.


Notary Public in and for the
State of Wisconsin.
My Commission Expires: 2/25/90/

UPL 06936