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Colby
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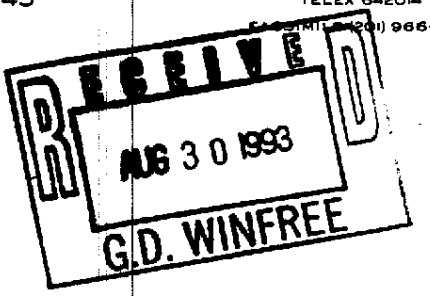

August 26, 1993

Gregory D. Winfree, Esq.
Litigation Counsel
Union Carbide Corporation
Law Department
39 Old Ridgebury Road
Danbury, CT 06817-0001

PRIVILEGED AND "CONFIDENTIAL MATERIAL SUBJECT TO PROTECTIVE ORDER"

Re: Colby v. Union Carbide Corporation

Dear Mr. Winfree:

This will provide you with a brief update on the status of discovery in the above captioned matter.

The deposition of plaintiff's safety engineering expert, Dr. Burton Z. Davidson, was conducted by Bob Hollingshead on August 23, 1993 and he will be providing you with a summary of Dr. Davidson's testimony within the next few days. Bob will also be conducting the deposition of plaintiff's medical causation expert, Dr. Rowland D. Goodman on September 8, 1993. I will be conducting the depositions of Dr. Dennis Fitzgerald (decedent's treating oncologist) and Dr. Vito Gulli (the physician who conducted the post-mortem examination of the decedent) on September 13, 1993.

On August 18, 1993, I deposed Dr. Brian Boyle (decedent's treating physician) at his office in Red Bank, New Jersey. A brief summary of the pertinent parts of the deposition, based upon my notes and recollection, is set forth below.

Dr. Boyle, along with his partner, Dr. Carmen, had been covering for Mr. Colby's primary treating physician, Dr. Commentucci, during Mr. Colby's February 1989 admission at Riverview Medical Center. Although the hospital record indicates that Dr. Boyle's initial impression of Mr. Colby's condition in February 1989 was "primary liver neoplasm", he testified that his impression changed after tests and studies revealed "adenocarcinoma metastatic to the liver with unknown primary." This later

impression is more consistent with the cause of death listed in the death certificate as "metastatic cancer to the liver".

According to Dr. Boyle, the sole basis for his suspecting a "primary liver neoplasm" following his initial assessment of Mr. Colby on February 2, 1989 was Mr. Colby's "huge, rocky hard liver." However, Dr. Boyle conceded that this sign, in and of itself, was also indicative of alcohol related diseases, i.e., cirrhosis of the liver, as well as metastatic cancer to the liver.

When initially questioned, Dr. Boyle stated that the post mortem examination conducted by Dr. Gulli was not definitive proof that the primary location of Mr. Colby's cancer was the lung, as compared to the liver. However, since he was not the treating physician in May 1989, Dr. Boyle could not comment upon the probable cause of death as he was not involved in Mr. Colby's care at this time. Nevertheless, he did finally concede that the possible cause of Mr. Colby's death was lung cancer.

Dr. Boyle is a doctor of osteopathic medicine, with board certification in internal medicine and gastroenterology. Overall, he makes a fair impression as a witness. Because of his opinions elicited at his deposition, we do not anticipate that the plaintiff's attorney will call Dr. Boyle as a witness on his client's behalf at trial. At this juncture, there would also be no basis for calling Dr. Boyle as a witness on behalf of Union Carbide, since the medical records for Mr. Colby's admission at Riverview Medical Center in February 1989 confirm Dr. Boyle's opinions obtained at the time of his deposition. These medical records can also be relied upon by our medical expert, Dr. Scoppetuolo.

Please call if you should have any questions concerning the above. In the interim, we shall continue to keep you advised of all further developments in this matter.

Very truly yours,

Kathryn M. Decker

KATHRYN M. DECKER

KMD:ss
cc: Robert L. Hollingshead

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Colby v. Union Carbide

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Testimony of Burton Z. Davidson

August 23, 1993

MINITRANS AND ALL-WORD INDEX
PREPARED BY:

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SUPERIOR COURT OF NEW .SEY
LAW DIVISION: MIDDLESEX COUNTY
DOCKET NO. L-1979-91

: PHYLLIS COLBY, etc., :
Plaintiff, : DEPOSITION UPON
: ORAL EXAMINATION OF:
: vs. : BURTON Z. DAVIDSON,
: Ph.D., P.E.
: UNION CARBIDE : CORPORATION, :
Defendant. :

TRANSCRIPT of the deposition notes of BURTON Z. DAVIDSON, Ph.D., P.E., witness called for oral examination in the above-entitled action, said deposition being conducted pursuant to the Rules Governing Civil Practice in the SUPERIOR COURT OF NEW JERSEY, by and before GINA MARIE LATHAM, a Notary Public and Certified Shorthand Reporter of the State of New Jersey, License No. XI01566, at the offices of LEVINSON, AXELROD, WHEATON & GRAYZEL, ESQS., 2 Lincoln Highway, Edison, New Jersey, on Monday, August 23, 1993, commencing at 10:49 a.m.

ROBERT CIRILLO, INC.
Certified Shorthand Reporters 5N - Regent Street - Suite 503 Livingston, New Jersey 07039
(201) 740-1331

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APPEARANCES:
LEVINSON, AXELROD, WHEATON & GRAYZEL, ESQS. BY: ALFRED A. LEVINSON, ESQ. Attorneys for Plaintiff Phyllis Colby
PITNEY, HARDIN, KIPP & SZUCH, ESQS., BY: ROBERT L. HOLLINGSHEAD, ESQ. - and
KATHRYN M. DECKER, ESQ. Attorneys for Defendant Union Carbide Corporation

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BURTON Z. DAVIDSON, Ph.D., P.E., 5 Hamlet Court, Somerset, New Jersey, having been first duly sworn according to law by the officer, testifies as follows:

DIRECT EXAMINATION BY MR. HOLLINGSHEAD:

Q. Dr. Davidson, good morning.

A. Good morning.

Q. As you will recall from other occasions, my name is Robert Hollingshead and I'm an attorney with the law firm of Pitney, Hardin, Kipp & Szuch. We represent the defendant, Union Carbide Corporation in the matter in which you've rendered an expert opinion.

This is, of course, our third go-around as I recall in depositions so I know you're familiar with the standard instructions. I'll only remind you of a couple, if I may.

Please allow me to finish my question before you start your answer and I'll do you the courtesy of allowing you to finish your answer before I ask another question.

If Mr. Levinson should have an objection to a question, allow us to hash it out on the record before you answer and he will instruct you

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accordingly in terms of however our conversation results.

You should keep all of your answers verbal. The reporter, who's on your right, cannot take down nods and shakes of the head. Actually, she can but then the question as to whether or not it's an accurate record is up in the air.

Did you receive from Mr. Levinson a request that you produce certain documents here today? It would have come some time last week.

A. I received it as a copy from you, I believe.

Q. That's fine. Could you just produce that for me?

A. Yes.

Q. Thank you.

MR. HOLLINGSHEAD: Could you mark this as Davidson-1?

(Letter dated 8-17-93 is received and marked Davidson-1 for identification.)

Q. I don't know if the document that's been marked as Davidson-1 asks for a current CV but I wonder if you have one with you?

A. No.

Q. Could you provide a current CV to

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Mr. Levinson when you go back to your office and he'll then forward it to me?

MR. LEVINSON: You can send it directly to me.

Q. If you have my address you could do that too.

Now, the last time that I took your deposition was some time late in 1989 as I recall. So rather than go through your entire history again, which I've done at length before, allow me to ask you just a few questions to update your current position and experience.

A. Can I ask you a question?

Q. Certainly.

A. Did you receive my correspondence?

Q. Yes.

A. Okay.

Q. The one that asks about a question?

A. Yes. Was there any problem? I didn't get any response.

Q. I have the check here. I will fill it out at the end of the day.

A. Okay. Sorry for the interruption.

Q. That's okay.

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Since approximately October of 1989 can you tell me if you have had occasion to render an expert opinion in any case involving either polyvinyl chloride and vinyl chloride monomer?

A. I don't recall any.

Q. Obviously other than this case in which you have rendered such an opinion.

MR. LEVINSON: What was the question?

MR. HOLLINGSHEAD: Since I deposed him in October of '89 has he done any?

MR. LEVINSON: Okay.

MR. HOLLINGSHEAD: I'm going to update it out rather than go over his history.

A. There may have been one.

Q. Can you tell me about that?

A. Having to do with extrusion of PVC resin.

Q. Was it a case involving personal injury?

A. Yes.

Q. How long ago was this?

A. Without checking my file I can't be accurate but it was some time in this last three

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year time frame.

Q. Can you tell me what was involved?

A. Four year time frame. No.

Q. Can you tell me what was involved in

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the case in general?
A. Thermal decomposition of PVC resin during extrusion and the evolution of toxic fumes and the exposure to the operator in a poorly ventilated work space.
Q. Do you recall the law firm that asked you to render such an opinion?
A. I would have to check my file. I wasn't prepared for that question to memorize but I have it in my file.
Q. Was it the Levinson firm?
A. No, it wasn't.
Q. Was it a firm on behalf of the injured worker?
A. Yes, it was.
Q. Do you remember the nature of the injury to the worker?
A. Respiratory problems.
Q. Was cancer involved?
A. At the time I rendered my report I didn't

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see that result.
Q. What happened to the case eventually, if you know?
A. It's still in litigation, as best I know.
Q. Were you deposed in that case?
A. No.
Q. Would it be difficult for you to find the name of the action, the caption, and tell me the law firm that you were retained by?
A. It wouldn't be difficult.
Q. Would you do that for me, please?
A. I would just have to do it. The plaintiff was Williams. I just don't know the law firm at this point nor do I recall the manufacturer of the resin at this point.
Q. Do you recall the type of PVC resin that was in that case?
A. I would have to check my file as to what process it came from but it's positively in my file. You need that too?
Q. Yes, if you could find it for me.
A. In other words, you want some details. Okay.
Q. My thought is if you find the report, although you probably are not permitted by

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that law firm to send me a report, you might simply make a brief summary from that and provide it to Mr. Levinson and provide it to me.
Have there been any other cases since 1989 in which you have appeared as an expert to give an opinion regarding PVC or VCM?
A. No. That's my only recollection in the last four years.
Q. Since approximately October of 1989 have you published any article or any piece of writing in that regard that deals with either polyvinyl chloride or vinyl chloride monomer?
A. No.
Q. What is your current past position at Rutgers?
A. I'm a chairman of the chemical engineering department.
Q. That was your position in 1989. My recollection as well.
A. I've been re-elected to my sixth consecutive three year term.
Q. Congratulations.
A. Some people say condolences.
Q. I might have said that too. I don't know what's involved.

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A. Headaches.
Q. Has the department since 1989 under your ...ion and supervision been involved in any ...dies concerning either polyvinyl chloride or vinyl chloride monomer?
A. No.
Q. Let's now move away from the time frame of 1989 until the present time and let me broaden it to your entire time during which you have appeared as an expert witness.
In all of that time have you ever testified at trial as compared to depositions?
A. In the subject matter of PVC resins?
Q. Have you ever appeared at trial in your capacity as an expert in the general field of chemical engineering, if I can use that field, or describe it that way for the moment?
A. Yes.
Q. How many times have you testified?
A. Since 1989?
Q. No. In your entire career.
A. Oh. I can't give you an accurate figure but –
Q. Give me a range.

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A. It has not been more than one or two times a year. In court.
Q. And over how many years are we talking?
A. The one or two a year average has really only been over the last ten years. Prior to that far less than that.
Q. Have you been found to be qualified by the court in each of the instances in which you appeared in court in order to testify?
A. The broad area of safety engineering, particularly chemical engineering, process safety engineering and then there's sub categories in that as I broke it down for the courts.
Q. All right. Back up to my question. I take it from your answer that in each of the instances which you have appeared in court with the intention of testifying as an expert you have, in fact, been found qualified by the court in the area of safety engineering?
A. Yes. Number of times. A number of times. In fact, in each instance that I've testified as a matter of fact.
Q. Thank you. You have never attended court with the intention of testifying as

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an expert and been found to be not qualified to render such an opinion. Have you?
A. No. My voir dire has held up in each instance. Yes.
Q. In each of these instances has it been in the general area of safety engineering with some subparts to that as you mentioned a moment ago?
A. Yes.
Q. Can you run through some of the, if I heard it correctly, some of the subparts of safety engineering in which you have been qualified to testify?
A. In fire safety including degradation and exposure to toxic chemicals relating from chemical processing.
Q. I'm sorry. Is that separate from fire safety?
A. Yes.
Q. That's the second category?
A. Yes.
MR. HOLLINGSHEAD: Would you read back to me the second?
(Whereupon the requested portion is read back by the reporter.)

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(1) Q. The second subpart that you referred (2) to which is exposure to toxic chemicals (3) resulting from chemical processing, is that the (4) subpart of your expertise that you are giving here (5) in this case, the Colby case?
(6) A. There's really two. There's thermal (7) degradation and exposure. There's two things (8) occurring here. There's the effect of heat on the (9) decomposition of chemicals leading to exposure and (10) then physical exposure by inherent properties of (11) materials in process.
(12) Q. Have you –
(13) A. But not necessarily fire but there could be (14) smoke involved so there's combustion involved. In (15) a sense both.
(16) Q. In that same sense thermal (17) decomposition of chemicals, if you recall, is part (18) of your – it's part of the expertise you have (19) rendered in the subpart of fire safety. Is it not?
(20) A. Correct. But it always ties in directly (21) with exposure to toxic chemicals.
(22) Q. That was understood. I wanted to (23) be sure that thermal decomposition really is (24) involved in both of the subparts of your expertise.
(25) A. Yes.

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(1) Q. In what capacity do you appear as (2) an expert in this case, the Colby case?
(3) A. As a chemical process safety engineer.
(4) Q. What opinion is it that you were (5) asked to express by Mr. Levinson when he retained (6) you for this case?
(7) A. He didn't really express it that way. He (8) asked for my opinions as to exposure to chemicals (9) in the workplace which I examined and rendered (10) opinions on as to the kind.
(11) Q. Anything else?
(12) A. That's it.
(13) Q. Have you been asked in this case (14) to render any opinion regarding medical causation (15) between Mr. Colby's exposure to certain chemicals (16) and his resulting cancerous condition?
(17) A. I was asked many years ago with Maliko and (18) Schaffer and others that were exposed to do a (19) literature survey and in that literature survey I (20) was not restricted to engineering or medical. I (21) just did a literature survey and I also compose (22) intersections between engineering and the medical (23) field which I took account of.
(24) Q. Are you expressing in an opinion (25) as to whether or not Mr. Colby's exposure to

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(1) certain chemicals is medically related to his (2) cancerous condition?
(3) A. No. I'm not making any conclusion as to (4) the medical causation. I do bring the chemicals (5) that I found, if they exist, to the body and into (6) the body by various physical chemical mechanisms (7) and then stop.
(8) Q. And then you allow other experts (9) in other fields to take that from there. Is that (10) fair?
(11) A. Correct. There's an intersection here but (12) I'm not drawing any medical inference at all.
(13) Q. In this case we both know that (14) that Dr. Goodman has rendered an expert report on (15) behalf of the plaintiff that discusses medical (16) causation. Correct?
(17) A. Yes. I reviewed that.

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(18) Q. That was my next question. From (19) your report it's obvious that you did review that. (20) Did you accept those opinions as written by (21) Dr. Goodman in any fashion in rendering your (22) report?
(23) A. I took cognizance of the fact that PVC and (24) VCM were indicated as exposure elements in this (25) report among others and in my report I indicated

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(1) were those probably came from in the work (2) environment.
(3) Q. I take it that you mean the (4) exposures that Mr. Colby had to PVC and VCM.
(5) A. Correct.
(6) Q. Where did those exposures come (7) from. Correct?
(8) A. Right and other chemicals that may (9) co-exist.
(10) Q. All right.
(11) A. In process in the same breathing zone.
(12) Q. And you deferred to Dr. Goodman (13) or anyone else who may appear but in this moment (14) you have Dr. Goodman's report. You are referring (15) to Dr. Goodman, once you have been advised as to (16) where the exposures came from, it's a compound (17) question, for him to express an opinion as to (18) causation. Is that fair?
(19) A. I took into account an intersection of the (20) generic make-up of a chemical that he identified (21) and that I found in the exposure zone.
(22) (Whereupon the requested (23) portion is read back by the reporter.)
(24) Q. Dr. Davidson, the problem may (25) have been caused by my question and let me rephrase

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(1) it and then I'll try for another answer.
(2) Understanding that you took that (3) intersection into account as far as medical (4) causation is concerned in this case is my (5) understanding correct that you defer to Dr. Goodman (6) to render that opinion?
(7) A. Correct.
(8) Q. You are not a toxicologist if I (9) understand your CV correct. Is that right?
(10) A. That's a hard question to answer. That's (11) not my main line of expertise but certainly it's a (12) major chapter that attacks the book we use in my (13) safety course that all chemical engineers in my (14) department are required to take. We certainly have (15) to know what a toxicologist knows about modes of (16) entry, of modes of exposure and the list of toxic (17) elements and how they react chemically and (18) biochemically in the body. This is all part of the (19) growing responsibilities of chemical engineers for (20) causing toxic effects in the environment and in the (21) workplace. So to that extent I'm a partial (22) toxicologist from the point of view as I need (23) information from them in order to, in a (24) comprehensive way, analyze an exposure case or fire (25) situation that leads to toxic fumes and so forth.

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(1) It's all part of the systems approach that a (2) chemical engineer has to take in safety analysis.
(3) Q. Would you agree with me that (4) there's a difference between understanding the (5) principles of toxicology to the extent you need to (6) know them to do your job and being an expert

in the field of toxicology? Is that fair?
A. Correct. An expert in toxicology would be working with animals, working with medical doctors, perhaps clinical work, perhaps with human people. I don't do that. No. But I do look at the results from this.
Q. And you have no degree in toxicology if I understand your CV correctly. Is that right?
A. That is correct.
Q. With regard to the study of epidemiology do you consider yourself to be a epidemiologist?
A. Again, the same kind of response. That's certainly an important chapter in comprehensive safety analysis, is to understand the patterns that exist with exposure and injuries to people in the environment. Asbestos, for example, is a very good case in point. A chemical engineer cannot be

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oblivious to the epidemiological evidence with say asbestos exposure or many, many, many years in the literature in their design and use of insulation materials, for example. So to that extent I'm a practitioner and user of information from that field but I certainly do not practice it with animal studies or I do not follow statistically. I rely on the statistics I get from the literature.
Q. So similar to the area of questioning involving toxicology you are aware of and may utilize epidemiological principles as you read them in the literature but you do not hold yourself out to be trained as an epidemiologist. Is that fair?
A. That is correct.
Q. How did you become involved in this case, the Colby case?
A. The only correspondence I have in my file goes back to October 19th which is my first involvement.
Q. Is that correspondence from Mr. Levinson or this firm?
A. Yes, it is.
Q. The Levinson firm?
A. Yes.

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Q. May I see this? This is a letter of October 19, 1992 from Mr. Levinson asking you to review the enclosed material and forward a report with regard to the Colby case.
Following your receipt of this letter did you have contact with Mr. Levinson to further understand what he was asking you to do or did you start off examining materials and preparing a report?
A. I believe I was contacted by Florence, his secretary. I believe I came down here and retrieved documents. Documents were also sent to me.
Q. So you don't recall any further conversation with Mr. Levinson about the case. Instead you gathered materials to start your review.
A. That is correct. I believe that was the only actual contact in writing from Mr. Levinson.
Q. Did you have any oral conversations with Mr. Levinson prior to – let me expand the time frame now, prior to the delivery of your report?
A. I don't believe so.

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d you have any further writing

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correspondence with Mr. Levinson prior to the delivery of your report?
A. I don't recall any.
Q. Just for the record, your report is dated December 4, 1992. So we're talking about looks like maybe it's about a six week period of time there.
A. That is correct.
Q. Can you identify for me the materials that you either reviewed or obtained at any time prior to writing your report? First let me ask do you have them all present with you?
A. I have present with me my entire file going back 14 years.
Q. All right. And that refers to the earlier cases involving the OTD/ATC facility.
A. Correct.
MR. HOLLINGSHEAD: Off the record.
(Whereupon a discussion is held off the record.)
Q. Dr. Davidson, as we've had a discussion off the record, what I'd like to do is to mark the various folders that you have brought with you which constitute the materials you have

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reviewed for your opinion in Colby and I'm going to ask you if you would to indicate what folders you have and basically what materials you have reviewed and then we'll mark them.
A. Okay. I have one folder marked cognate B.D. reports. B.D. stands for my initials.
In that folder I have my December 4th, '92 report on Colby. I also have in that folder my March 20th, 1990 report on Bernadino. I also have in that file, in that folder, my July 3rd, 1990 report on Bernadino. I have in the folder a copy of my July 20th, 1989 report on Peterson. I have in the file a report dated March 28, 1977 on Malko, et al. But on here I indicated here that in my review of my own deposition I indicated that this particular report wasn't really a report. It was a work product and I don't believe you have a copy of it so maybe we ought to just put it –
Q. Why don't you put that aside and see whether or not I should have that.
A. Yes. I have a copy of a report dated July 31st, 1975 on Malko, et al. And I have in here a report by R.N. Wheeler, Jr. on Malko. And the date of that is October '89, I believe. No. That can't be right.

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Q. If that's in Malko it had to be in the '70s. It may be undated.
A. It's undated but it looks to be the same report that I have on October '89 by Wheeler also. It's undated.
Q. But it says Malko on the cover sheet?
A. Yes. It's on the Union Carbide letterhead.
Q. That's fine. That identifies it.
A. And I have in here my notes which came from my Peterson file, five pages on yellow paper, calculations and so forth.
Q. All right.
A. That's that file.
Q. Why don't we put that aside as the first folder that we will mark as Davidson-2.
A. My correspondence file I guess just had one letter in it.
Q. Actually, there are more documents

in there. I can see from here.
A. Yes. They're moot copies.
Q. Correspondence –
A. Between us.
Q. Okay. We'll do that as three.
A. I have one called Colby work history.

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Q. You can say generally what's in there without identifying each document.
A. I have a copy of Dr. Goodman's report.
Q. What's the date of that report, sir?
A. 10-22-92.
Q. Thank you.
A. I also have some notes on a summary of Colby's work history which is a document I received from Mr. Levinson and I have in here a medical report dated November 2nd, '89 from Ted Loomus.
Q. That was issued in the Peterson case.
A. Yes.
Q. May I see the second document there, the history document that you got from Mr. Levinson?
A. Yes. I have another folder, the fourth one in sequence. It contains the October '89 report by R.N. Wheeler. That was on the Peterson matter with a bunch of paper clips and so forth.
Q. Those are your paper clips and your notes –
A. And my notes sticking out and also in the back is a copy of the Gollob Analytical Services.

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THE WITNESS: Off the record.
MR. HOLLINGSHEAD: Sure.
(Whereupon a discussion is held off the record.)
A. There's one file B.D. work sheets on the Peterson matter, are my own notes on reading the deposition transcripts. And there's a copy of the personal history of Peterson received from the Levinson firm. Summary. And in that folder actually were those notes in the – in here I took out of here.
Q. The history of the documents that you pulled out before?
A. No, the one about cognate reports. Those yellow pages actually belong in here.
Q. So you're taking the yellow notes that you referred to in the cognate B.D. reports file and you're placing it into the one that says B.D. work sheets on Peterson.
(Whereupon a discussion is held off the record.)
A. By the way, I review them in parallel. It's just the way I'm pulling them out of my bag.
Q. My original question was what

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materials did you review? I'm not interested in the order.
A. Sure.
Q. But may I ask that you reviewed all of them prior to the preparation of your report of December 4, 1992?
A. That's correct.
Q. Okay.
A. There's one marked Malika and in here they're defendant's statements of facts and my deposition transcript which I reviewed.
I have another folder here marked Bernadino and in there I have some categories, medical reports, interrogatories, depositions, photos and statements of coworkers.
Q. All right. Probably as you give them to me we should state for the record, since we have a number of folders to do – Let me back up for a moment. My by calculation the last folder that you just described was marked as Davidson-8. And the files that you gave me prior to that will be marked between D-2 and D-7. So at this point on as you give them to me I will give them an exhibit number which will make it a little easier.
A. I have one here that is called Colby

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admissions. These are requests for admissions. That's it. Just one item in there.
Q. That will be marked as Davidson-9. These, by the way, are only the requests as I'm looking at them. This is Mr. Levinson's request for admissions to Union Carbide.
A. Yes. Right.
I have another folder called Colby and then facts and plants. Plants. So this folder has to do with statements of fact at the subject site in Perth Amboy. I have several folders. One called –
Q. Why don't you identify the folder.
A. Union Carbide and industry health and statement of fact and in here. There's defendant's statement of fact.
Q. Is that for Malika?
A. This is for Malika. And a copy of a label. Then I have interrogatories and these were all from Colby. Colby answers to interrogatories, interrogatories, Colby. Colby. Just Colby. And then there's supplemental interrogatories. Also Colby.
Q. I take it there are answers to both the interrogatories and the supplemental

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interrogatories?
A. Yes. Correct.
Q. Okay.
A. More of the same. Colby. Colby.
Q. That will be marked as Davidson-10.
A. Another folder marked Colby but things in here are things taken out of other files. There's one area called standards and codes and this comes from all of my files. I just stuck them altogether. There's documents from EPA and safety data sheets and there's an OSHA, there's a NIOSH request by an employee William Foder, F-o-d-e-r, requesting an analysis of the exposure. There's some documents from Gollob Analytical Services. There's OSHA regulations and a draft copy of a report on respirator protection from OSHA.
And then I have one called Mrs. Colby's deposition with my markings on the front page as to items of special interest to me where I indicate a comment and a page number. And then there's one called engineering controls and in there is one of the trade journals in my field called Chemical Engineering Progress. In fact, it is the trade journal in chemical engineering. And there's a

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article on VCM emission control, page 41. In fact, there's a whole series of PVC, VCM and that was September '75. Volume 71, number nine.

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(4) Q. That entire folder will be marked (5) as Davidson-11.
(6) A. I have another folder which is related to (7) U.S. government literature, miscellaneous I would (8) say but pertinent. One on oncology overview, (9) abstracts 1960 and then some NIOSH document.
(10) There's a report by Jones on worker (11) exposure to vinyl chloride and PVC in production (12) and fabrication. '78. There's a – this is a U.S. (13) government document EPA on the scientific and (14) technical assessment report on vinyl chloride and (15) PVC, 1975, December. And then there's an article (16) on toxicology of plastics, 1960, journal article. (17) That's that one.
(18) Q. That will be marked as (19) Davidson-12.
(20) A. Peterson interrogatories is another file. (21) Questions and answers.
(22) Q. Davidson-13.
(23) A. Also Peterson material safety data sheets (24) on a whole bunch of chemicals that were shipped to (25) or used at the subject site into the '80s from Mr.

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(1) Hollingshead dated November 10th, 1989. And a (2) report, medical report, from a Ted Loomus, (3) Dr. Loomus, again indicated 3-26-90 was also in (4) there.
(5) Q. That will be marked Davidson-14.
(6) A. And then I have one folder which with just (7) one item in it, a copy of my deposition transcript (8) in the Peterson matter with a bunch of paper clips (9) that I put in there and highlighting which I put in (10) there.
(11) Q. Davidson-15.
(12) A. I have here a medical report – I have here (13) medical reports in the I believe the Peterson (14) matter from Epstein, Velez. This is work product (15) that Mr. Levinson should look at. These are two (16) that you should look at.
(17) Should I remind him on this point?
(18) Q. We'll do it when we're done.
(19) A. Okay. Notice to take deposition and (20) produce documents in Peterson. Another (21) correspondence from Mr. Levinson. Report by (22) Dr. Goodman.
(23) MR. LEVINSON: Off the (24) record.
(25) (Whereupon a discussion is

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(1) held off the record.)
(2) THE WITNESS: This one why (3) don't we leave out.
(4) A. There's a copy of a report engineering (5) control assessment of the plastics and resin (6) industry case study by Gideon for the National (7) Institute for Occupational Safety and Health, (8) August '77.
(9) Q. That will be Davidson-16.
(10) A. And here I have the last, the last folder (11) that I have with me. There are several, probably a (12) dozen or so copies of articles from the open (13) literature, toxic effects of PVC and/or VCM dating (14) back many years and some of them are actually (15) marked in previous depositions. These may actually (16) go back 15 years.
(17) Q. All right. We'll mark that as (18) Davidson-17.
(19) A. And the folder is marked literature on (20) PVCR, meaning resin, and VCM. Physical, chemical (21) and/or toxic properties and it says Peterson.
(22) Q. And that's it of what you have (23) with you?
(24) [illegible]'s it.
(25) [illegible]ine.

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(1) MR. HOLLINGSHEAD: Why (2) don't we take a short break and ask our (3) reporter to mark these.
(4) A. Sure.
(5) (Whereupon a recess is (6) taken.)
(7) (Cognate B.D. reports is (8) received and marked Davidson-2 for identification.)
(9) (Colby correspondence is (10) received and marked Davidson-3 for identification.)
(11) (Colby work history is (12) received and marked Davidson-4 for identification.)
(13) (Reports - Union Carbide's (14) experts is received and marked Davidson-5 for (15) identification.)
(16) (B.D. work sheets is (17) received and marked Davidson-6 for identification.)
(18) (Malilko folder is (19) received and marked Davidson-7 for identification.)
(20) (Bernadino folder is (21) received and marked Davidson-8 for identification.)
(22) (Colby admissions is (23) received and marked Davidson-9 for identification.) (24) (Colby (25) Sex/plant/interrogatories are received and marked

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(1) Davidson-10 for identification.)
(2) (Folder containing (3) documents from EPA, OSHA, etc... is (4) received and marked Davidson-11 for (5) identification.)
(6) (U.S. government (7) literature is received and marked Davidson-12 for (8) identification.)
(9) (Peterson interrogatories (10) are received and marked Davidson-13 for (11) identification.)
(12) (Safety data sheets are (13) received and marked Davidson-14 for (14) identification.)
(15) (Davidson deposition (16) transcript in Peterson matter is (17) received and marked Davidson-15 for (18) identification.)
(19) (Medical reports in (20) Peterson matter is received and marked Davidson-16 (21) for identification.)
(22) (Literature on PVCR and (23) VCM is received and marked Davidson-17 for (24) identification.)
(25) MR. HOLLINGSHEAD: Just so

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(1) the record is straight, there was one (2) document that was taken out and which I (3) believe the attorney/client privilege is (4) being invoked.
(5) MR. LEVINSON: That is (6) work product.
(7) MR. HOLLINGSHEAD: Would (8) you describe it for the record so we can (9) get past that without revealing its (10) content? What's the nature of it?
(11) MR. LEVINSON: This was an (12) engineering report prepared, an analysis in (13) the case of Malilko versus Union Carbide (14) prepared by Professor Burton Davideon in (15) which he asked for certain information from (16) me in the Malilko case and made some (17) comments on the information and he wanted (18) further data.
(19) MR. HOLLINGSHEAD: So I (20) understand, even though it's called an (21) opinion and report it really was intended (22) to be guidance to you as to how to conduct (23) some part of the litigation.
(24) MR. LEVINSON: Yes. It (25) was a preliminary impression and

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(1) recommendations. There's some technical (2) questions he wanted answered and that was (3)

about it.
MR. HOLLINGSHEAD: Would you, if you don't mind, give it back to Dr. Davidson?
Q. Would you, Dr. Davidson, would you keep that with the other materials if the question comes up as to whether I'm entitled to it? At the moment I don't need to quarrel with it.
A. In my deposition on page 42 is the story on this so –
Q. In the Maliko case?
A. Yes. In my deposition I explained that it was work product. It was intended to be work product.
Q. To your recollection, was it ever produced in the Maliko case? It's too long ago for me to remember. I thought you might recall.
A. It was not.
Q. What we have marked here I understand to be all of the materials which you reviewed prior to rendering your expert report on December 4, 1992 in the Colby case or at least materials available to you to review. Is that

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fair?
A. Among other things.
Q. That's what I was concerned about. You said before these are materials you have with you. Are there other things that you don't have with you but which you recall reviewing prior to drafting, writing your report of December 4, 1992?
A. Yes.
Q. Can you give me a laundry list of them or tell me generally what those materials might be?
A. Yes.
Q. Please. Before you start how long is the list?
A. Not very long. There are – there were three books that I reviewed; Sax's book on Dangerous Properties of Chemical Materials. I reviewed a textbook on PVC manufacturing, two books, one addressing environmental factors and one addressing chemical processing factors.
Q. Do you remember the authors of either of those books?
A. Yes. I don't remember offhand but I can find it for you if you could just give me a second.

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There's another book too. One was the 1968 edition of Sax's book Dangerous Properties of Industrial Materials. That was R 11 on page 17 of my Maliko report.
Q. The R?
A. Reference.
Q. Excuse me, Doctor, was it the 1968 edition that you looked at for the Colby report?
A. Yes.
Q. Okay. Is that because that Colby facts occurred in the 1960s?
A. Correct. R 30 on page 18 of my Maliko report, Saavetnick, called polyvinyl chloride. It attacks the book. Lefaux, Plastics Application, series 19.
Q. Would you please spell those names for the record?
A. Sure. S-a-a-v-e-t-n-i-c-k. And R 32 practical toxicology of plastics, 1968. And the author is Renee Lefaux, L-e-f-a-u-x. There was the one on environmental factors in PVC manufacturing. It's a CRC

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publication. I don't have the date or anything.
Q. Do you recall the author of that?

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A. I don't. I have the book on my desk at home.
Q. If I need that I'll ask Mr. Levinson to ask you for the title.
A. Yes. Yes. Those are the basic references.
Q. So that between the documents in the folders that we have marked and the texts or publications that you have now referred to that is your complete review of files or materials in order to prepare the report of December 4, 1992.
A. Correct.
Q. Let me direct you back, if I may, to the request for documents that I served by way of my letter of August 17 just to be sure that we have covered everything in that request. Do you have a copy of that?
A. Yes, I do.
Q. Did I take your copy?
MS. DECKER: You can use mine.
Q. Without reading what the request is which would burden the record, if you look at that can you tell me if you have now produced everything in response to request number one?
A. Yes.

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Q. And number two I think that's primarily what we have just gone through. Correct?
A. Correct.
Q. Number three which may be somewhat duplicative, it talks about all file materials as stated in your report.
A. Yes.
Q. Number four, which in general is your complete and entire file regarding this matter.
A. Yes.
Q. Number five which is all reports prepared by you in connection with the Colby case.
A. By the way, there's no correspondence between me and the plaintiff.
Q. No. That was our request if there were such.
A. No.
Q. Number five, all reports prepared by you in connection with Colby.
A. You have that.
Q. And that's the only record that you prepared is the December 4th report?
A. Correct.
Q. Have you ever provided Mr.

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Levinson with an oral report in the Colby matter?
A. No.
Q. And you provided him with no supplemental reports. Is that correct?
A. Correct.
Q. Request number six, copies of the "cognate industrial hygiene literature" referenced in your report on page seven.
A. Correct. That's among the documents that we have here.
Q. We may get into that in a little more detail later. And number seven, all additional materials reviewed by you. We have just gone through that, I assume.
A. Correct.

(16) Q. I beg your pardon. I misread my (17) own request. This asks for all additional (18) materials reviewed by you since preparing your (19) report of December 4, 1992. Have you done anything (20) on this file since preparing your report of (21) December 4, 1992 other than prepare for today's (22) deposition?
(23) A. That's what I did. I just reviewed (24) everything that's here.
(25) Q. So in that review in preparing

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(1) for this deposition you did not go and review (2) anything else other than what you have identified (3) this morning. Is that fair?
(4) A. Correct.
(5) Q. Okay. Very good.
(6) Just for the sake of some convenience for (7) the record, I'm going to ask the reporter to mark (8) as Davidson-18, I believe that's the next number, (9) your report of December 4, 1992.
(10) (Davidson report dated (11) 12-4-92 is received and marked Davidson-18 for (12) identification.)
(13) Q. Before we actually turn to that (14) report, let me ask one or two other general (15) questions.
(16) When I deposed you last, which was in 1989, (17) we went through in some detail the amount of time (18) you spend serving as an expert to assist in (19) litigation as compared to the amount of time you (20) spend in your capacity as chairman of the chemical (21) engineering department at Rutgers.
(22) My recollection, please correct me if I'm (23) wrong, I'll do that in a shorthand fashion; you (24) said that you tried to follow the schedule of (25) allowing approximately five, four to five days a

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(1) month for your outside activities. By that I mean (2) as an expert in litigation. Is that a fair summary (3) of what you said back then?
(4) A. Well, I don't think I used the word (5) litigation. I think I used the word consulting (6) work.
(7) Q. That's fine.
(8) A. That's correct.
(9) Q. I am distinguishing your actual (10) work at Rutgers as compared to your consulting work (11) outside. Does that time frame still hold, that is, (12) that you try to spend only about four or five days (13) a month on your outside consulting work?
(14) A. Correct and maybe even –
(15) Q. Let's say over the past year or (16) so how much time have you spent?
(17) A. Well, this past –
(18) Q. On outside work.
(19) A. On this past year it has been less than (20) five days. It's getting down to four and three (21) days by my own control.
(22) Q. Do you have a standard fee for (23) your outside consulting work?
(24) A. I have a standard fee at current.
(25) Q. What is that?

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(1) A. For normal work, review of documents, (2) conference, phone calls, travel time, things of (3) that nature; unless it's long distance involved (4) time which I have a different policy or overnight, (5) 175 an hour. And for deposition or testimony in (6) court under oath is 275 an hour or any part of an (7) hour. And I think it's been like that for a couple (8) of years.
(9) Q. Using the last year, (10) approximately the last 12 month time frame as a (11) basis for this (12) jon, can you estimate for me (12) the percentage of your total income that comes – (13) your work on behalf of Rutgers as the chairman of (14) the chemical engineering department as compared to (15) your income from outside sources, particularly your (16) consulting work.
(17) A. Percentage. Taking in account the fact (18) that the hourly rates are very different, hourly (19) rate at Rutgers is very different than the hourly (20) rate for a licensed professional engineer doing (21) independent consulting work.
(22) Q. I think we could take judicial (23) notice of that.
(24) A. Yes. About 30 percent.
(25) Q. 30 percent of your total income

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(1) comes from outside consulting work?
(2) A. Correct.
(3) Q. Okay. Dr. Davidson, with regard (4) to the materials that you have described for us (5) and, in fact, many of which you have brought with (6) you, I note that within your report that we have (7) marked as Davidson-18 there's a reference to a (8) medical report by someone by the name of O. Aroback (9) dated June 25, 1990. The reference actually (10) appears on page four of your report. Is that (11) report located somewhere between the materials that (12) you have produced?
(13) A. I have not yet received that report. I was – (14) at the time I made that statement I was under the (15) impression I would be examining reports from those (16) two medical people but I have not yet received (17) them. I did receive Dr. Goodman's report.
(18) Q. All right. Have you ever seen (19) the report from Dr. Epstein dated August the 15th (20) of 1989?
(21) A. No, I haven't.
(22) Q. Let me see if I can refresh your (23) recollection.
(24) I've had the ability within the past (25) several days to reread your deposition in the

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(1) Peterson and in that deposition I believe the (2) Epstein report was referred to and you indicated (3) that you had reviewed it for the Peterson (4) deposition.
(5) A. Right.
(6) Q. Do you recall that?
(7) A. I don't recall it but if you recall it (8) that's good enough. I have it.
(9) Q. But the important thing is you (10) don't recall having reviewed it for the Colby case?
(11) A. That's correct.
(12) Q. Okay.
(13) A. Probably because I couldn't find it. If I (14) had it in my file.
(15) Q. Fine. Other than what I'll refer (16) to as the PVC cases that you have had with the (17) Levinson firm over the course of some 15 years now, (18) we've talked about those various cases, have you (19) had other work with the Levinson firm as a (20) consultant or an expert?
(21) A. Yes.
(22) Q. Restricting yourself for a moment (23) from 1989 forward, which is the last time I had a (24) chance to depose you, do you have a recollection of (25) having worked with the Levinson firm on any other

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(1) cases?
(2) A. Yes.
(3) Q. Can you tell me just in general (4) what those cases were, assuming that there was more

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(5) than one?
(6) **A. Yes. Exposure to toxic chemicals in the** (7) **workplace. Several different kinds.**
(8) Q. Do you recall what the materials (9) were that were involved in those cases?
(10) **A. All of those cases are still in litigation** (11) **so –**
(12) Q. You can still tell me, the (13) litigation is public, if you have rendered a report (14) in those cases. In particular, you should tell me (15) if you're acting as a consultant and you have not (16) surfaced as an expert then perhaps you want to (17) discuss that with Mr. Levinson.
(18) **A. In most of them I have rendered an expert** (19) **report. Yet to be deposed. They're still in** (20) **various stages of litigation.**
(21) Q. How many cases are we talking (22) about since 1989?
(23) **A. Several. Two, three, four.**
(24) Q. Are you dealing with different (25) lawyers within the Levinson firm?

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(1) **A. Hard to say. It changes sometimes.**
(2) Q. I'm sorry. That's what I meant. (3) You are dealing with different lawyers here?
(4) **A. I'm dealing with the firm and different** (5) **lawyers. Correct. Primarily one but it sometimes** (6) **changes.**
(7) Q. Can you tell me what the (8) chemicals are in those cases?
(9) **A. I can certainly. I'm just wondering what** (10) **I'm about to say is something which I shouldn't** (11) **say.**
(12) MR. HOLLINGSHEAD: Let's (13) go off the record for a second.
(14) **(Whereupon a discussion is** (15) **held off the record.)**
(16) MR. HOLLINGSHEAD: We have (17) had a discussion off the record regarding (18) whether or not Dr. Davidson should feel (19) free to reveal any information regarding (20) his other work for the Levinson firm. It's (21) clear to me that he's uncomfortable doing (22) so because he doesn't know whether or not (23) the information has been made public and I (24) don't wish to make it uncomfortable by (25) pressing the issue for now.

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(1) Rather than do it that (2) way, I will ask Mr. Levinson in a letter to (3) provide me with information regarding any (4) of those expert reports in which – or (5) rather which may have been made public by (6) the submission of the report to the (7) adversary.
(8) Q. I do understand, however, (9) Dr. Davidson, from what you said off the record (10) that none of those other cases involved PVC or VCM. (11) Is that fair?
(12) **A. Correct.**
(13) Q. And that goes back to one of my (14) original questions today which I asked you if you (15) have done any PVC or VCM consulting work since 1989 (16) other than the Colby case and your response as I (17) recall was no, you have not.
(18) **A. Not with this firm. I have one other which** (19) **I'm going to get you again.**
(20) Q. That's involving the extrusion of (21) PVC?
(22) **A. Yes. Since that's active, I don't know if** (23) **it's public, I'm going to be restricted by the same** (24) **thing but I think I can get you the name of the** (25) **attorney to contact and correspond with.**

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(1) Q. That will be fine. Referring you (2) to the report that we've marked as Davidson-18 (3) which is your report of December 4, 1992, I'm going (4) to try to take you through that in some systematic (5) fashion which I think might be the best way to (6) proceed today.
(7) In the first paragraph you refer to (8) "dangerous chemical materials" in Mr. Colby's (9) workplace and elsewhere. Can you tell me what you (10) mean by the phrase dangerous chemical materials in (11) that sentence?
(12) **A. Yes. It has the potential to cause bodily** (13) **harm and/or property damage and/or environmental** (14) **damage.**
(15) Q. Were you utilizing any particular (16) list that might be called dangerous chemical (17) materials? In other words, did anybody supply you (18) with such a list or did you make those conclusions (19) based upon your review of the file materials?
(20) **A. Oh. I can glean from the material safety** (21) **data sheets and physical chemical properties and** (22) **material whether they have this propensity. I can** (23) **also determine this from lists, if I can, Sax's** (24) **book which is entitled Dangerous Properties of** (25) **Materials and from the literature.**

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(1) Q. What did you use in order to (2) obtain even a mental list of some dangerous (3) chemical materials in Mr. Colby's workplace at OTD?
(4) **A. In reviewing his work history, correlating** (5) **it, cross-correlating it with a history of** (6) **coworkers over a long period of time, my** (7) **understanding of the physical process taking place** (8) **and the materials, the inherent properties of the** (9) **materials.**
(10) Q. All right. Looking for a bit of (11) a shortcut approach here, your report, which we (12) will get to in more detail, contains references to (13) a number of chemicals. Obviously polyvinyl (14) chloride, vinyl chloride monomer, polyethylene, (15) polystyrene. Those are four of them. There are (16) others in here.
(17) Is it fair for me to conclude that (18) "dangerous chemical materials" you found in your (19) review of various documents are contained within (20) this report?
(21) **A. Yes.**
(22) Q. The amended complaint contains a (23) reference to several materials. I just want to be (24) sure I understand as to what you are commenting (25) upon. Paragraph two of the – the original

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(1) complaint, paragraph two of that complaint refers (2) to the following and I just want to know whether or (3) not you have commented upon all of these in some (4) fashion. Polyvinyl chloride?
(5) **A. Yes.**
(6) Q. Vinyl chloride?
(7) **A. Monomer. Yes.**
(8) Q. The complaint says vinyl (9) chloride. You're amending that to vinyl chloride (10) monomer which is the gas?
(11) **A. You can have the monomer or the polymer.**
(12) Q. I'm only reading what's in here. (13) You commented on vinyl chloride monomer. Correct?
(14) **A. Yes.**
(15) Q. Polyethylene?
(16) **A. Correct.**
(17) Q. Polyurethane?
(18) **A. I did not specifically comment on that in** (19) **the report nor do I exclude it. I have no facts** (20) **that I reviewed that shows where that**

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might be (21) coming from.
(22) Q. All right. In your review of the (23) file materials that we have talked about you did (24) not see any reference to polyurethane. Is that (25) correct?

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(1) A. That's correct.
(2) Q. Polystyrene, the next?
(3) A. Yes. That's included.
(4) Q. Isopropilidene bisphenol resins?
(5) A. I looked at that. Yes.
(6) Q. By the way, does that go by (7) another name?
(8) A. Bisphenol A.
(9) Q. Also called bis-A on occasion?
(10) A. Shortened, bis-A
(11) Q. Let me go back. This actually (12) says in one phrase isopropilidene bisphenol resins, (13) phenols.
(14) A. Yes.
(15) Q. You did comment on both of those. (16) Correct?
(17) A. Resins and phenols. I didn't comment on (18) that because of procedure. I obtained from Mr. (19) Wheeler's report and in answers to interrogatories (20) that that particular resin apparently was not (21) shipped to this facility during that time frame.
(22) Q. You're talking about the bis-A, (23) isopropilidene bisphenol –
(24) A. Correct.
(25) Q. And phenols?

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(1) A. Yes.
(2) Q. Heavy equipment machinery (3) lubricants and fuels.
(4) A. I didn't specifically comment on that (5) because I had no specific information as to what (6) those generic compounds were in any of the fact (7) base that I have in these 17 volumes of material.
(8) Q. And the lastly it says fumes from (9) the heat sealer in the vinyl resin bag packing bay.
(10) A. Yes, I did.
(11) Q. Okay. In a general sense, (12) Dr. Davidson, can you tell me where you obtained (13) your information as to what chemicals Mr. Colby had (14) been exposed to? By that I mean, for instance, (15) were your primary source documents obtained from (16) during discovery or the deposition of Mrs. Colby or (17) something like that?
(18) A. The first domino in that would have been – (19) was Mrs. Colby's deposition where she explained, (20) outlined his work history during that period where (21) she explained the physical appearance of her (22) husband when he came home from work, her (23) recollection of what he said he was exposed to. (24) Knowing the time frame and the exposure history of (25) previous coworkers and knowing the generic

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(1) materials that were involved those are the (2) collective ways I deduced what probably he was (3) exposed to.
(4) Q. How did you utilize the (5) information from the Maliko, Peterson and Bernadino (6) cases, if you did, to determine what Mr. Colby was (7) probably exposed to? Did you make an assumption (8) that he was exposed to the same products in that (9) time frame as the others had been exposed to?
(10) A. I wouldn't call it an assumption. I would (11) call it an analogous situation. He was in the same (12) workplace, he was in the san[illegible]nething zones. He (13) worked in and around the same materials. The (14) description in Mrs. Colby's description correlated (15) very well with the previous testimony about the (16) hygiene of the environment in which these workers (17) were working and the generic materials were all the (18) same.
(19) Q. Were their positions as employees (20) within the OTD facility the same?
(21) A. This I don't know.
(22) Q. Let me go back. My recollection (23) of Mr. Peterson for sure is that he was a (24) maintenance man.
(25) A. That's my recollection.

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(1) Q. And my understanding of Mr. Colby (2) is that he was a supervisor. I'm not sure exactly (3) in what capacity but a supervisor.
(4) A. Correct.
(5) Q. Would that factor –
(6) A. And a shop steward.
(7) Q. Fine. If you assumed those two (8) facts to be true, Peterson was a maintenance man (9) and Colby was a supervisor or shop steward, would (10) that fact alone cause you to want to know more (11) specifically what Mr. Colby might have been exposed (12) to?
(13) A. Well, specifically yes, but specifically (14) with respect to the same materials that these other (15) individuals were exposed to they're identical. (16) It's the PVC resin dust and the eluted monomer and (17) the entrapped monomer which was the tie element (18) that I found dating back now 15 years as a (19) consistent generic tie element for exposure to a (20) dangerous chemical.
(21) Q. Did you assume that the degree of (22) exposure was the same between all of these workers?
(23) A. The degree was of the same order of (24) magnitude. Different qualities but the same (25) degree. The order of magnitude was very similar.

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(1) Was similar.
(2) Q. Let's make sure. When I use the (3) word degree I meant amount of exposure, length of (4) exposure and exposure to similar materials. That's (5) what I mean by the word degree.
(6) A. Yes.
(7) Q. I assume you defined degree (8) similarly to that.
(9) A. Yes. The quantity and duration of two (10) variables.
(11) Q. But they're very important (12) variables in terms of the workers' exposure to (13) toxic materials. Are they not?
(14) A. They're one of many important factors.
(15) Q. All right.
(16) A. You can have a short exposure to a high (17) concentration being equivalent to a long exposure (18) to low concentration. And then there's many (19) combinations in-between.
(20) Q. In the Maliko case involving (21) those four individuals and in the Peterson case in (22) particular, you had deposition testimony from the (23) individuals as to what they were specifically (24) exposed to. Did you not?
(25) A. Yes.

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(1) Q. That is not true in the Colby (2) case. Is it?
(3) A. Not from the deceased. He wasn't

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deposed.
Q. Correct. The best you had in that regard was Mrs. Colby's recollection of conversations with her husband as to what he was exposed to. Is that fair?
A. Correct, and his work history, which is part of the record.
Q. Where is his work history part of the record?
A. I think it was submitted in the answers to interrogatories that he was employed there, he had these job assignments and he worked in that packaging building and to that extent he was there.
Q. That's right. He was there.
A. Didn't involve the gasoline gas station down the street.
Q. He was there but that does not tell you the degree of his exposure to these products. Correct?
A. It tells me only that because of the nature of his supervision as a shop steward he was in the same breathing zones as other coworkers. They were all in the same breathing zone. They were all

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inside the building.
Q. Is that sufficient information for you to determine the degree and order of magnitude of his exposure to these products?
A. It is to the extent that Mrs. Colby indicated he was covered like a snowman. He came home with the particles clinging to his clothing, complaining of coughing and choking, particularly when the heat activated machinery was working to seal the bags. That type of thing correlated very well with previous testimony from operators who were exposed.
Q. He was not an operator. When you talk about operator you mean bagging operator?
A. Right. And it was indicated previously team shop steward supervisors comingle with operators particularly when there are spills and mishaps they get right in there and become the same kind of worker. They have to go and see what happened when a bag broke open and the particles were flying all over the room and building up layers on everything and a determination has to be made by the super as to what to do. They have to be in the building. They have to point to the exposure at the point of spill. They are

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equivalently exposed at that point.
Q. Your assumption from that statement, I assume, is that a supervisor or shop steward who comes into the room following an incident involving a bursting bag is exposed to the same degree as the bagging operator who sat there during the bursting episode?
A. It would be a similar order of magnitude. It wouldn't be the same but it would be similar.
Q. Why would it be similar?
A. Because he's in the same room were there's no ventilation or no respirator, wearing no protective clothing. There's naked exposure in both instances.
Q. In the one instance, if we focus on the bagging operator, he would have been exposed through the incident itself with the bursting bag, generally from above as I recall, with the material in the atmosphere and perhaps descending on him.

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A. Correct.
Q. And the shop steward would come in after the episode, would he not?
A. Could be there while it happened.
Q. I understand that but –

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A. Could be there before it happened.
Q. Let's talk probabilities as compared to possibilities. Yes, he could be but let's assume that he's not. I'm using a different circumstance here. The bagging operator for sure is here because that's his job. Correct?
A. Correct.
Q. That's what you understand his job to be.
A. Correct.
Q. The supervisor may or may not have been. If he's not there during the bursting episode and comes later is his degree of exposure similar to that of the bagging operator for the reasons you've expressed?
A. Very similar.
Q. When you at least mentally did your list of "dangerous chemical materials" that Mr. Colby was exposed to did you include cigarette smoke?
A. Yes.
Q. What was your understanding of Mr. Colby's smoking history?
A. He was a smoker.
Q. Do you know to what level or what

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degree?
A. It's – I have my notes on that and in Mrs. Colby's deposition. Do you want me to regurgitate it?
Q. It came from Mrs. Colby's deposition?
A. Yes.
Q. My recollection is that she said that he smoked a pack and a half a day. Is that consistent with your recollection?
A. It may be. It might be.
Q. I stand corrected if I'm wrong.
A. Page 103. She is, finally after three pages of questioning her as you did, and finally on page 105 line 14 well above that did he smoke as much as two packs a day? Her answer, not that I recall. I don't know. Your question, somewhere between a pack and two packs a day? Mrs. Colby answers, maybe a pack and a half. And then she goes on to indicate what cigarettes.
Q. Did you, in reviewing the various materials that were supplied to you, did you come up with any information that would suggest that his smoking history was other than that?
A. No. That's the source of my information.

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Q. Was it your understanding that his smoking history continued at that level essentially up until the time let's say until he became seriously ill? Is that your understanding as well?
A. It may be my understanding. I'm not certain –
Q. All right –
A. How long he did and when he stopped.
Q. You, however, drew some conclusion that he had a pertinent smoking history because you talk about the potential synergistic effects with occupational chemicals.
A. Yes. I found from my review of Dr.

Selekoff's authoritative works on asbestos and other chemicals he and Dr. Hammond, I believe, they found some positive correlations between the ease at which you contract mesothelioma asbestosis and other asbestos related diseases with cigarette smoke and their advice was not to have people work in these dangerous areas who have a history of smoking because of that.

Q. Let me stop you. I'm going to get to a question of synergism. The real point of my question is that you did consider the smoking

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history to be of sufficient concern to talk to synergists?

A. I certainly did.

Q. When you say in this first paragraph that your charter was to render a report on Colby's relative exposure to dangerous chemical materials in his workplace and elsewhere does the elsewhere refer to anything outside of his employment with OTD?

A. It does.

Q. Smoking history would be part of that, I assume.

A. It would be part of that.

Q. What did you learn with regard to Mr. Colby's exposure to dangerous chemical materials away from OTD during the course of his lifetime?

A. What I could glean from deposition testimony from Mrs. Colby I couldn't find any generic compound that would be classified as dangerous other than possibly his smoking habit, previous smoking habit, and drinking habit. Those two.

Q. Mrs. Colby was your only source for information in that regard?

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A. And anything I gleaned from medical reports.

Q. Okay. In other words –

A. And their questioning and delving into the same area.

Q. Where the doctors interviewed him, asked him questions about his lifetime of working?

A. Correct. Correct.

Q. Did you make any inquiries on your own of Mr. Levinson or anyone else in order to obtain greater information regarding his potential exposures to other chemicals away from OTD?

A. That was my basic question that produced the type of work history coming from Mr. Levinson's office which is part of the documents here.

Q. That is the document I have some interest in. If you could find that. I think it was within one of the first few folders that we marked.

A. Colby history.

Q. May I see that?

MR. LEVINSON: That came out of four.

MR. HOLLINGSHEAD: Would

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you mark this as 4A?

(Work history provided by Mr. Levinson is received and marked Davidson-4A for identification.)

Q. Dr. Davidson, with regard to the document you have given me that is called history which is marked as Davidson-4A, is that the only document you received in response to your request for additional

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information regarding Mr. Colby's work history at OTD?

A. Correct.

Q. Does that document contain any reference to exposures to chemicals away from OTD?

A. It doesn't indicate any specific compounds. And there was nothing specifically stated.

Q. In fact, you have never been advised either orally or in any of the materials that Mr. Colby had an exposure to a dangerous chemical other than what he was exposed to at OTD plus his cigarette smoking?

A. Correct.

Q. And potentially alcohol.

A. That's it. That's fair. That's right.

Q. Do you know when Mr. Colby left OTD's employment?

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A. I can't give you the date.

Q. Let me suggest to you it was 1967. Does that ring a bell with you? He was employed at OTD from 1961 to 1967.

A. I don't recall the month.

Q. About that time frame?

A. That time frame.

Q. If he had been exposed to, to use your word, "dangerous chemical materials" following his employment at OTD isn't that something that you would want to know and take into consideration in preparing your report and opinion?

A. Correct.

Q. And it turns out that he had such exposures I assume that you would wish to consider that and perhaps a supplemental report?

A. If it surfaced and I had the generic compounds and the conditions of exposure it would be very helpful.

Q. Do you know anything as you sit here today about any exposures to dangerous chemical materials that Mr. Colby may have had prior to his work with OTD starting in 1961?

A. Other than smoking and his drinking, I don't know of any.

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Q. Is it your understanding that his smoking and drinking history, whatever it may be, we'll get to that later, commenced prior to his work with OTD?

A. Yes.

Q. And you got that from Mrs. Colby's deposition primarily?

A. Primarily.

Q. As you sit here did can you think of any other source that gave you that information?

A. May have been some medical records on file at OTD but I'm not certain but the primary is Mrs. Colby's deposition.

Q. Initially, did you ever see any of the hospital records involving Mr. Colby's various admissions and treatments at the hospitals?

A. I don't think I did. I don't recall that.

Q. Did you see the reports of any of his treating physicians?

A. No. No.

Q. So in terms of medical records what you saw, if I heard you correctly this morning, was basically Dr. Goodman's report, single report of October something 1992?

A. Right and his statement in there that he

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(1) did review those documents. I'm relying on his (2) expertise in his review of the autopsy report which (3) he said he reviewed.
(4) Q. But in terms of anything that Mr. (5) Colby may have said as to either his treating (6) physicians or the hospitals upon his admission you (7) did not have those materials to review to determine (8) what was said in terms of other exposures.
(9) A. Correct.
(10) Q. If anything was said. I'm not (11) representing to you that it was. I simply don't (12) know as I sit here but you didn't have that (13) material.
(14) A. That's correct.
(15) Q. Okay. What did you learn from (16) whatever sources you had about Mr. Colby's (17) employment after he left OTD?
(18) A. Just what was stated in Mrs. Colby's dep.
(19) Q. Do you have a recollection of (20) that as you sit here without pulling it out?
(21) A. I would have to pull it.
(22) Q. Let me see if I could help you. (23) I believe he went to work with the operating (24) engineers and was then assigned various jobs, if (25) you will. I'm probably not saying it well but is

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(1) that your basic understanding?
(2) A. Well, I would like to look at my notes (3) which are written on the deposition.
(4) Q. Dr. Davidson, did you find a (5) reference in Mrs. Colby's deposition to that area?
(6) A. Yes.
(7) Q. What does it say?
(8) A. On page 67 line ten your question where did (9) your husband go after he left OTD, what did he do? (10) Answer, he worked as an operator of heavy (11) equipment. He went out in the field. Now you (12) asked now, when you say he went on as an operator (13) of heavy equipment did he work for Local 825 or was (14) he working for other employers? No. From the (15) union.
(16) Q. The answer was no from the union?
(17) A. No. No. Right. From the union. Explain (18) to me what he was doing. He worked at a union (19) hall.
(20) Q. My recollection of that part of (21) the deposition, and you can confirm it for me, is (22) that Mrs. Colby could not be more specific than (23) that as to what he actually did when he was out on (24) the various jobs. Correct?
(25) A. That's correct.

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(1) Q. All right. Have you had the (2) ability to learn from any other material or (3) reference document of what Mr. Colby's specific (4) duties and jobs might have been after he left OTD?
(5) A. This is the only source I have.
(6) Q. Would it be of assistance to you (7) in order to prepare a report or perhaps supplement (8) the report to know more specifically of how he (9) spent the next 20 years or so of his life in the (10) employment sector in order to determine other (11) dangerous chemicals he might have been exposed to?
(12) A. It would be very helpful if I had any (13) specific information.
(14) Q. Right. Which you don't have (15) based on everything you have seen.
(16) A. No.
(17) Q. Okay. Let me back up for a (18) moment. I thought I heard you refer to medical (19) records that were available from OTD itself. (20) Perhaps I misheard that. Did you have a specific (21) reference in mind to that?
(22) A. The reference I had in mind, but I don't (23) recall where the documents are, he complained at (24) work about coughing and spitting up and phlegm and (25) so forth and I deduced from that that he must have

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(1) reported this to the medical people at the facility (2) and I would presume there would be a report on (3) file.
(4) Q. Okay.
(5) A. I haven't seen that.
(6) Q. You're working backwards by (7) deductive reasoning, if you will, if that he made (8) any complaints and the fact that you probably did (9) glean from Mrs. Colby's deposition and I even (10) believe from the work history that Mr. Levinson (11) supplied you with, that he could have, therefore, (12) complained to the medical people at OTD and that (13) there ought to be records available.
(14) A. Yes, either directly or through his union.
(15) Q. You're not saying, however, that (16) you saw any such records and they were supplied to (17) you, i.e., medical records from OTD?
(18) A. That's correct.
(19) Q. Okay. When you talk on the first (20) page of your report that's been marked Davidson-18 (21) you refer to an opinion that Mr. Levinson was (22) seeking on " avoidance of exposures."
(23) A. There's a misspelled word there.
(24) Q. I see it. I'm ignoring it. The (25) word should obviously be opinions.

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(1) When you talk about avoidance-of-exposures (2) I assume that you're talking about steps that could (3) have been taken, steps by the employer, OTD or the (4) manufacturer of certain material, in this case (5) Union Carbide, to avoid or alleviate exposures of (6) the workers.
(7) A. Correct. There are two primary mechanisms (8) for that.
(9) Q. Which we'll get to later. I want (10) to make sure I understand. We're not talking about (11) avoidance of exposure by the workers themselves. (12) The avoidance mechanism being employed by workers –
(13) A. No. They could not have known that (14) couldn't perceive.
(15) Q. Which you say elsewhere in your (16) report.
(17) A. Yes.
(18) Q. In that same paragraph you refer (19) to carcinogenic chemical agents identified in the (20) medical report of Dr. Rowland D. Goodman dated (21) 10-22-92 and those in Colby's exposure history.
(22) A. Yes.
(23) Q. What specific carcinogenic (24) chemical agents were identified by Dr. Goodman in (25) his report?

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(1) A. The PVC powder and again mention that Mrs. – (2) and then and again mentioned in Mrs. Colby's dep.
(3) Q. So we use the same phrase, when (4) you say PVC powder is that PVC resin?
(5) A. That's resin.
(6) Q. You don't mean to suggest that (7) there's a difference between the two or do you?
(8) A. No. PVC resin is powder.
(9) Q. You use them interchangeably?
(10) A. Interchangeably, yes, and also that also (11) means the entrapped monomer and

the eluted monomer. (12) Altogether in one terminology.
(13) Q. I understand that from your (14) report. Does Dr. Goodman in his report, dated (15) 10-22-92, refer to Mr. Colby's cigarette smoking?
(16) A. Without reading it over again I can't (17) recall. Do you want me to read it over?
(18) Q. Actually, I will tell you that on (19) the third paragraph of the first page he says, (20) "this indicates the patient was a heavy smoker and (21) had heavy ethanol intake but the quantities are not (22) given in any detail." So it's in there.
(23) A. Yes. I see it now.
(24) Q. All right. Are you aware that (25) there are other reports prepared by Dr. Goodman

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(1) with regard to the Colby matter?
(2) A. I'm not aware of any.
(3) Q. You've never seen them?
(4) A. This is the only report that I was in (5) receipt of.
(6) Q. And the only one upon which you (7) relied in preparing your opinion?
(8) A. Part of my opinion. Yes.
(9) Q. Part of your opinion.
(10) A. Yes.
(11) Q. Let me show you two reports. One (12) has an examination date of July 29, 1986 and (13) another one entitled death case report dated 1-9-90 (14) and ask if you have ever seen either of those (15) before.
(16) A. I haven't seen either one of these but the (17) 1-9-90 looks very similar to the 10-22-92. There's (18) a lot of similarities.
(19) Q. Going back to the report of (20) 10-22-92 can I direct your attention to the second (21) page where Dr. Goodman undertakes a bit of the (22) summary of various hospital records that he has (23) seen and I would ask you to look at the fourth line (24) down of that top paragraph. It says, "This (25) indicates patient smoked two packs of cigarettes

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(1) daily and admits to heavy ethanol intake." The (2) reference seems to be to the Riverview Hospital (3) record of July 10, 1983. You were aware of that (4) statement in Dr. Goodman's report, I assume.
(5) A. Yes.
(6) Q. Did that give you greater (7) confidence that, in fact, Mr. Colby would appear to (8) have been a smoker to the extent between one and a (9) half packs and two packs a day at least?
(10) A. Yes. It gave me confidence that there's a (11) correlation between what Mrs. Colby was testifying (12) to and what was gleaned from a different source (13) here.
(14) Q. A little further on in the same (15) paragraph there's another reference to (16) Dr. Commentucci on a record in 1986 that the (17) patient smoked two to three packs of cigarettes (18) daily and drinks at least a six pack of beer daily. (19) So you had that information available to you as (20) well?
(21) A. Correct.
(22) Q. Coming back to Dr. Goodman's (23) report again, as far as the carcinogenic chemical (24) agents are concerned, the only ones identified in (25) this report then, are as far as you are aware, PVC

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(1) and I'll say PVC/VCM for the time being and (2) smoking.
(3) A. Yes.
(4) Q. The other chemicals that are (5) mentioned in here in Dr. Goodman's report is it

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(6) y[illegible]nderstanding that they are not carc[illegible]enic (7) chemical agents?
(8) A. I don't know that as a fact.
(9) Q. Let's go back to that. After he (10) mentioned PVC again I'm looking at the paragraph (11) that says industrial history on the front of the –
(12) A. I am too.
(13) Q. Okay. After PVC and VCM it (14) mentioned polyethylene.
(15) A. Yes.
(16) Q. Are you aware whether (17) polyethylene is a carcinogenic material?
(18) A. It depends on what reference and what (19) application. There are references on all solid (20) plastic materials, have a potential for (21) carcinogenic reactions.
(22) Q. Let me ask you more specifically –
(23) A. In addition the one book that I referenced (24) is all about that subject. Implantations under the (25) skin. Plastic of all types have produced

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(1) carcinogenic reactions. Not all but many.
(2) Q. In humans?
(3) A. Not in humans. Animals.
(4) Q. Now, do you recall any specific (5) literature that would support the proposition that (6) polyethylene, that specific chemical or plastic, is (7) carcinogenic to either animals or humans?
(8) A. It couldn't be the polyethylene. It would (9) be the un-reacted monomer, that is the active (10) species or intermediate species.
(11) Q. Were you aware of any specific (12) literature that supports that proposition that the (13) monomer is carcinogenic to either animals or (14) humans?
(15) A. Carcinogenic, I can't specifically state (16) but it does have a TLV of toxic material, ethylene.
(17) Q. But my specific question now (18) deals with carcinogenicity.
(19) A. I would have to read almost every article (20) in my file to pick up a specific –
(21) Q. I don't wish you to do that.
(22) A. And I don't recall specifically. That's my (23) answer.
(24) Q. And my question is only what is (25) you recall specifically and if you could direct me

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(1) to something specific. The same question if you (2) would regard to polyurethane. Are you aware from (3) any specific literature that it is considered to be (4) carcinogenic in animals or humans?
(5) A. Yes. Polyurethane is – I've had a lot of (6) experience with polyurethane and I can tell you (7) it's not a pure substance. There's un-reacted (8) components in it like TDI which is a carcinogen or (9) carcinogenic or suspect carcinogenic materials.
(10) Q. Could I interrupt you? I think (11) we established earlier that there's nothing that (12) you have seen in the materials that would suggest (13) that he was exposed to polyurethane.
(14) A. That's correct and that still stands as to (15) today. I haven't found anything. I assure you if (16) I would have found something I would be able to (17) comment on this of this particular compound.
(18) Q. We can pass over that. The next (19) is polystyrene and I ask you the same question as (20) to whether there's literature in support for it (21) being a carcinogenic material?
(22) A. Not the polymer but the un-reacted

monomer (23) because it's ethyl benzene.
(24) Q. The un-reacted monomer of (25) polyethylene is ethyl?

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(1) A. No. Polystyrene.
(2) Q. Is ethyl benzene?
(3) A. Could be.
(4) Q. It seems to be –
(5) A. Well, we don't know how much reactive – if (6) it's completely purified there's not but that's (7) never the case.
(8) Q. All right.
(9) (Whereupon a discussion is (10) held off the record.)
(11) Q. With regard to the monomer, (12) whatever its consistency is, are you aware as you (13) sit here of the literature that supports the (14) proposition that it's carcinogenic?
(15) A. I've seen references to the un-reacted (16) styrene monomer as being a suspect carcinogenic (17) element in and of itself.
(18) Q. Is that because of the benzene (19) element?
(20) A. It could be the benzene. Well, benzene is (21) in the ring. It's part ethyl benzene and then we (22) dehydrogenate to get the styrene monomer. The (23) benzene is also there just like benzene is also (24) there for phenol.
(25) Q. Recognizing as I do that you are

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(1) speaking generally in terms of literature that you (2) have seen, do you recall any specific literature on (3) the issue of the monomer from polystyrene being (4) carcinogenic?
(5) A. I've seen it. I recall it specifically.
(6) Q. Let's just run through the rest (7) of these. The same question, if you will, (8) isopropilidene?
(9) A. I have no comment on that. I haven't seen (10) that.
(11) Q. All right. Now, Dr. Goodman says (12) in his report disphenol resins, and I take that to (13) be an incorrect term and I assume that it's (14) bisphenol resins. Are you aware of any other (15) literature supporting the proposition that (16) bisphenol resins are or can be carcinogenic in (17) animals or humans?
(18) A. Yes. The phenol components of –
(19) Q. Of the bis-A?
(20) A. Yes, an extremely low threshold I think it (21) is.
(22) Q. Do you have a specific (23) recollection of a particular piece of literature (24) that supports that proposition?
(25) A. Yes. I have seen comments to the phenol

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(1) component as far as phenol is in the suspect (2) carcinogenic list.
(3) Q. The list that you talk about, (4) you're referring to the EPA?
(5) A. It could be the EPA, it could be the OSHA.
(6) Q. But that's where you have seen –
(7) A. It could be in Sax's book also but I've (8) seen it. Yes.
(9) Q. He has phenols next. I assume (10) that that's a reference again to bisphenol and your (11) answer would be the same.
(12) A. Yes.
(13) Q. Lubricants and fuels, probably (14) too general to know what that is in reference to.
(15) A. I don't know what lubricants and what (16) fuels.
(17) Q. You'd need to know more than (18) what's here in order to determine whether it's (19) carcinogenic?
(20) A. I would like to see the MSDA.
(21) Q. In any event, it did not enter (22) into your opinion because you didn't have any (23) information on it. Correct?
(24) A. Yes.
(25) Q. And fumes from the heat sealer in

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(1) the vinyl resin bag packing bay that was something (2) that you did study. Are there carcinogenic (3) elements in that?
(4) A. Yes.
(5) Q. What constitutes the carcinogenic (6) elements in the fumes from the heat sealer?
(7) A. You've got quite an alphabet soup of (8) chemicals composed and recombined elements from the (9) thermal activation of PVC including benzene which (10) has been reported in the literature and scientific (11) experiments on the heat activation of PVC (12) producers, that and a potpourri of other chemicals (13) including – and including the monomer VCM.
(14) Q. As I recall, there's a (15) substantial portion of your report that talks about (16) the fumes from the heat sealer so the best time (17) would be to do that is when we get to your report.
(18) MR. HOLLINGSHEAD: Having (19) concluded that portion of the deposition (20) why don't we take a break for lunch. Is (21) that all right with you, Mr. Lavinson?
(22) Fine, he says.
(23) (Whereupon a lunch recess (24) is taken.)
(25) Q. Dr. Davidson, on page one of your

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(1) report down at the bottom AVCM appears. Can you (2) tell me what you mean by atmospheric, local or near (3) field, free gaseous vinyl chloride monomer? (4) Particularly the reference to local or near field, (5) does that simply refer to closer or further away?
(6) A. And in-between.
(7) Q. An in-between?
(8) A. Yes. It's a continuum.
(9) Q. So local is close?
(10) A. Local means and includes microscopically (11) close. Close, further away and then further and (12) further away. There's no magical dividing line (13) except the term local and/or near field means from (14) the point that it becomes fugitive, airborne which (15) can be very local at the molecular level all the (16) way to and including breathing zone and beyond even (17) over the boundary fence into neighborhoods. All (18) part of the spectrum of near and far afield.
(19) Q. When you refer to free gaseous (20) monomer or chloride monomer that's a reference to (21) the monomer whether it has been leached out of the (22) resin or just exists as a monomer. You're (23) referring to that as the same?
(24) A. Right. There are several sources for it; (25) the free gaseous component monomer that came from

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(1) one way or another the resin particle another as an (2) entrapped and eluted material or as a thermal (3) decomposition product in the heat sealing process.
(4) Q. On the next page when you refer (5) to PVCR, polyvinyl chloride resin, do you (6) distinguish in your usage of the term PVC, do you (7) distinguish between various types of polyvinyl (8) chloride resin?
(9) A. No.

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(10) Q. This is intended to refer to any –
(11) **A. It could be a copolymer as long as it** (12) **generically has the carbon hydrogen chloride** (13) **grouping and any other copolymer with it is fine.**
(14) Q. Are you aware of what the various (15) forms of PVC resins were in the mid 1960s? We can (16) take Mr. Colby's time of employment at OTD which (17) was 1961 to 1967 as the time frame, if you will.
(18) **A. From Wheeler's report.**
(19) Q. Is Mr. Wheeler from – (20) Dr. Wheeler from Union Carbide?
(21) **A. I don't think so but that's okay. Is he a** (22) **doctor? His report and deposition indicated that** (23) **there were three kinds being produced and shipped** (24) **to the Perth Amboy facility; suspension, bulk and** (25) **solution.**

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(1) Q. Do you know the characteristics (2) of each of those?
(3) **A. Yes.**
(4) Q. Can you tell me in general what (5) they are?
(6) **A. The suspension way of making the polymer in** (7) **a reactor according to Mr. Wheeler represented** (8) **about 25.7 percent of the shipments by poundage.** (9) **Basically it's a suspending agent alone, alcohol** (10) **and water, and the monomer is all put into a** (11) **reactor, stirred up, temperature control and you** (12) **get out particle fines in the 50 to hundred micron** (13) **range. And the residual free monomer concentration** (14) **averages up to as high as 2,000 parts per million** (15) **and averaged around 860 parts per million prior to** (16) **1974. That's the suspension.**
(17) **The bulk represents a lower percent, I** (18) **think 12.8, according to Mr. Wheeler's testimony,** (19) **by weight. It's a different system. It doesn't** (20) **use any solvent. It's a mixture of PVC and monomer** (21) **mixed together in a reactor and the size of the** (22) **particles, average size, around 80 microns but** (23) **contains a very low residual free monomer** (24) **concentration. According to Mr. Wheeler, less than** (25) **ten parts per million by weight.**

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(1) **And then the solution which represents 61** (2) **and a half percent by weight. Again it's done in a** (3) **continuous flow stirred tank reactor or stir tank** (4) **reactor and it has a comonomer and a solvent** (5) **producing 75 microns size particles but it has a** (6) **low concentration of residual free monomer. Less** (7) **than one part per million by weight.**
(8) **Those were primarily the three having a PVC** (9) **make-up to the resin which were shipped. I believe** (10) **the suspension was something like five million** (11) **pounds a month, I believe. There's some table data** (12) **that indicates how many millions of pounds per** (13) **month but there was a huge, huge quantity.**
(14) Q. What was the percentage of the (15) solution PVC that was shipped to –
(16) **A. 61 and a half percent, the largest** (17) **fraction, but the second largest was the suspension** (18) **which had the largest residual free monomer. Or if** (19) **you want to do it; the one that produced, shipped** (20) **the most residual free monomer was a suspension.**
(21) Q. But in terms of the percentage of (22) all pounds or tons that were shipped the solution (23) had by far the big –
(24) **A. Correct.**

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(25) you have any reason to

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(1) **disagree with Mr. Wheeler's statements as to** the (2) **residual monomer, chloride monomer in those three** (3) **types of PVC you've just identified?**
(4) **A. Yes. I do have some, some residual doubt** (5) **as to how he accomplished. I haven't seen the** (6) **description of the analytical technique used to** (7) **measure that and the statistics behind it. The** (8) **sampling technique was every pound that was** (9) **produced, sampled or was sampled once a month for** (10) **residual. I would like to know how he could in the** (11) **'60s know that one part per million was residual** (12) **free monomer.**
(13) Q. Have you done any independent (14) studies of your own to determine what those numbers (15) in terms of residual monomer, chloride monomer, (16) ought to be in your opinion as compared to the (17) numbers given by Mr. Wheeler?
(18) **A. I looked at that time, as a mental exercise** (19) **there's – I even asked and received some 79** (20) **samples of several of those in one quart jars** (21) **hermetically sealed and I was going to produce to** (22) **have that analyzed by Gollob Analytical Services,** (23) **the same group that was retained by Union Carbide** (24) **to do the same thing. I never followed through** (25) **with that for one reason or another. I think**

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(1) **probably because I didn't think those samples were** (2) **representative.**
(3) Q. Do you have any information (4) within the material that has been supplied to you (5) for the Colby case that would allow you to come up (6) with a calculation that would result in different (7) numbers than those put forth by Mr. Wheeler?
(8) **A. Yes. They would be the same kind of** (9) **simplified calculations that he went through I went** (10) **through except I did one thing differently. I** (11) **relaxed some of the assumptions that he made** (12) **showing that if you relax one assumption and then** (13) **another assumption and relax them in combinations** (14) **you can dramatically change the atmospheric or the** (15) **residual free monomer concentration, the atmosphere** (16) **concentration in the breathing zone.**
(17) Q. Let's make sure we're talking (18) about the same thing. Why was Mr. Wheeler's (19) calculations just intended to show what we have (20) been talking about thus far, the residual vinyl (21) chloride monomer, in the particular PVC particle at (22) the time of manufacture?
(23) **A. No. He didn't do any calculations on that.** (24) **He just stated them in a table.**
(25) Q. Which table are you referring to?

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(1) **A. Give me just a moment to regurgitate that** (2) **which is right in front of me. Page 53 is –**
(3) Q. Of?
(4) **A. October '89. Peterson. If you keep going,** (5) **talking about particle size and then we go onto the** (6) **next estimates of exposure to vinyl chloride** (7) **monomer. We get to a point where he on page 59 at** (8) **the bottom, which is also rider 56 in answers to** (9) **supplemental interrogatories or something like** (10) **that, where he gives these like for suspension a** (11) **number of 860 without really telling me how he** (12) **derived that and what**

year that he did the (13) calculation.
(14) Q. Let's stop here so we can clear (15) up the record.
(16) On the bottom of page 59 of the report that (17) you're referring to from the Peterson litigation he (18) says the following, at the time these resins were (19) shipped, which means from their point of (20) origination which I recall is Texas City, Texas (21) primarily to OTD and go back to the road, the (22) residual vinyl chloride, the residual vinyl (23) solution was estimated to be and then he lists (24) conclusion resin less than one PPM.
(25) **A. Right.**

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(1) Q. Bulk resin 15 PPM and suspension (2) resin 860 PPM. Now he also cites to his resins (3) table at the end as to his support for those (4) numbers and he cites to reference numbers two, (5) three and 93 so has he not provided you with at (6) least some specific reference as to where his (7) calculations or his numbers came from.
(8) Reference number two in the literature (9) cited is apparently a paper by R.N. Arnold called (10) current data of the residual vinyl chloride in (11) suspension/non-solvent vinyl resins. Reference (12) number three again is to Arnold, an analysis of (13) suspension of vinyl resins for VCM content and (14) reference number 93 is to Wheeler's letter and (15) report to Mr. Ren (phonetic) of the U.S. Department (16) of Labor in 1975. So there's some reference there.
(17) **A. I don't deny the reference, I just don't** (18) **see any data.**
(19) Q. Have you seen the reference items (20) that are specifically alluded to her?
(21) **A. I just saw the reference to the – I** (22) **haven't seen the meat.**
(23) Q. You haven't seen the document (24) that's being referred to?
(25) **A. That's correct. And how the measurement**

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(1) **was ascertained, was it a gas chromatograph or what** (2) **technique was used and the accuracy of the** (3) **technique. Standards were set up to test the** (4) **accuracy calibrations and so forth.**
(5) Q. All right. What you're saying, (6) if I hear you correctly, is that you have questions (7) about the calculation. You have not sufficiently (8) been made aware of how the calculations were done (9) and the nature of the calculations but you have not (10) done specific calculations based upon data from the (11) 1960s with regard to the resins that were being (12) shipped to OTD to come up with specific numbers on (13) your own as you sit here today. Is that fair?
(14) **A. That's very fair and of course don't forget** (15) **the word was estimated to be. Didn't say it was** (16) **analyzed to be.**
(17) Q. Yes. You're referring back to (18) the reference on –
(19) **A. Page 59 –**
(20) Q. Statement by Mr. Wheeler?
(21) **A. That opens the door to estimates and** (22) **simulation analysis.**
(23) Q. What do you know and from what (24) source do you know it as to how Mr. Wheeler did his (25) calculations for these estimates?

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(1) **A. I believe in his deposition he said in the** (2) **period around the '60s they were developing I** (3) **believe a chromatograph or an analytical technique** (4) **that could be used to take field samples back to a** (5) **laboratory for analysis that were limited to 50** (6) **parts per million residual free monomer level. And** (7) **that's why I'm raising doubts as to how you can** (8) **measure one when they admit that their model was** (9) **good to 50. I believe it was in the period of the** (10) **early '60s and I do recall reading that in his** (11) **deposition transcript.**
(12) Q. That had to be from the Maliko (13) case. I think that's the only time he's been (14) deposed.
(15) **A. It was that far back. Yes.**
(16) Q. Okay. When you said earlier that (17) you believe he made, I'm paraphrasing, that he, Mr. (18) Wheeler, made certain assumptions leading up to his (19) estimates or calculations what particular (20) assumptions did you think he made with which you (21) quarrel?
(22) **A. In my notes which were in Davidson number** (23) **ten I tried to redo his simulation with my own** (24) **model which basically is the same model he used but** (25) **updated from the point of view of application and**

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(1) **technique and using exactly his assumptions. With** (2) **no equivocation I came up with a number of point,** (3) **an average number of .962 parts per million** (4) **atmospheric monomer concentration in the breathing** (5) **zone in the bagging room and he came up with a** (6) **number .98. I figure that's close enough. We both** (7) **agree as to how to get that number from the** (8) **assumptions.**
(9) Q. Can I interrupt for a second?
(10) **A. Yes.**
(11) Q. Where are the assumptions listed (12) so that you understand what he was doing?
(13) **A. Sure. Sure. The one assumption which he** (14) **got by hearsay was from a Mr. Archer who gave him** (15) **some input on the HVAC; heating ventilating and air** (16) **conditioning. That's a modern way of saying what** (17) **was the ventilation rate in the room. And Mr.** (18) **Archer gave him, as I understand it, a design** (19) **figure of 4,308 cubic feet per minute air flow** (20) **ventilation forced in a 16,500 cubic foot bagging** (21) **room. That was one assumption. He assumed two** (22) **things. One, that that was correct; two, that the** (23) **exhaust fan was always working and on.**
(24) Q. It might be difficult if I wait (25) to the end. Was it your understanding that there

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(1) was only one exhaust fan for the room?
(2) **A. For each room.**
(3) Q. One bagging room?
(4) **A. Yes.**
(5) Q. Where was that located?
(6) **A. In the ceiling.**
(7) Q. Was there local exhaust on the (8) equipment at all in the bagging room?
(9) **A. It could be but that's not significant.**
(10) **That's inside the room. That's not bringing in** (11) **fresh air.**
(12) Q. Without it it would be exhausting (13) air and particles in the air from the –
(14) **A. It would be making the situation worse if** (15) **it was doing that which I understand it was. It** (16) **was actually blowing air through the building and** (17) **when they touched it simply spread the pollution** (18) **further into the room, into a wider breathing zone.** (19) **But going back to your question.**
(20) Q. I'll correct that later.
(21) **A. Going back to your question, that was one** (22) **assumption that he made. I have no problems with** (23) **his assumption as to the**

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volume of the room. I was (24) in the room I had taken notes, although I can't (25) seem to find them back in '79 when I was there. I

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(1) agree with that number. That number is about (2) right. It may be off by 500 cubic foot. That's (3) not significant.
(4) The other thing that he assumed was the (5) free –
(6) Q. Before you move to that tell me (7) what's wrong with the assumption.
(8) A. Nothing. About the volume of the room?
(9) Q. No, about the amount of the 4,300 (10) cubic feet per minute.
(11) A. Yes. That's important. When it's off (12) there's no ventilation at all in the room and even (13) when it's on the assumption is made that you are – (14) you have uniformed distribution of pollutants in (15) the room which is not the case. You have (16) tremendous stratification. You have white snow on (17) the floor described to be six inches to a foot high (18) of spurious PVC powder that came from the broken (19) bags and the exhaust in the ceiling is not picking (20) this up at all. And accordingly VCM, the gas in (21) the atmosphere being heavier than air is going to (22) stratify itself and this exhaust fan cannot pick it (23) all up. There's an efficiency factor.
(24) He assumed 100 percent efficiency which is (25) by every ventilation standard book I've ever read,

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(1) and I've read a lot of them, you never use in (2) designing ventilation of a room. You always throw (3) in an engineering design factor of at least 250 (4) because efficiency very often is only 50 percent.
(5) Q. Do you have any information that (6) would suggest that Mr. Archer's advice to Mr. (7) Wheeler was incorrect? By that I mean as to (8) whether or not he had testing support for that (9) statement.
(10) A. From what I can infer from what has been (11) stated, and it's just an inference at this point, (12) all Mr. Archer did was one of two things. He (13) either got up on the roof and read the (14) manufacturer's cubic feet per minute off the motor (15) or he had some engineer design drawing that stated (16) that. So that's one assumption which I challenge (17) and it should and could be massaged up and down to (18) see the effect on the calculation.
(19) The other one which I have problems with is (20) the generation term for residual – for free (21) monomer in the air coming from so many bags being (22) processed per minute and so much air being blown (23) through the bag. And based on a residual free (24) monomer concentration of, I believe he had 550 (25) parts per million, I believe it was shipped with an

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(1) average number of 890, I think Mr. Wheeler felt (2) that some of that was lost in transit and so forth. (3) By the time it got to Perth Amboy it was 500 (4) something so I question that. He doesn't know that (5) for a fact. He doesn't know it was 890 or if it (6) would have been twice or half that. So I question (7) the generation term as being not cast in concrete.
(8) Q. I'm sorry. I'm not sure I follow (9) on generation term.

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(10) He calculation has a ventilation term and (11) a generation term.
(12) Q. Generation referring to what?
(13) A. Generation referring to what – first of (14) all, he's admitting that there's a generation of a (15) carcinogen in the workplace in the breathing zone. (16) That is the most significant admission I've seen in (17) all the documents in my file that he, who is an (18) expert for Union Carbide, probably knows as much (19) about this as any other single person at Union (20) Carbide in that time frame is admitting that. So (21) that was really a backbone to all of my (22) investigation, is that document. His deposition (23) report was very revealing in that sense. He's a (24) chemical engineer.
(25) Q. And you addressed that in your

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(1) report?
(2) A. Yes.
(3) Q. So we'll get to that. Let's stay (4) with my –
(5) A. I'm still –
(6) Q. What's generation term?
(7) A. Your question was a simple question to me (8) but it's a very involved question for me. Only (9) involved in the sense that has many parts.
(10) The generation term is a very (11) barometrically sensitive term with respect to the (12) final number you get in the breathing zone. If you (13) double it you get twice, if you take 50 percent of (14) it you get half.
(15) Q. The only thing we're missing – (16) let me stop you because I don't think you (17) understand my question. It's really much simpler (18) than that. What does the word generation refer to, (19) VCM that is generated –
(20) A. Yes.
(21) Q. Is –
(22) A. In that bagging room at every instant of (23) time.
(24) Q. I now understand generation term. (25) As to the significance we'll get to it later.

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(1) A. Yes. Okay.
(2) Q. Let's go back to this assumption (3) that –
(4) A. He doesn't state is the temperature.
(5) Q. Ambient temperature in the room?
(6) A. Well, that temperature is not so critical (7) to me. It's the temperature of the particles in (8) the bag in the bagging process what temperature (9) were they in. That's important because it was (10) stated previously by Mr. Wheeler and other experts (11) in the field that one of the most important (12) variables for the self elution of the entrapped (13) monomer is temperature aside from particle size and (14) the method of preparation. That's nowhere in his (15) simulation. A higher temperature would give you a (16) higher generation.
(17) For example, lower temperature lower. The (18) exposure would be greater in the summer and this (19) was not an air conditioned environment so I would (20) estimate that in the summertime it's like any (21) un-air conditioned factory situation. It's (22) reflecting outside air and may even be hotter (23) because of the accumulation of heat.
(24) Q. All right.
(25) A. I challenge that. And I went through some

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(1) simulation to say relax the assumptions up

and down and in combinations and showed it quite easily to myself as a demonstration that the combination of reducing the HVAC by 50 percent and increasing the generation rate by just a factor of two gives me a parts per million average in the breathing zone of VCM of 3.85 parts per million.

Q. Is that independent of which type of PVC resin it is?

A. No. This is based on suspension. I haven't deviated from his other assumptions in the calculation. He was saying considered to be the worst case situation. I accepted that as a worst case situation and I did the following simulation which was on pages one, five and...

Q. So you came up with 3.8 PPM with those changes. Is that right?

A. Yes, and then I did one other thing which he did but we did it differently. He went through the Gollob Analytical Services reports which are attached in Davideon-5. They're 50 pages of data, real data taken by analytical field chemists by Gollob, brought back to a lab and under scientifically controlled conditions analyzed for VCM. So I have a – this is the most accurate data

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I have seen. And he picks out only those data points which agree with his simulation in the one part per million range. But I have shown and I have pages upon pages of evidence that Gollob provided to Union Carbide in their own analytical reports. It shows that one part per million was violated a number of times in a number of places throughout the entire period of their examinations which, by the way, took place in the '74, '75 time frame which you would expect to be lower because that's when they were making process changes in Texas to reduce the hazard. So the situation in the '60s had to be higher than that and yet Mr. Wheeler ignored all of that in his simulation chapter and only picked out those numbers which agreed with his simulation.

Q. Administratively, let me clear something up. One of those comments that you've just put on the record are specifically part of your report in this case. Right? In other words, you've not written a report that specifically outlines all of that in the Colby case.

A. Well, indirectly, yes.

Q. No. No. Answer my question. I'll get to the next. It's not in the Colby case.

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Right?

A. It's in the Colby case as far as my analysis and conclusions not explicitly stated but it was part of the documents which you have in the Peterson case so I –

Q. That's all I was getting to.

A. I don't want to reproduce it again.

Q. You are relying upon the report and the explanation that you gave within the Peterson case to describe your reaction to Mr. Wheeler's report as it existed in the Peterson case and as it may exist in the Colby case. It doesn't yet but it may. Is that fair?

A. Well, it doesn't exist and it is a factor. It's –

Q. It's not yet been written in the Colby case. There's no report on the Colby case.

A. About?

Q. By Mr. Wheeler.

A. Oh, by Mr. Wheeler. No. No. There was not. I would like to see that if there is.

Q. Coming back to your figure of 3.8 PPM. this is what your calculation is for the reasons you've expressed as to what the vinyl chloride monomer content in the atmosphere in the

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bagging room is estimated to have been in the 1960s time frame. Is that fair?

A. That's not fair. That's not what I showed and it's not what Wheeler showed either. Neither one is showing that. What we're doing is showing a particular model applied to a particular set of assumptions which is – which assumptions fall into the big ball park of highly probable. However, I could relax this even more. I could say the generation term was ten times higher and the ventilation was zero and instead of giving 3.85 parts per million and I would go 38 parts per million. I could even go 300 parts per million.

Q. Do you have any support for the suggestion that the ventilation of the room ought to be magnified or the lack of ventilation, if you put it that way, ought to be magnified by as much as tenfold?

A. Yes.

Q. What?

A. From the description of the witness, this is going back to Maliko, Peterson, Bernadino, including Mrs. Colby's description of what her husband looked like when he came home; there was no ventilation in this room. If there had been

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adequate ventilation in this room he would not have been exposed. He would not have been coverd with particle fines and not in the air suspended, et cetera, et cetera.

Q. But you have felt comfortable in adjusting the assumptions that Mr. Wheeler used as you have described to result in the 3.8 PPM number?

A. Just to massage it in a direction that he did not look at to show how barometrically sensitive they are.

Q. Was there a published TLV for VCM in this time frame, i.e., 1961 to 1967?

A. Yes.

Q. Whose publication was it?

A. This would have been ACGIH. It was either 50 or 500. I think it was 50 parts per million.

Q. ACGIH was putting out TLVs prior to OSHA which didn't exist at the time. Correct?

A. Yes.

Q. OSHA came into existence around 1972, I believe, and then began to put out TLV?

A. They call them TLVs.

Q. ACGIH continues today as an organization, does it not?

A. It does.

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Q. Is it American –

A. American Congress of Government Industry Hygienists.

Q. Let me return you to the temperature particle. Is it as important to know the temperature of the particle at the time of manufacture and that each time in-between before it gets to its resting place if you recall at

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OTD in order to determine whether or not residual vinyl chloride monomer is being leached out of, if that's the right phrase, during that entire continuum?

A. Temperature is one of several very important variables that determine how fast you can elute out entrapped monomer. The higher the temperature the faster the elution.

Q. You don't take issue with Mr. Wheeler's expressed concept that from the time of manufacture to the time of exposure at OTD VCM was being eluted out of the PVC resin. Do you?

A. I take no exception with that. That follows the laws of physics.

Q. As a concept you agree with that?

A. Yes.

Q. You have a concern in that regard with his calculations as to how much was being

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eluted out of the PVC resin during that trip, if you will, to OTD?

A. How much was being eluted and what the starting point was. And also you have to understand that in the handling from the point of origin there is a lot of physical handling and you can get attrition losses, you can get particle size reduction and that increases the surface area which also affects the rate of elution.

Q. Do you know how the material, the resins were handled on the trip from point of manufacture in Texas City, Texas to point of origin which was OTD in Perth Amboy?

A. I have no details. I do have details on how they were handled at OTD.

Q. Let's stay with that for a moment. How was it handled at OTD?

A. I have a photograph.

Q. It was gravity fed?

A. Yes. It came in a great big box car and it was lifted up and physically dumped.

Q. It was tilted?

A. Tilted.

Q. The entire van box was placed up on a cradle and tilted. Correct?

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A. Right. Which is a place where you would direct this attrition process to take place and then you would inspect it again in the bagging operation.

Q. Isn't it true that there is very little attrition in the gravity fed concept?

A. I wouldn't accept that without data.

Q. Do you have data to suggest otherwise?

A. I have experience of handling solids of all types under this kind of condition and you do get particle fines all the time. How much you'd have to run the experiment and do the calculations but it should be part of the data base when you express particle sizes which I didn't find in the Wheeler report.

Q. Is there a less abrasive method of transport than gravity feed?

A. Among the methods used by engineers it's the least abrasive. Pneumatic conveyance would be the highest but it's still on one end of the scale being able to have the potential to cause attrition because it's particles in motion rubbing against each other rubbing against the sides of the container and

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free- g at 15 feet a second.

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Q. With regard to the amount of entrapped VCM at the point of manufacture at Texas City, Texas are you familiar with any information from the materials you have seen that would state or indicate that Mr. Wheeler's calculations are incorrect?

A. Incorrect is not the word I would use. There's nothing incorrect about the single calculation that he did as far as it goes. I take no exception to the numbers plugging into a steady state material balance expression which he used. Every sophomore in chemical engineering knows how to do that calculation. So that's not what is incorrect. What is incorrect, he has no knowledge of what the residual free monomer is in each and every particle that is shipped. He has no generic information as to what it is on an average basis. The analytical methods that were used to analyze it in the '60s were only good to 50 parts per million and questionable. He has no concept about that. All he knows is that he's given a number, an average number, from someone else without checking the origin of that and showing me in his report that he checked that out. I find fault with this. That's a generation – that's an initial state term

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which is part of the assumptions I changed in my simulation by raising the number to show a higher generation rate because you have a higher starting point. And don't forget he's showing an average without a standard deviation. Is he talking about a standard deviation of one part per million by weight or standard deviation by 500 parts per million? I don't have that figure either.

Q. But you also don't have access to the reference documents that he has placed in his report that we were talking about before, references two, three and 93 which may contain such information.

A. I cannot repeat to you what it says or does not say. I don't have it. I don't recall if I have ever read it. It's been a long time.

Q. But my question is you don't have access to it either. Do you?

A. No, but I have access here a reference that says the range is 150 to 2,000 parts per million so why is he picking 860 when the range is 2,000? The worst case would be why didn't he pick 2,000 if he admitted an answer of two that the range could go as high has 2,000. I would like to know where that number is coming from.

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Q. It's fair then to say that you have a number of questions regarding the calculations that you would like further information on if it were available in order for you to determine if, indeed, the calculations were done properly or not.

A. Yeah. The calculations are done properly. They're right on the page. That's a bookkeeping –

Q. Your concern is the assumption –

A. The model itself is wrong. Assumptions in the model that he used are wrong.

Q. Maybe –

A. Wrong in the sense that they're not comprehensive, they're not detailed, they

don't (15) take into account inefficien-, of mixes, they don't (16) take into account the fact that a PVC resin cell (17) particle that still has entrapped monomer is highly (18) toxic as the free monomer itself and that's not in (19) his equation.
(20) Q. To abbreviate that, you would (21) like an explanation to determine, which you've (22) never seen I assume from what you're saying, as to (23) more detail as to how the numbers were derived, why (24) the numbers were selected as they were when there's (25) a larger range that seems to be indicated. In

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(1) other words, the detailed explanation of that.
(2) A. And also I would like an explanation of why (3) his simulation didn't go further and try to (4) correlate better with the higher number that the (5) Gollob Analytical Services were producing in '74. (6) Numbers are going up to three to ten to 20 parts (7) per million and he's going only .98. That's not (8) fair. The simulation model should have the (9) capability of showing the high numbers as well and (10) the reason he can't do that is because his model is (11) not a detailed model.
(12) Q. Weren't the Gollob numbers taken (13) from the warehoused area of OTD?
(14) A. That was one place. Also the bagging room. (15) They had harnesses put on operators and they (16) modeled them around in the bagging room which was a (17) very intelligent thing to do because that's the (18) breeding zone and those numbers were high. In (19) fact, I believe Schaffer was one of those people (20) who was going back in the early period.
(21) Q. What determines the difference in (22) entrapped monomer in the three different PVC (23) resins? What are the factors that influence that?
(24) A. It starts in the reactor. The method used, (25) whether it's a suspending or emulsifying agent or

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(1) not, the particle size and the porosity of the (2) particle and internal surface area.
(3) Q. Did it follow, therefore, that (4) the smaller the particle the less porous the (5) particle and the smaller internal surface area (6) translates in a lower amount of trapped VCM?
(7) A. Yes.
(8) Q. And does the solution resin fit (9) that description? Is that why it has the smallest (10) amount of entrapped VCM?
(11) A. Yeah. In the very next stage where they do (12) the stripping it's in that stage where all these (13) factors come to play and you're able to strip out (14) whatever residual monomer is left. If the particle (15) is small, has a high porosity, you can get more of (16) it out in the vacuum stripping stage. In fact, (17) that is the case and that means that that is the (18) particle that you should probably ship exclusively (19) and stay away from those which you have difficulty (20) stripping.
(21) Q. Suspension PVC has the highest (22) content of entrapped VCM regardless of the specific (23) number. Correct? Between the three of them it has (24) the highest by far?
(25) A. That's correct. Even using Mr. Wheeler's

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(1) number he puts it at 18, 16, 15 for bulk and less (2) than one for solution. That seems rather clear.

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(3) Q. Does suspension resin have a (4) reputation for dustiness? Do you know?
(5) A. It can. I don't know what its reputation (6) is in total but I can tell you from looking at the (7) microscopic pictures that they look like pieces of (8) popcorn. It depends on the history of the physical (9) handling also.
(10) Q. Let's take it at the time of (11) manufacture –
(12) A. And it –
(13) Q. When –
(14) A. One other thing is the sifting process that (15) determines the separation at the point of origin. (16) There's a standard ASTM screening test for these (17) particle fines, measure size that is used, and you (18) have to know details about the efficiency of that (19) screening, the separation to large particles from (20) the particle fines. Particle fines don't get (21) separated out that easily. They become (22) electrostatic and they tend to cling to everything (23) including myself and though a particle which should (24) not break up may be carrying some unwanted smaller (25) particles with it which didn't fall through in the

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(1) screening process because of electrostatic (2) adhesion.
(3) Q. Let's stay. We'll come to that (4) later. Let's stay with the subject at hand which (5) is looking at the various PVC resins at the time of (6) manufacture. At the time of manufacture there has (7) been very little handling, if you will, of the (8) product. Right at that very moment. At the time (9) of manufacture there's virtually no handling to (10) create dust and fines. Is that correct?
(11) A. That's incorrect.
(12) Q. During the manufacturing process (13) itself –
(14) A. In Texas.
(15) Q. Yes.
(16) A. There's a lot of handling.
(17) Q. All right. Do you know if one of (18) the attractions of suspension PVC resin is the lack (19) of dustiness of the material?
(20) A. It doesn't say that there's no dusting.
(21) Q. I'm only asking you if it is (22) known to have a lack of dustiness.
(23) A. It has the least amount of dusting of those (24) present. Yes.
(25) Q. Why is that?

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(1) A. Just the physical nature of the product.
(2) Q. So of the three that we've talked (3) about it's the least likely to give off dust. Can (4) we put it that way? It's not to say that it does (5) not, I'm not limiting that, but the least likely to (6) give off dust?
(7) A. I would subscribe to that.
(8) Q. And which of the others is the (9) most likely to give off dust? We're left with bulk (10) and solution.
(11) A. I don't know without checking the reference (12) on that which is which order. I could get it (13) backwards.
(14) Q. Okay. Back on page two RVCM says (15) entrapped gaseous and/or dissolved (or absorbed) (16) residual VCM in a PVCR particle. Is the use of the (17) word absorbed correctly or would it be adsorbed?
(18) A. It's really adsorbed.
(19) Q. AD now. Adsorbed that it clings (20) to the sides, does it not?

A. No.
Q. You tell me –
A. Adsorbed means that it's adhering to the outer surface.
Q. And absorbed means?

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A. With the B, absorbed means part of the polymer structure like putting salt in water, the salt molecules are dissolved in the water molecules. They fit together.
Q. Put it a different way for a layman, would it be where the gaseous element has actually invaded the particle and the particles have been absorbed almost like water into a sponge?
A. You could describe it that way. Yes.
Q. I'm trying to get the picture here.
A. Okay.
Q. What do you mean by dissolved in this particular definition of RVCM?
A. The same as absorbed.
Q. Is vinyl chloride monomer listed as a carcinogen, currently listed as a carcinogen by either EPA or any OSHA or any other federal agency?
A. Yes.
Q. Is polyvinyl chloride resin also listed as a carcinogen by any federal government agency?
A. I've never seen the resin listed.
Q. Carcinogens are listed by class,

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are they not; class one, two, et cetera, et cetera?
A. Correct.
Q. What is VCM listed as? Is that a class one carcinogen?
A. I'd have to review the definition of classes to tell you that.
Q. There is a difference between a known carcinogen and a suspected carcinogen, is there not?
A. Yes.
Q. Is VCM a known carcinogen?
A. Definitely.
Q. Is it a known carcinogen in both animals and humans?
A. Yes.
Q. How many other chemicals are there that are listed as known carcinogens to both animals and humans, approximately?
A. I couldn't begin to tell you. It's a dynamic thing. It changes every day.
Q. As of the last time you might have reviewed that information what was the number approximately?
A. Years ago I looked at that and it was over 20 so I don't know where it is today. I have never

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seen one listed that was taken off the list though.
Q. Once it's on the list it stays and then others are added. Is that fair?
A. Yes.
Q. Have you determined in any of your review of documents and information that's been supplied to you that Mr. Colby was not exposed to any of those other known carcinogens, both known carcinogenic to both animals and humans? In other words, have you eliminated any of those others as being part of his exposure history?
A. Well, I've indicated that his alcohol and smoking problem are in his history.
Q. This is true. You did. Is alcohol

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list a carcinogen?
A. I don't know what kinds of alcohol he drank all the time.
Q. However the reference has been to beer.
A. I don't know. There's some wines I know of that have asbestos particles in them and I know that specifically that was shipped in PVC bottles that have taken out the monomer, extracted it. It's something that I would have to see a lot of detail on.

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Q. This is another area where you and I are somewhat at a loss to know the rest of his history to know if there was anything else that he was exposed to. Is that fair?
A. That's fair.
Q. What is your understanding of the nature of the cancer that Mr. Colby contracted?
A. In looking at Dr. Goodman's report it appears that what he is saying, if I interpret it correctly, and this is strictly my engineering determination, I'm not a medical doctor; perhaps the initial site may have been in the lungs and then metastasized to other organs. At least that's what is referred, but I don't have any great detail. I suspect you ask Dr. Goodman.
Q. In terms of the preparation of your opinion, did it make a difference to you as to the nature of the cancer when you were assessing the exposure history?
A. It doesn't matter to me what organ is attacked first, what the nature is with respect to what organ is showing up first. The only thing that is important to me is what are the ways in which it invaded the body, got to the body, gone to the mouth, the skin, got to the breathing zone, got

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in his nose. May or may not, depending on particle size, gotten into the bronchial area and then smaller particles into the – these are four things to me that I need to present to the medical profession so they can make an educated evaluation of what actually clinically happened.
Q. All right. Your job as it were was to provide that information for the medical side so that the medical side or part of the team could then assess the impact that that exposure would have upon the body; in this case, Mr. Colby's body. Is that fair?
A. Correct. Correct. And really pointing out to them how potentially particles with residual monomer in it really is and it doesn't have to be inhaled. It can be ingested. It can inhaled in the nostril, in the esophagus, attach to the skin and there can be release of the monomer from those sources within the body taking place.
And then I talk about the secondary exposure; you bring it home on your clothing, you are constantly exposed to the eluted monomer in your breathing zone to various degrees of concentration.
Q. Going back to the questions

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involving listed carcinogens, is cigarette smoking a listed carcinogen?
A. Well, it says on the package may cause cancer. I don't know if it is, per se, listed. I am aware of some of the cancer causing agents that are part of cigarette smoke.

(7) Q. Are any of those listed as (8) carcinogenic?
(9) **A. Yes.**
(10) Q. To both animals and humans?
(11) **A. Yes.**
(12) Q. What elements of cigarette smoke (13) are carcinogenic?
(14) **A. Probably cyclical compounds of benzopyrenes (15) and that family.**
(16) Q. On page two of your report you (17) have a discussion regarding synergistic effects (18) particularly as you know it between smoking and (19) asbestos.
(20) **A. Yes.**
(21) Q. Can you explain what you mean in (22) that first full paragraph when you talk about (23) strong synergistic effects between these exposures (24) in combination of occupational chemicals exposures (25) in respect to the chemical risk of lung cancer?

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(1) **A. Yes. This is not my opinion as a generic (2) opinion. This I'm getting from reading Dr. Irving (3) Selekoff's literature and Dr. Wagner's literature (4) that is in my archives here.**
(5) Q. Joseph Wagner?
(6) **A. Yes, from The National Institute of Health.**
(7) Q. When I knew him I thought he was (8) with OSHA.
(9) **A. It could be OSHA. These are two (10) authoritative people, two highly authoritative (11) people. If they're saying – Dr. Selekoff, that's (12) his profession, that's what he does. If he is (13) saying that then I have to bring it out in my (14) analysis because it's part of the exposure picture.**
(15) Q. Was it –
(16) **A. It's in the person's history and then you (17) have the occupational exposure. It appears to be (18) analogous to what he's previously opined in (19) asbestos exposure and cigarette smoking. I said (20) may well be.**
(21) Q. You must be reading my notes. (22) That's a question that I have.
(23) Didn't Dr. Selekoff only know the (24) synergistic effect between smoking and asbestos in (25) particular?

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(1) **A. That's the one that I specifically have (2) read. Yes.**
(3) Q. Have you read in any other (4) literature any other suggested synergistic effect (5) between smoking and a particular chemical other (6) than asbestos?
(7) **A. Only his own statements exactly like that (8) by analogy and he said it with respect to PVC and (9) the VCM monomer.**
(10) Q. Dr. Selekoff did?
(11) **A. Yes, and so did Wagner.**
(12) Q. Can you tell from your documents (13) as to what, if any, publication that was?
(14) **A. It's in here. I can find it. It may take (15) a little time. It was in like an EPA document. It (16) was a question and answer kind of thing. They were (17) both answering questions or being interviewed by a (18) reporter or something at a scientific meeting and (19) it was documented here as something published.**
(20) Q. Did either Dr. Selekoff or (21) Dr. Wagner comment, to your knowledge, on any (22) synergistic effect between alcohol and let's start (23) with asbestos?
(24) **A. I haven't seen that.**

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(25) Q. Have you seen any suggestion by

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(1) either of those two individuals as to a (2) relationship between alcohol and PVC or VCM?
(3) **A. I haven't seen that either.**
(4) Q. Are you aware of that suggestion (5) of a synergistic effect between alcohol and PVC or (6) VCM from any other source?
(7) **A. No. Just with respect to smoking.**
(8) Q. So that again explains why in (9) this paragraph you talk about the fact that there (10) may well be a link between alcohol consumption and (11) occupational chemical exposures. In other words, (12) you're not saying there is, you're using the word (13) may well be based upon what you read.
(14) **A. Right. I am aware that medical people will (15) be reviewing this report and I'm putting out in (16) that place, and that's one place, an idea which (17) they should pursue and they should answer from a (18) medical point of view.**
(19) Q. What did you mean in this (20) paragraph when you referred to Mr. Colby as "an (21) inveterate beer drinker"?
(22) **A. A habitual, according to Mrs. Colby's (23) deposition statements.**
(24) Q. Did you come to any conclusion on (25) your part as to how habitual that was, i.e., how

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(1) much did he drank?
(2) **A. I think in the – I have to look at my (3) notes but there was some estimate. I don't have it (4) right offhand.**
(5) Q. While you're looking though, (6) isn't it fair that you've never seen the medical (7) records from hospital admissions?
(8) **A. No.**
(9) Q. I was going to refer to that. So (10) your only source of information was Mrs. Colby on (11) this subject?
(12) **A. Yes. That's correct. I don't have a (13) number for that.**
(14) Q. That's right. Whatever the (15) number was, you said that he was a habitual beer (16) drinker. Is that fair?
(17) **A. Yes.**
(18) Q. When you talk about the (19) correlations found for asbestos workers who smoked (20) in this paragraph you're referring to the Selekoff (21) article?
(22) **A. Yes.**
(23) Q. Singular article?
(24) **A. There's more than one. There were several (25) that he wrote but –**

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(1) Q. All on the same subject?
(2) **A. Yes.**
(3) Q. Okay.
(4) **A. He was, I believe, the firsthand. He and (5) Dr. Hammond was a collective. I think both at (6) Mount Sinai.**
(7) Q. Do you recall from the articles, (8) and I appreciate you don't have them with you, just (9) from your general knowledge of them, do you recall (10) how much smoking was shown to create the (11) correlation?
(12) **A. I can't give you a precise number and I (13) don't want to guess.**
(14) Q. It would in the article though in (15) all likelihood?
(16) **A. Yeah, but my recollection is that a pack, (17) pack and a half every day is in the ball park. (18) That's not light smoking.**
(19) Q. You say in the last part of this (20) paragraph that, and I'll quote it, "There is no (21)

evidence that Colby was exposed to respirable (22) asbestos particles in his workplace or elsewhere (23) but was definitely exposed to AVCM and PVCR at OTD (24) as discussed below."
(25) **A. Yes.**

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(1) Q. Do you recall from the Peterson (2) case that Mr. Peterson had asbestos exposure at the (3) OTD facility?
(4) **A. I recollect that line of questioning but I** (5) **don't know where it's coming from.**
(6) Q. You don't recall –
(7) **A. I don't know the source that he was exposed** (8) **to at the facility if he was exposed.**
(9) Q. My recollection is that he was (10) involved with the changing of brake drums on the (11) forklifts.
(12) **A. If that's correct.**
(13) Q. I'm going by my memory now so I (14) don't want to mislead you. Does that ring a bell (15) with you as to that being the nature of the (16) exposure?
(17) **A. We'll find out. I'm looking at my** (18) **deposition. I don't know without going through it.**
(19) Q. I don't mean to make this a (20) memory test for you.
(21) **A. If there was something strong in the data** (22) **base I would have remembered it. I think my memory** (23) **says there wasn't anything strong. I could be** (24) **wrong there. I don't want to guess.**
(25) Q. Although I read your deposition,

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(1) I don't have a specific reference to it. Actually, (2) Dr. Davidson, with the very able assistance of Ms. (3) Decker here she pointed me to page 71 of your (4) deposition in the Peterson deposition. 71. (5) There's a reference to asbestos.
(6) **A. 71?**
(7) Q. Yes. Starting around line 16.
(8) **A. Oh. Good. You have brake lining but** (9) **where?**
(10) Q. At OTD.
(11) **A. Was it elsewhere?**
(12) Q. No. I think if you jump to page (13) 73, actually there's no – let's back up for a (14) moment. Since neither one of us have the Dr. Velaz (15) deposition or the Henry Velaz deposition –
(16) **A. Top of 73 he had some exposure to it.**
(17) Q. Yes.
(18) **A. Okay. Fine.**
(19) Q. Down the middle of that page it (20) talks about repairing brake lines. So at least to (21) the extent from the Peterson case there was an (22) indication that there may well have been asbestos (23) exposure to Mr. Peterson. In fact, there probably (24) was. You don't know whether or not Mr. Colby had (25) similar experiences at OTD. You have not seen

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(1) anything that would suggest one way or the other (2) that he did or didn't have exposure to asbestos.
(3) **A. Correct.**
(4) Q. At OTD?
(5) **A. Yeah.**
(6) Q. You don't have any knowledge that (7) he was exposed to asbestos at any time. Do you?
(8) **A. No.**
(9) Q. Okay. Let's talk about (10) synergistic effect for just a moment, if we may. (11) By synergistic effect between two chemicals, (12) ciga[illegible]moke and asbestos, for example, do you (13) mean to say that there is a more rapid onset of a (14) particular end result or that something is more (15) likely to occur? Just what you do you mean or what (16) did Dr. Selekoff mean by synergistic effect?
(17) **A. He was very specific what he meant and it's** (18) **my understanding and is what I subscribe to because** (19) **it is in with chemical engineering principles.**
(20) **Apparently cigarette smoking and, for that** (21) **matter, other chemicals that may be inhaled that** (22) **are dehydrating types like solvents, de-fatting** (23) **agents and cigarette smoking does effect the** (24) **defense mechanisms according to the medical** (25) **literature in eliminating particle fines in the**

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(1) **mucous membrane area, and if this is the case, and** (2) **also deep into the alveoli and bronchia where you** (3) **are weakening the lungs' defense mechanisms to** (4) **eliminate particles, particle fines is where the** (5) **synergism is coming from according to the medical** (6) **profession which, therefore, make it easier and** (7) **probably at lower concentrations for any toxic** (8) **material or cancer causing material to do damage** (9) **earlier and at a lower concentration if you happen** (10) **to be an inveterate smoker. That's what he's** (11) **saying and has said.**
(12) Q. Somewhere I thought it was in (13) your report, and I don't see it offhand, I thought (14) there was a quick reference in terms of synergism (15) to the suggestion that it increases the likelihood (16) of a particular and result or increases the risk of (17) that end result.
(18) **A. The risk. Yeah. Sure. That explains a** – (19) **could explain – well, some people if they're heavy** (20) **smokers don't need a lot of exposure whereas people** (21) **who aren't heavy smokers, otherwise very healthy,** (22) **need longer exposure and there's even some people** (23) **who get exposed and never get cancer so...**
(24) Q. Both nonsmokers and smokers?
(25) **A. Yes. There's a hereditary factor. I read**

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(1) **about it.**
(2) Q. That's the medical side. Right?
(3) **A. Yes.**
(4) Q. Okay. At the bottom of page two, (5) the last paragraph, there's a reference – there's (6) at least a suggestion that Mr. Colby, and other (7) workers like him I suppose, but let's stay with Mr. (8) Colby; absorbed AVCM through the skin. Is there (9) literature to support the proposition that VCM can (10) be absorbed through the skin?
(11) **A. I don't know about the literature but** from (12) **a chemical engineering point of view we have an** (13) **interphase that is porous and living and we have** (14) **VCM which has a double bond and it easily bonds to** (15) **proteins. You have to have absorption at that** (16) **point.**
(17) Q. So your conclusion is that you (18) would have absorption through the skin based on (19) standards, chemical principles?
(20) **A. Yes. And it would, if the skin were** (21) **scratched, if you had scratches or open wounds of** (22) **any type where you might have blood or newly formed** (23) **skin which doesn't have a big defense mechanism,** (24) **would be a site of skin absorption.**
(25) **Phenol, for example, is readily absorbed**

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through the skin and is probably as likely to be a invader into your body there as through inhalation. Phenol, for example, but we're not talking about phenol. I gave you an example of a chemical which readily absorbs. Notorious for that.

Q. If the skin were, in fact, with a PVC resin that had already eluted out all of its entrapped monomer that would not be a danger. Would it?

A. It would have a very low order of danger providing it's not sitting on an open wound. Then I don't know even then. I will be highly suspect that it would cause an injury. We thought asbestos was supposed to be inert. PVC is supposed to be inert. We found that there's geometric –

Q. So I'll adopt that as part of my hypothetical that it's not sitting on an open wound. In that situation, putting aside what other effect there may be from the PVC resting on the skin, there's at least not a danger of absorption of VCM through the skin. It may be an irritant, it may cause a rash. I'm not talking about –

A. It can't have any VC –

Q. That's right. That's right. Can the PVC act as an irritant on the skin to cause a

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rash or something seen without these entrapped VCM?

A. Of course of the allergic reaction.

Q. I don't mean that to exclude –

I'm asking if the absorption through the skin would only refer to entrapped VCM.

A. It's the VCM that is the culprit there.

Q. Okay. Okay. Now, is it fair to conclude working backwards that that position that the lower the amount of entrapped VCM at the time that the PVC resin is in contact with the skin the less danger there is that it can be absorbed through the skin?

A. That's true. The potential is driven by the concentration radiant.

Q. All right. All right. When you speak on page three of your report about airborne suspension time, it appears in the middle of the top paragraph, could you tell me, please, why airborne suspension time is a factor in your opinion? What role does it play?

A. Oh. That just lingers around in the breathing zone and the exposure zone that much longer. You don't want the particle fines in the air. You can't avoid it with the triboelectrostatic charges. They repel each other and they tend to

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get suspended longer.

Q. Is the reason they're suspended longer because the triboelectrostatic charge builds up –

A. That's one and there's air turbulence.

Q. It doesn't settle.

A. Correct. And the shape factor of the particle would have a bearing on it.

Q. Okay. Let's take a moment. Some of this now is getting to some of these things we already talked about. It will be faster if I go through the remainder of my outline now.

(Whereupon a discussion is held off the record.)

Q. On page three in particular of your report you talk here in some detail about thermal decomposition fumes. We have been through this issue not only a little bit today

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but also in some detail in Peterson so I don't want to repeat all of that but I did have a few new thoughts in this regard.

Assume that there were no PVC resins on the heat sealing equipment at the time the flap is sealed on the bag, which is how the process works as I remember. With that assumption, what fumes

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would be given off by the heat sealing equipment? Do you understand my question?

A. Sure.

Q. Eliminate any PVC resin from the heat –

A. Touching any hot surface there wouldn't be any PVC problem. There may be a problem from the glue.

Q. Do you know what the glue was made of?

A. No.

Q. When you talk in your report about thermal decomposition fumes you are assuming that there was PVC resin present at the time the heat was applied and everything you have given us in the way of an opinion flows from that assumption. Does it not?

A. It more assumes the facts in the case from the description of all the witnesses going back to '79 is that from the bag break-open, they can break open in most anyplace, and sometimes on the heat sealing machine. If it happens right there you have copious amounts of dust on hot surfaces, then you have the suspension in the – from the air from these bags touching the surfaces.

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When I was at my inspection, which was a down time for the facility where they cleaned it up, I looked very careful. I wear a white glove when I look around and I saw in every crevice all over the building, in the packing room, in the heat sealing room, every place; still white powder they couldn't clean up. It was everywhere. The powdery nature was the rule, not the exception. Bags broke open every day. And so the premise in your assumption, although I understand it and I answered, it is false. You do have particles on the hot surfaces most of time.

Q. What I'm trying to establish is that when you talk about thermal decomposition within your report you're starting with the proposition that there was PVC resin present on the heat source.

A. And glue.

Q. And glue. Now, why does the glue become important in that consideration but not important if it were the glue only that was being heated by the source?

A. I didn't say that.

Q. I would –

A. I don't know the generic glue but I've seen

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this in the literature that that is a suspect source of additional toxic fumes.

Q. What fumes would that be in the absence of PVC?

A. It depends on what kind of glue it is. If it's an epoxy you can get all kinds. I couldn't begin to tell you the exposure you would get from the decomposition. Depends on the glue, but you do get more fumes from the glue.

Q. You mentioned hydrogen chloride as

being one of the fumes that is given off when heat is applied to PVC resin.
A. It's one of the major fumes.
Q. Can hydrogen chloride be given off when the glue only is being heated in the absence of PVC resin?
A. Only if the glue contains a chlorinated hydrocarbon compound.
Q. You don't know that. Now, is hydrogen chloride toxic?
A. It's an acid.
Q. Does that mean that it's a preliminary irritant?
A. It's an irritant of every part of your body. First place you sense it is in your throat

and in your nose and then in your pulmonary system. Hydrochloric acid is what the HCl –
Q. Is it a –
A. Encountered water you get hydrochloric acid.
Q. Is it a carcinogen?
A. I don't know.
Q. When you say in this paragraph on page three, "The fumes were composed of, but not limited to, hydrogen chloride, AVCM, some vinyl acetate, a little benzene, and a cacophony of lesser amounts of different hydrocarbon compounds", what you are referring in this sentence is the primary fumes that were given off from the heat sealing equipment when you list them in particular?
A. In the presence of PVC resins. Yes.
Q. Yes. When you say but not limited to in that sentence do you mean that there are others but that you can't identify them or are they at such a trace amount that they're not important for consideration?
A. Both. If fact, Gollob in his report also alluded to this and when he did his GC analysis they actually saw 50 peaks of 50 other compounds unidentified that were present in there in the

breathing zone of operators along with the ones he did identify, namely, the VCM. So he agrees also he found or experimentally what I said here, and of course the literature shows this all over the place.
Q. Is vinyl acetate a by-product of the thermal decomposition of the PVC resin?
A. Yes, in and of itself or a copolymer PVC resin.
Q. Is the same true for benzene?
A. Benzene is formed or recombined in the decomposition process, comes off as benzene is. Benzene doesn't have to be part of the compound to be formed. It's formed – the ring structure is formed in the thermal decomposition. It has been measured half a part per million range to a part per million range in the literature under scientifically controlled conditions.
Q. When you say it's been measured at that range do you mean upon the thermal decomposition of –
A. PVC resin.
Q. By the way, does it make a difference which type of PVC resin we're talking about here in terms of thermal decomposition?

A. Not to any great extent. The fingerprint would be. There would be an overlap. You would get HCl in both cases, benzene in both cases, you would get the

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mor r in both cases.
Q. It's the smaller elements that would change.
A. Would change. Yes.
Q. Why would that be so?
A. The time it spends on the hot element, the amount of heat flux that can be transferred to the element based on the size of the particle.
Q. As a layman I would have thought that the fumes you get upon thermal decomposition of a resin like this would depend upon what the resin itself was composed of. Are you suggesting that that's not so?
A. No. I'm suggesting that if the resin contains as one of its components monochloride monomer it could have other things in it. You're going to have some overlap. You're going to get HCl if there's a chloride and hydrocarbon is present. You got – you can get monomer or acid when there's oxygen present. Oxygen is always present. It's the smaller concentrations that will vary but don't forget there would be 50 to 100 of

those even though each one may be half a part per million. That adds up to a lot. That component is still a sizeable component if you add them all up.
Q. When you have thermal decomposition of a PVC resin particle, let's just take a particle for simplicity's sake, is vinyl chloride monomer; one of the by-products of that that is given off?
A. It can come two ways. It can come by simply unzipping the polymer to get it or the entrapped free monomer comes right off because of the thermal activation.
Q. Are you aware of any studies that indicate that the monomer VCM is one of the by-products upon thermal decomposition of PVC resin?
A. Yes. Wheeler said that in the report. If you change the temperature you elute more. As you keep raising temperature you're thermal decomposing. You're eluting by thermal activation the entrapped monomer. You're increasing its diffusion characteristics. It doesn't have to be smoking in a flame to be thermally activated.
Q. We're talking here about the heat sealer in the OTD facility. When we talk about

thermal decomposition that's what we're talking about. Isn't it?
A. I'm referring to intimate contact with the heated surface that is in excess of the couple hundred degrees centigrade.
Q. The only surface of that sort that you're aware of is the heat sealing equipment in the bagging room. Is that right?
A. No. There's testimony also, if you recall, to welding in and around these areas as machinery has to be fixed, some spot welding, and if there's dust particles around or if a welder has to walk through a dusty floor and area these particles are with him and he dusts his clothes off. These particles getting anywhere close to the arc of a welding torch or a flame of an acetylene torch you're going to get a similar situation.
Q. Fine. So when you talk about

thermal decomposition you're talking about two (20) situations with, one, the heat sealing equipment in (21) the bagging room and the second, any welding that (22) might be done in the facility itself. Correct?
(23) **A. The prior would be the first and the** (24) **secondary would be the second one.**
(25) Q. So we understand our terms,

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(1) you're not referring, when you use the phrase (2) thermal decomposition, you're not referring to (3) either the ambient temperature surrounding a (4) particle of PVC or as I think you referred to it (5) earlier, the internal temperature of the PVC resin, (6) does not qualify as thermal decomposition.
(7) **A. Correct. That's correct.**
(8) Q. With regard to the welding, are (9) welding fumes toxic in the absence of PVC resins?
(10) **A. Yes.**
(11) Q. Do you know the nature of the (12) toxicity and the by-products of the heat created by (13) the welding?
(14) **A. Yes.**
(15) Q. What is the nature of the (16) toxicity? Start with that first.
(17) **A. Well, depends what you're welding.**
(18) Q. Not the material you're welding (19) but what you're using to weld it.
(20) **A. Yes.**
(21) Q. What kind of –
(22) **A. How much is chromium is there in zinc?**
(23) Q. Are there carcinogenic materials (24) in those by-products from welding?
(25) **A. Could be if there's things like barium**

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(1) **present. Heavy metals.**
(2) Q. And again we don't know as to (3) whether or not in Mr. Colby's case he was either (4) welding or exposed to welding fumes during his (5) position at OTD. Is that correct?
(6) **A. When there was welding in these areas that** (7) **he was supervising and if he was in those areas he** (8) **would be similarly exposed to those fumes as well.**
(9) Q. But we don't know that. That's a (10) supposition on your part and mine as to whether or (11) not he was exposed to anything like that.
(12) **A. Correct.**
(13) Q. When PVC resin is not present (14) during the welding operation what are the (15) by-products of the welding operation in terms of (16) fumes?
(17) **A. Are you excluding atmospheric VCM?**
(18) Q. Yes.
(19) **A. Okay. It could be metal fumes of a large** (20) **variety depending what's being welded.**
(21) Q. So we're back to the same issue.
(22) **A. Yes. Yes.**
(23) Q. Perhaps I mis –
(24) **A. Oxides, oxides of nitrogen. Nitrous oxide.**
(25) Q. All right. Now, let's assume

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(1) that the welding occurs in the presence of PVC (2) resin or vinyl chloride monomer in the atmosphere. (3) What is the by-product of the welding operation in (4) terms of fumes?
(5) **A. Predominantly the major fumes would be from** (6) **the welding itself.**
(7) Q. Would you have hydrogen chloride (8) present again due to the presence of heat and PVC (9) resin?

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(10) **A. If the PVC resins were present, yes.**
(11) Q. This question deals –
(12) **A. If you would you would have to add to the** (13) **toxicity of those fumes by making it more acetic.**
(14) Q. What's the difference between a (15) homopolymer and a copolymer, if I got the terms (16) correct? I'm referring to page three of your (17) report, third paragraph.
(18) **A. Yes. Yeah. Copolymer is the mixing or** (19) **blending of two different polymers starting from** (20) **two different monomers. A homopolymer is a polymer** (21) **made up in chains of the same monomer.**
(22) Q. The three types of resins, PVC (23) resins that were shipped to OTD in the '60s, (24) suspension, bulk and solution; were they all either (25) homo, poly or copolymer?

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(1) **A. Yes. The suspension was predominantly** (2) **homo. The solution one is the one that will be** (3) **more likely to be a copolymer.**
(4) Q. And bulk is more likely to be (5) what?
(6) **A. Homo. And the same with emulsion but that** (7) **wasn't –**
(8) Q. Emulsion you understand to be the (9) fourth major PV –
(10) **A. Yes.**
(11) Q. Manufactured by Carbide at the (12) time but not shipped to OTD.
(13) **A. According to their representation, yes.**
(14) Q. And you've accepted that. You (15) have no information to suggest to the –
(16) **A. I have no problem with that.**
(17) Q. Does the fact that a PVC resin is (18) either homopolymer or copolymer impact upon the (19) nature of its toxicity?
(20) **A. Yes.**
(21) Q. In what fashion?
(22) **A. If they both have VCM as a starting block** (23) **then they both have similar toxicity with respect** (24) **to VCM. But the copolymer has in addition another** (25) **chemical specie, vinyl acetate or whatever it might**

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(1) **be. It would add to the toxicity.**
(2) Q. What determines if a resin is a (3) copolymer or a homopolymer? For example, why in (4) the situation of solution resin might there be I (5) think you said vinyl acetate as the copolymer?
(6) **A. Yeah.**
(7) Q. Is that the "nature of the (8) beast"? Is it indigenous to the product or is (9) there – does some chemical process have to occur (10) to create a copolymer as compared to homopolymer?
(11) **A. The latter. It's indigenous, inherent of** (12) **the two chemicals combining with themselves to make** (13) **a copolymer in some complex way in solution in the** (14) **reactor.**
(15) Q. At the time of manufacture?
(16) **A. At the time of manufacture in the reactor** (17) **vessel.**
(18) Q. All right. And thereafter it (19) retains its copolymer nature once – in other (20) words, once the reaction has occurred and there is (21) a copolymer of vinyl chloride monomer and vinyl (22) acetate that remains with the resins for the rest (23) of its life or until such time as it's leached out (24) perhaps?
(25) **A. Yes.**

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(1) Q. So the last thing is it will (2) remain there if until such time, if ever, that it (3) leaches out?

A. Yes. You may add things, coloring agents for the downstream user, but at the point of distribution to OTD the answer is yes.
Q. On page three towards the bottom of the third paragraph there is a reference to chemically producing oxychlorination of the ethylene. We're talking now about, I would imagine, polyethylene at this point. Let me see if I can find that. Five lines up from the bottom. Starting in the middle of the sentence "the potential to chemically produce some oxychlorination of the ethylene would" I assume the word is exist. Going back to the full sentence it talks about a source of heat. Maybe I should read the whole sentence. Sorry. "Should atmospheric ethylene, released from its polymer resin, encounter hydrogen chloride at or near a source of heat (e.g. in excess of around 300 degrees F at the PVCR heat sealing machines or welding machines), the potential to chemically produce some oxychlorination of the ethylene would exist."

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What is the significance of oxychlorination of the ethylene?
A. Okay. This is something that was revealed to myself in the study of the chemistry which I kind of overlooked previously. I still don't consider it a major source. The major source is the elution of the residual free monomer in and of itself. However –
Q. Excuse me one second. The monomer as in PVC or –
A. Yes –
Q. Or polyethylene?
A. No. No. PVC.
Q. The major source meaning major source of toxic exposure to Mr. –
A. Cancer causing exposure. Since polyethylene was handled in and around this time frame and since ethylene monomer can be eluted just like vinyl chloride monomer from polyethylene resin you have, to some extent, although I have not seen a measurement – Gotlob wasn't looking for it or wasn't asked to look for it. Just based on the physics and the chemistry you get some ethylene in the air from these polyethylene pills or pellets, you have thermal activation of PVC in the presence

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of air, you have the classic oxychlorination reactions taking place. The only thing missing to make it really residual is a copper catalyst but it would go on its own with a copper catalyst making it go faster. What you have is a three step reaction. And I got this from Sasvetnick's book, 1969, but he's referring dating going about 20, 30 years. This is an old way of making VCM. Oxygen reaction to HCl which chlorine gas will react with the ethylene to produce dichloroethylene which immediately gets decomposed into VCM and HCl and that right at the hot surfaces your own factory for producing more VCM.
Q. Because the extra VCM, as you refer to it in this report, is being created by this oxychlorination process?
A. Correct.
Q. Do you have any information within all the materials supplied to you, not only in the case, but in other litigations involving OTD that you've been associated with any information to indicate a level of ethylene monomer that was being given off in the bagging operation at OTD?
A. No.

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Q. Do you have any calculations that would assist you in determining how much, if any, ethylene monomer was being given off in the bagging operation?
A. I have no measurement.
Q. All right. Are you therefore making some form of an assumption based upon the fact that polyethylene was being bagged at the facility?
A. Yes.
Q. Okay. What is your understanding as to the nature of the form, that is of the polyethylene, that was being bagged at the OTD facility in 1960s?
A. Pellets and prills. By that you mean the same thing?
Q. Yes.
A. Yes.
Q. As compared to resin?
A. Well, a resin –
Q. It's a compressed resin.
A. Correct.
Q. Have you ever examined either a pellet or a prill of polyethylene that was bagged at the OTD facility in the 1960s?

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A. Yes.
Q. When did you do that?
A. '79.
Q. As part of the Malko case?
A. Yes. I had a jar of it and I also have photographs of it all over the floor in the warehouse. Bags just breaking open. I've seen it on the floor.
Q. Would you classify a pellet as being soft or hard?
A. It's not soft and it's not hard.
Q. So it's a degree of –
A. It's solid but not hard.
Q. Is it your view that the pellet in some fashion decomposed through handling?
A. Yes.
Q. Or had parts break off?
A. It could.
Q. Is there any other source for it breaking off or decomposing as you understand the operation at OTD?
A. Sure. The exact – in the areas where you do are welding –
Q. Let me eliminate that. I'm talking about the actual handling of the product,

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similar to what you've described in the handling of the PVC resin where you have expressed yourself with the opinion that it breaks off, it creates a dusting situation, et cetera, et cetera. Putting that same type of analysis into the polyethylene side of the equation, when you have a pellet what is the handling at the OTD facility that would cause it to become dust or powder or decompose into smaller particle –
A. Just the final handling, the physical rubbing.
Q. One pellet rubbing against the other?
A. Non-uniform particle sizes.
Q. Based on your view of the pellet that you had or pellets that you had in hand and able to inspect in the late 1970s, did you come to

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(18) that conclusion?
(19) **A. There was dust inside the glass bottle.**
(20) Q. Of the sample bottle that you (21) had?
(22) **A. Correct. But that's not what is causing** (23) **the ethylene to come out. It comes out on its own.**
(24) Q. In other words, it elutes out?
(25) **A. Just like the VCM. It's a close cousin to**

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(1) **VCM.**
(2) Q. Do you have any calculations (3) based upon literature or experience that would (4) indicate how much ethylene monomer leaches out of (5) or elutes out of the pellet?
(6) **A. Haven't seen any data.**
(7) Q. Do you have anything to suggest (8) that at what rate it would elute?
(9) **A. No data.**
(10) Q. With regard to the polystyrene, (11) was that in pellet form or powder form?
(12) **A. Pellet.**
(13) Q. Similar to the composition of the (14) pellets of the polyethylene pellets?
(15) **A. Yes.**
(16) Q. Is it your view that it also (17) could decompose through handling as just described?
(18) **A. Yes. And it also elutes its monomer, the** (19) **styrene monomer, the same way and it could be the** (20) **heat activated either heat sealing bag in the** (21) **presence of arc welding, acetylene torch welding.**
(22) Q. But as with polyethylene I take (23) it you don't have calculations or information to (24) indicate what levels of styrene monomer was being (25) leached out at the OTD facility in the mid 1960s.

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(1) **A. Correct.**
(2) Q. On page four of the first full (3) paragraph you state that "The scientific literature (4) generally cautions users of PEL's in the study of (5) occupational carcinogenesis to be conservative when (6) a multiple of toxic agents, other than the culprit (7) carcinogen, are concurrently present in the (8) workplace exposure pool." (9) Is that intended to be a general statement (10) as to what literature in the main supports or do (11) you have particular literature in mind that (12) cautions users in this way?
(13) **A. Actually, that whole sentence should be in** (14) **quotes because I listed that from a NIOSH or EPA or** (15) **a NIOSH document which I have here someplace.** (16) **Slightly paraphrased but it's 90 percent literal.** (17) **It's not my opinion, it's the opinion of the** (18) **scientific people working in the field. And it's** (19) **also my experience in working with Lateshare's** (20) **(phonetic) principles, which is a mathematical** (21) **principle used by toxicologists throughout the** (22) **field. The formula itself says that. So that** (23) **statement is accurate and applicable.**
(24) Q. When you say you have the formula (25) right here in front of you you're looking at your

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(1) report?
(2) **A. Yes.**
(3) Q. What's the formula?
(4) **A. Okay.**
(5) Q. Here?
(6) **A. Yes.**
(7) Q. You wrote it on your version of (8) the report.
(9) **A. Yes. Yes.**

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(10) Q. Would you compare, kind of (11) translate that formula for the record? Because I'm (12) not going to try.
(13) **A. It simply says that as a start approximate** (14) **that this person goes back to 1900, this formula** (15) **goes back to 1900. It's stated in every toxicology** (16) **engineering, quantitative toxicology book. It's in** (17) **Sax's book we referenced before.**
(18) **We use it as a first estimate of the** (19) **combination of all effects of multiple toxic** (20) **elements and it's a formula that adds them up in a** (21) **weighted average to show the total effect. And you** (22) **have to know the fraction in the breathing zone of** (23) **each component and you have to know the individual** (24) **PEL of the component and from that you plug it into** (25) **this formula. You get out the average effective**

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(1) **PEL of the mixture which is always greater than any** (2) **individual. And it's a first estimate and it's** (3) **instructive and it's been used. It's quite a bit.** (4) **It's a standard kind of formula and that that** (5) **sentence is simply another way to say that.**
(6) Q. Well, later in this paragraph you (7) talk about synergistic effects again. Is this (8) sentence that we've been talking about in some way (9) instructive on the whole issue of synergism?
(10) **A. Yes. This – that sentence and the formula** (11) **are one of the same thing. Doesn't really address** (12) **synergism. It addresses additive effects of** (13) **multiple exposures.**
(14) Q. So you can have additive effects (15) of working with more or placing a combination, more (16) than one chemical, and on top of that you could (17) have a synergistic effect as we talked about (18) before?
(19) **A. Exactly. In other words, if you're smoking** (20) **but not smoking at the time you're inhaling the** (21) **carcinogen, say two carcinogens, some of the two** (22) **carcinogens will follow this additive thing but** (23) **then the synergism comes from the smoking. They** (24) **both synergistically behave in a way where the sum** (25) **is greater than the individual components.**

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(1) Q. It was this paragraph, (2) Dr. Davidson, that I had in mind earlier today when (3) I said to you somewhere within your report there (4) seems to be a very easy way to describe synergism (5) and I couldn't find it and I recall it's here. You (6) say in the middle of this paragraph with regard to (7) synergism effects the following, "The idea is that (8) these effects would facilitate the carcinogenic (9) action of the VCM."
(10) **A. Yes.**
(11) Q. Give me a definition of (12) facilitate in that sentence, please.
(13) **A. Yes. Taking the case smoking, as I** (14) **indicated according to Dr. Selekoff and others,** (15) **this reduces the body's natural defense mechanism** (16) **against toxins of all types including carcinogens** (17) **and, therefore, the possibility exists where lower** (18) **concentrations over shorter periods of time can** (19) **give you as dramatic effect as higher** (20) **concentrations over long periods of time or even** (21) **lower concentrations over longer periods of time.** (22) **That's why in asbestosis cases, I've reviewed this** (23) **extensively, I found one that had exposure for**

as (24) little as six months in South Africa, came down (25) with mesothelioma, 12 year old, going all the way

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(1) 20 to 30 years gestation period depending on the (2) nature of the whether they smoke or don't smoke; (3) concentrations so forth. All those factors you can (4) get wide ranges of possibilities so you can never (5) say that one minute exposure is not dangerous. It (6) could be highly dangerous.

(7) Q. In general based upon those (8) principles would you say that the heavier a smoker (9) someone is, by that I mean the more cigarettes on a (10) daily basis, the more likely it is that the (11) synergistic effect of that with a particular (12) chemical might cause a cancer to come earlier (13) rather than later?

(14) A. It certainly could explain that. But, (15) again, you're getting very close, if not in a (16) medical situation, asking me to give you medical (17) expertise.

(18) Q. I'll take it up with the proper (19) medical people here within the case but –

(20) A. That's a good question. I don't have the (21) precise answer. I don't rule out any combination (22) of dose, response, duration.

(23) Q. But you certainly don't disagree (24) with my logic that the more someone smokes, since (25) that is their main element of synergistic effects.

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(1) the more likely it is that the cancer, if there is (2) to be one, would come earlier.

(3) A. If you take out of your – out of your (4) equation inherited –

(5) Q. Or add into the equation those (6) other factors.

(7) A. Exactly. Exactly. So, you know, in and of (8) itself there's a correlation. Don't forget, (9) there's many other factors as we all know.

(10) Q. Back to the medical report of (11) O. Aroback, A-r-o-b-a-c-k, that you referred to on (12) page four, I realize you said earlier that you have (13) never reviewed it; did I understand you also to say (14) that you have never received it as well?

(15) A. I could have received it. I don't recall.

(16) Q. I've never seen it.

(17) A. That's two of us.

(18) Q. Okay.

(19) MR. HOLLINGSHEAD: But in (20) that case Mr. Levinson and I will go over (21) whether that's available.

(22) Q. But, in any event, you've not (23) seen it nor reviewed it?

(24) A. I thought someone told me, maybe it's (25) Florence, it's coming and it never came. I think

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(1) that's it. Something like that. I'm big on that, (2) really. Except that it was in my notes some place (3) to review and that's why I put it here.

(4) Q. Let me go back to something that (5) I touched on just before lunch.

(6) I asked you at that time if you would (7) estimate for me the percentage of your income over (8) the course of the past 12 months or so that was (9) related to your outside consulting activities and (10) you gave me a number of approximately 30 percent. (11) My question only is if I were to say that back over (12) the course of the last several years would that (13) percentage approximation be the same or (14) approximately the same?

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(15) think over the last five years, yes.

(16) Q. It's about 30 percent?

(17) A. I'm saturated out. I can't afford any more (18) time than four or five days a month. In fact, (19) every year now I can afford less. Problems at (20) Rutgers are getting too complicated and they need (21) my full attention seven days a week, it appears.

(22) Q. But you're comfortable at least (23) until recently, even though your outside consulting (24) work has apparently decreased a little, it's been (25) at a fairly steady rate for the past five years or

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(1) so and it's been about 30 percent of your time.

(2) A. Maybe 20 to 30. Now in the dollars, not (3) time. Time it's been around four or five days for (4) the last out of a month.

(5) Q. Just a few more questions. On (6) page six of your report, actually page five because (7) it carries over to page six, you talk about design (8) and improvement of various manufacturing processes (9) within the PVCR chemical process industries. And (10) on page six you talk about three mutually exclusive (11) safety management engineering modalities that are (12) generally used.

(13) I note that the sentence is in the present (14) tense there, although earlier in the paragraph you (15) refer specifically to the time frame of prior to (16) '61 and even up until 1967. So when you talk about (17) these three mutually exclusive safety management (18) engineering modalities that are generally used do (19) you mean to suggest that they were also used (20) industrywide back in the early 1960s?

(21) A. Those three modalities are generic. (22) Industry has forever tried to follow those three (23) separately or in combination because they are (24) engineering controls that do protect. It is the (25) industry standard. Has been the standard ever

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(1) since I've been a chemical engineer which is over (2) 35 years, taught in schools and undergraduate, 35 (3) years ago.

(4) Q. Do you have any knowledge as to (5) what efforts Union Carbide was making in the early (6) 1960s to eliminate hazards in particular with (7) regard to exposure to vinyl chloride monomer?

(8) A. They were making progress in all of these (9) areas. The problem is they started too late and (10) the follow-through wasn't there and I have problems (11) with the management aspects. Had they had a great (12) influence on management of the – from the cradle (13) to grave of the monomer they would have only (14) deduced from logic that since they didn't have (15) answers to very important questions about how much (16) residual monomer is there that the only way to (17) protect workers downstream in the handling (18) redistribution center at OTD were to provide Scott (19) Air Paks worn 100 percent of the time which was (20) state-of-the-art at that time which would have (21) protected these people 100 percent of the (22) inhalation, respiration, ingestion exposure and (23) then with proper protective clothing, creams and so (24) forth they can be used to protect the rest. And (25) that could have been done and should have been done

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(1) in the '50s and '60s readily and very cost (2) effective until they had the hard answers that they (3) have today. They should have

anticipated. They (4) admitted that they knew about the monomer problem. (5) The residual. That in and of itself is a siren (6) call. It is a bell ringing off in any safety (7) engineer's head. That tells you that the active (8) component that makes the polymer is going along (9) hitchhiking itself right down the chain of commerce (10) to end users, intermediate users like Colby and (11) Bernadino and without protection warnings and so (12) forth. That's the problem I have.

(13) Q. Wasn't it true, however, (14) throughout the chemical manufacturing industry, (15) certainly in the 1960s, that a lot of the action (16) that was taken was based upon the best information (17) available at the time as expressed in the threshold (18) limit value for exposure to various chemicals (19) including PVC?

(20) A. We live by safety. Safety says that if you (21) don't know the lower limit, if you don't know, you (22) protect until you do know. They admitted they (23) didn't know in the '50s and '60s that this was a (24) definite cancer causing element until 1974 in the (25) Wall Street Journal, let's say. That is a signal

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(1) to protect against this highly reactive chemical (2) just from the point of – forget that it's (3) carcinogenic. It's highly toxic. Just to protect (4) against toxicity. If you don't know what the lower (5) limit is and certainly if you follow the literature (6) with other materials the TLV or the PL goes down (7) every year. It does so with asbestos. If you (8) follow that history by analogy it goes down with (9) every chemical and they should have recognized that (10) grading. I made have plots of benzene, I made (11) plots of asbestos, I made plots of all of these (12) compounds and showed them in my studies in my (13) safety class, and just because every curve goes to (14) zero, what Selekoff says and Wagner, no limit is (15) safe.

(16) If Selekoff was working for Union Carbide (17) in the '50s and '60s he would have said to them we (18) don't have the answer. No limit is to be trusted. (19) You must protect positively, and that the engineers (20) at Union Carbide would have determined we cannot (21) control at the point of risk with ventilation local (22) problems and, therefore, you protect the worker (23) with respiration.

(24) Q. Wouldn't that be true, however, (25) with regard to virtually every chemical in every

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(1) industrial manufacturing process, i.e., that (2) following that theory that every worker should be (3) completely protected with a Scott Air Pak at least?

(4) A. Or equipment fume hood, glove box and other (5) ways of effecting the same. Yes. True.

(6) Q. For any manufacturing process of (7) any chemical. Correct?

(8) A. You have to put in that formula the word (9) reasonable. It's not reasonable to do it for (10) water. It's not reasonable. It's not reasonable (11) to do it for air, both chemicals. It is reasonable (12) to do it for VCM considering its history going back (13) to 50 or 75 years with an indication from the (14) medical people that there are suspect highly toxic (15) unexplainable reactions and eventually cancer comes (16) out. This is different than water. This is (17) different than air.

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(18) Q. But neither water nor air by (19) itself is carcinogenic. Correct?

(20) A. I'm not aware of it.

(21) Q. Until such time as any particular (22) chemical is shown affirmatively not to be (23) carcinogenic are you suggesting that these (24) precautions would have been reasonable throughout (25) the chemical manufacturing industry in the 1960s

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(1) for any chemical?

(2) A. Not any chemical. Just those chemicals (3) where you do have a history from the literature a (4) pattern of it getting worse with the knowledge with (5) every year. The ingredient was steep enough in (6) that for Union Carbide to say vinyl chloride (7) monomer, we know the unsaturated bonds is a highly (8) reactive item. When it is protein it has – the (9) medical field knew and understood that 50 years (10) ago. That's not water. Water doesn't do that with (11) protein. Unsaturated carbon bond does. That's why (12) benzene is a carcinogen, that's why VCM is a (13) carcinogen. It's that double bond that is a (14) problem. It's a very reactive group.

(15) Q. You already received your degree (16) as a chemical engineer by the time the early '60s (17) came about.

(18) A. Right.

(19) Q. Was that the view of chemical (20) engineers in the industry with regard to any highly (21) reactive chemical, i.e., that there is a very (22) strong likelihood with a highly reactive chemical (23) that it may eventually turn out to be a carcinogen?

(24) A. Not necessarily a carcinogen. Highly (25) toxic. That's enough.

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(1) Q. I'll amend the question to a (2) highly –

(3) A. You don't know the word cancer in there to (4) be the trigger.

(5) Q. I'll take it out. Was that the (6) general view of the chemical engineering trade, (7) your practice as well as the chemical industry in (8) the 1960s, that a highly reactive chemical just by (9) having that knowledge could mean that it could (10) eventually be shown to be a highly toxic chemical (11) so that workers needed to be protected from it?

(12) A. If you add to that equation the pattern and (13) the divulgence of the medical literature that is (14) paralleling the engineering concerns.

(15) Q. What was the medical literature (16) involving PVC in the 1950s?

(17) A. You read my Mailko literature survey?

(18) Q. Yes. A long time ago.

(19) A. That's what I'm talking about. All that (20) literature. That's a pattern. You don't see that (21) for water and air. You see that for PVC and by (22) analogy you saw it for asbestos. Asbestos had the (23) same parallel history. It started in 1920, was the (24) first one, and it became increasingly worse each (25) and every year and every year you had a growth and

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(1) then the number of publications in the literature. (2) When you follow the literature that way and then (3) look at the years for control and ask them how to (4) detect this is getting worse each year, we don't (5) know it could head as far as cancer, but it's (6) highly toxic. It's highly reactive. You wouldn't (7) have your child – I wouldn't have my child

breathe (8) VCM and I wouldn't do this in 193 We knew enough (9) about it. You wouldn't do it. It's too reactive (10) so you protect. The only way to protect is (11) engineering controls; ventilation, and also if it's (12) a fume hood or box. He didn't have that at OTD.
(13) Do we have respirators in the marketplace (14) that would protect? Yes, Scott Air Pak, and then (15) you have to warn, instruct your operator why you (16) have to wear the air pak, because we don't have the (17) answers to the questions but we have enough.
(18) Q. Did you work with PVC or VCM in (19) your practice as a chemical engineer in the 1960s?
(20) A. No. I was at Northwestern.
(21) Q. I was going to ask you where you (22) were precisely back then.
(23) A. Yes. Yes.
(24) Q. You obtained your Ph.D. from (25) Northwestern in 1963.

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(1) A. Correct.
(2) Q. You immediately went into the (3) teaching field. Didn't you? You started in (4) February '63 until 1964 and then you stayed in the (5) teaching field from that point on. Is that right?
(6) A. I had multiple industrial assignments each (7) year for from '63 through '70.
(8) Q. So you were not out in the (9) industry?
(10) A. Yes, full-time for two months at a time in (11) the industry.
(12) Q. Okay. I misunderstood that. (13) That was as part of your teaching –
(14) A. No.
(15) Q. Separate from teaching?
(16) A. In academics you have one or two (17) appointments; a 12 month appointment, a nine month (18) appointment. If you chose a nine month you have (19) two months off in the summer to gain industrial (20) experience, et cetera, et cetera which I chose to (21) do in the first four, five years, six years and a (22) few years after that.
(23) Q. Are you aware as to whether other (24) chemical manufacturers other than Union Carbide (25) were taking these types of steps that we have just

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(1) had a long discussion on in the early to mid 1960s?
(2) A. I have no firsthand knowledge.
(3) Q. As to whether they did or did (4) not?
(5) A. Right. I do have knowledge about Union (6) Carbide because I have a bunch of facts in evidence (7) here and things to read and statements made, (8) correspondence I read between Union Carbide and OTD (9) people and so forth. I have a very good picture in (10) reading Wheeler's report and deposition. It paints (11) a picture for me of how they reacted and based –
(12) Q. My question in particular was (13) whether or not you have knowledge as to what other (14) chemical manufacturers were doing and the answer to (15) that is no, you have no such knowledge?
(16) A. In '74 and five we had B.F. Goodrich come (17) in with a similar program of positive protection.
(18) Q. If you recall, when was the (19) incident or the report from the B.F. Goodrich (20) Company, whatever proper corporate name it may be, (21) that caused anybody to look again

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at th .e of (22) VCM? Was that around that same time frame?
(23) A. '74. Wall Street Journal. '74.
(24) Q. And that was the incident (25) involving the reactor workers at B.F. Goodrich.

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(1) Have you ever seen a study either in the (2) literature or elsewhere that shows or indicates (3) that exposure to polyvinyl chloride resins even (4) with the – or leaching of entrapped VCM has caused (5) cancer in the B.F. Goodrich reactor workers that (6) were in the manufacturing end of the process as (7) compared to workers who are exposed to the final (8) product, i.e., the resin? Correct?
(9) A. Correct.
(10) Q. Back to my question. Have you (11) ever seen a study or any reference in the (12) literature to a study that indicates that exposure (13) to PVC resins including entrapped VCM has resulted (14) in cancer?
(15) A. Not the resin. Just the VCM.
(16) Q. But the only studies involving (17) the VCM are those studies that show exposure to (18) workers in the manufacturing end where apparently (19) there's no question but that the exposure levels (20) are much higher by many multiples. Is that fair?
(21) A. Particularly when they clean out reactors (22) or silos being much higher. Yes.
(23) Q. Wasn't that the B.F. Goodrich (24) experience in information that –
(25) A. That was the data point but that doesn't

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(1) point, rule out other data points that they didn't (2) study.
(3) Q. But you're not aware of any other (4) data points or studies?
(5) A. Correct.
(6) Q. Okay.
(7) (Whereupon a discussion is (8) held off the record.)
(9) MR. HOLLINGSHEAD: I'm (10) done.
(11) (Whereupon the deposition (12) concludes at 4:23 p.m.)

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(1) C E R T I F I C A T I O N
(4) I, GINA MARIE LATHAM, a Notary Public and (5) Certified Shorthand Reporter of the State of New (6) Jersey, Certificate No. XI01566, do hereby certify (7) that prior to the commencement of the examination (8) BURTON Z. DAVIDSON, Ph.D., P.E. was sworn by me to (9) testify the truth, the whole truth and nothing but (10) the truth.
(11) I DO FURTHER CERTIFY that the foregoing is a (12) true and accurate transcript of the testimony as (13) taken stenographically by and before me at the (14) time, place and on the date hereinbefore set forth.
(15) I DO FURTHER CERTIFY that I am neither a (16) relative nor employee nor attorney nor counsel of (17) any of the parties to this action, and that I am (18) neither a relative nor employee of such attorney or (19) counsel, and that I am not financially interested (20) in the action.

(23) A Notary Public of New Jersey
License No. XI01566

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(1) I N D E X (2) WITNESS DIRECT (3) BURTON Z. DAVIDSON, Ph.D., P.E. (4) By Mr. Hollingshead 3
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Davidson-17 Literature on PVCR and VCM Davidson-18 Davidson report dated 12-4-92 Davidson-4A Work history provided by Mr. Levinson

NOTES

UCC 075792

Look-See Concordance Report

- - -

2,393 UNIQUE WORDS
386 NOISE WORDS
28,557 TOTAL WORDS

- - -

SINGLE FILE CONCORDANCE

- - -

CASE SENSITIVE

- - -

INCLUDES OCCURRENCES IN QUESTIONS & ANSWERS ONLY

- - -

WORD RANGES @ BOTTOM OF PAGE

– B –

– D –

– E –

– N –

– O –

– P –

– Q –

– R –

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