

WORKERS' COMPENSATION BOARD

FRANKFORT, KENTUCKY

AIR PRODUCTS and CHEMICALS, : CLAIM NO. 34-27354  
INC., :

Plaintiff :

vs. :

JESSE BOREN, Deceased, :  
LEONA BOREN, Widow, and :  
SPECIAL FUND, :

Defendants :

Deposition of JOHN T. BARR, taken at Air  
Products and Chemicals, Inc., Main Building, Route 22,  
Trexlerstown, Pennsylvania, on Tuesday, January 29, 1985  
commencing at 11:00 a.m.

A P P E A R A N C E S:

BOEHL, STOPHER, GRAVES and DEINDOERFER  
BY: DONALD K. BROWN, JR., Esquire  
Suite 340 Executive Boulevard  
Paducah, Kentucky 42001  
For the Plaintiff

MARY ANN KIWALA, Esquire  
Department of General Counsel  
620 South Third Street  
Louisville, Kentucky 40202  
For Defendant Special Fund

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## WORKERS' COMPENSATION BOARD

FRANKFORT, KENTUCKY

AIR PRODUCTS and CHEMICALS, : CLAIM NO. 84-27854  
 INC., :

Plaintiff :

vs. :

JESSE BOREN, Deceased, :  
 LEONA BOREN, Widow, and :  
 SPECIAL FUND, :

Defendants :

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John T. Barr

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(The parties agreed to reserve all objections, except as to the form of the question, until the time of trial, and to waive the necessity for calling the Court Reporter for purposes of authenticating the deposition, in the event that it should be used at trial.)

JOHN T. BARR, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BROWN:

Q Would you state your name and address for the record, please.

A John T. Barr. 3926 Lilac Road, Allentown, Pennsylvania. 18103.

Q Mr. Barr, with whom are you employed?

A Air Products and Chemicals, Incorporated, here in the Trexlertown complex.

Q What is your position?

A Manager of regulatory response.

Q What do your duties entail as manager of regulatory response?

A I am in the corporate safety and environmental department. As such, I have corporate staff responsibility for identifying and developing

1 regulations and statutes that deal with health, safety  
2 and the environment.

3 And determining what the impact of those  
4 proposed changes would be and presenting to the proper  
5 person Air Products' public response to these  
6 proposals.

7 Q Prior to being employed by Air Products, were  
8 you employed by the Air Reduction Company or Airco?

9 A Yes, I was.

10 Q Can you give us a summary of your employment  
11 history beginning with your first employment with  
12 Airco?

13 A In mid July of 1967, I came with Airco Chemicals  
14 and Plastics, which was a subsidiary of Air Reduction  
15 Company at the Calvert City plant as technical  
16 manager of that plant.

17 It was just after the Cumberland Chemical  
18 Company operations of the PVC plant had been  
19 amalgamated back into the Airco operation.

20 I was employed as technical manager, which  
21 placed me in charge of the technology which was being  
22 used in the plant.

23 Supervising the technical engineers, the plant  
24 engineer who was in charge of the maintenance operation,  
25 the instrument department and other groups who helped

1 maintain the plant position so that it ran well and  
2 ran properly.

3 Q How long did you continue working at Airco?

4 A I worked with Airco Company up through the time  
5 when the operations there were sold to Air Products,  
6 at which time I continued on my same job.

7 Q Would that have been January 1971?

8 A January 29, 1971.

9 Q Would you tell the Workers' Compensation Board  
10 your educational qualifications, please?

11 A I have a bachelor's degree in chemistry from  
12 Arkansas College in Fayetteville, Arkansas.

13 I have a master's degree in chemistry from the  
14 University of Arkansas, Fayetteville, Arkansas.

15 I completed all of the course work for a Ph.D.  
16 in theoretical chemistry at the University of  
17 Tennessee, but I could not take the time to write my  
18 thesis, so I do not have a Ph.D..

19 I have taken further work in chemistry,  
20 biochemistry, organic chemistry at Temple University,  
21 Philadelphia.

22 I have taken several courses in business at  
23 Murray University, Murray, Kentucky.

24 I've taken a number of other advanced training  
25 and continuing education courses through the various

1 technical associations such as the American Chemical  
2 Society, American Institute of Chemical Engineers and  
3 groups like that.

4 Q Mr. Barr, have you had occasion to author or  
5 co-author any articles on polyvinyl chloride or vinyl  
6 chloride monomers?

7 A Yes. I've written a number.

8 Q Would you give us a summary of those articles,  
9 please.

10 A In the early 60's, I wrote chapters which were  
11 included in two books, which were a general descrip-  
12 tion of the process for making PVC and its copolymers.

13 I have written a number of technical articles  
14 on the application and use of PVC.

15 I currently have in press two chapters for  
16 the edition of the revision of the Encyclopedia of  
17 PVC, which is coming out this year and next, which is  
18 going to be called the New Encyclopedia of PVC, which  
19 emphasizes safety, health and environmental aspects  
20 of vinyl chloride, PVC and fabrication processes  
21 using PVC.

22 There are a total of 20 or 25 articles in this  
23 area.

24 Q During your association with Airco, were you  
25 familiar with the work activities of Mr. Jesse Boren?

1 A Yes. I knew Mr. Boren personally and saw him  
2 frequently.

3 I made an effort to get out into the plant as  
4 often as I could, at least two or three times a week  
5 I toured through the working area.

6 He was on shift, of course, so I didn't see  
7 him every time I went out there. But when his work  
8 shift and mine coincided, I would see him and talk to  
9 him among others.

10 So I was familiar with him and what he was  
11 doing.

12 Q Mr. Watson has already testified that Mr. Boren  
13 worked at Airco as an operator trainee, assistant  
14 operator and so on.

15 Do you know whether his employment in those  
16 capacities would have resulted in exposure to vinyl  
17 chloride monomer?

18 A Yes, it did result in vinyl chloride monomer  
19 exposure.

20 There was no way to prevent this.

21 Q In what manner would he have been exposed to  
22 vinyl chloride monomer while he was employed by Airco?

23 A Well, by virtue of the fact that no system is  
24 leak proof and you cannot have zero exposure to any  
25 substance, the fact that he was in a plant where there

1 was vinyl chloride being used meant he had some  
2 exposure.

3 Beyond that, to be more specific, one of the  
4 jobs which I know that he discharged was to work as  
5 a reactor cleaner.

6 PVC is made in batch operations in a stirred  
7 pressure vessel. The vessel is charged with monomer  
8 water, suspending agents, initiators and other  
9 chemicals. It is stirred, agitated, heated and  
10 polymerized. The solid product which results is then  
11 discharged in the process.

12 The walls become coated -- fouling is the term  
13 that is used -- where it is necessary from time to  
14 time to clean walls off so that you have heat transfer  
15 or else the reaction would not be controllable.

16 There are various ways of cleaning reactor  
17 walls. These were glass lined vessels in the plant  
18 at that time. It was necessary for a man in most  
19 cases to go in there about every 10 to 12 batches  
20 and physically remove the polymer which was adhering  
21 to the wall.

22 In so doing, the man would be exposed to  
23 considerable vinyl chloride in the atmosphere. That  
24 is one way that Mr. Boren was exposed.

25 Another way was that at the end of the

1 polymerization, there is two or three or four percent  
2 unreacted monomer in the polymer. The first step  
3 after polymerization is to drop the batch from the  
4 reactor into a stripper.

5 There was one stripper at the end of each line  
6 of four or five or six reactors which served to remove  
7 most of the unreacted monomer by applying a vacuum  
8 and heat to the suspension or slurry of resin in the  
9 tank, at which time the vacuum was broken and the  
10 slurry was then pumped into the blend tanks which were  
11 outside the building, where it was then held and  
12 transferred into the centrifuge.

13 Not all of the monomer was removed in the  
14 stripping step, and there were considerable amounts of  
15 it left when it was put into this open blend tank at  
16 the edge of the building.

17 It then migrated from the slurry into the air,  
18 and some of it was present in the work place.

19 The odor was quite noticeable around the blend  
20 tanks. Anyone working in that area and in the  
21 stripping and dumping operation would have been  
22 exposed.

23 Mr. Boren did work as a stripper operator for  
24 a portion of his time.

25 Q Would Mr. Boren's work duties subsequent to

1 the purchase of the Calvert City facility by Air  
2 Products have resulted in exposure to vinyl chloride  
3 monomer?

4 A He continued his same work in the plant. At  
5 various times he worked in the recovery area where he  
6 would be in charge of the compression pumps that were  
7 being used.

8 He worked in the polymerization area.

9 The answer is, of course, any time that he  
10 worked in that area, he would continue his exposure to  
11 vinyl chloride.

12 Q Mr. Watson has testified that Jesse Boren was  
13 transferred to the utility area in 1982.

14 Would he have been exposed to the vinyl  
15 chloride monomer -- he being Mr. Boren -- after the  
16 transfer to the utility area?

17 A The utility area of the boiler house where he  
18 worked was several blocks away from the various small  
19 remaining vinyl chloride operations that went on  
20 after the PVC plant was closed.

21 There would be no reason for him to have any  
22 exposure after that May of '82 transfer.

23 Q Based upon your familiarity with Mr. Boren's  
24 duties, the requirements of his job description, in  
25 your opinion, when would have been the last date that

1 he would have had exposure to vinyl chloride monomer?

2 A Based on the records I have seen, the last  
3 date in which he had potential exposure -- not  
4 necessarily exposure, but potential for exposure --  
5 would have been the date at which he was transferred  
6 into the utility area, which is given as May 18th,  
7 1982.

8 Q Mr. Barr, as a result of your education and  
9 work experience, have you acquired any familiarity  
10 with the condition of angiosarcoma?

11 A Yes. I have followed that problem since 1973  
12 when it first became apparent from animal studies  
13 being carried on in Europe.

14 Q Could you give the Workers' Compensation Board  
15 a summary of the history of an individual exposed to  
16 vinyl chloride monomer which results in angiosarcoma?

17 MS. KIWALA: I'm going to object at this  
18 time if you are trying to get some medical  
19 proof in.

20 Mr. Barr is eminently qualified, but I  
21 don't think he has been qualified a physician.

22 MR. BROWN: I'm not asking for his opinion  
23 as to medical proof but as to his research and  
24 studies that were done regarding the length of  
25 exposure to vinyl chloride monomer, the average

latency period and so forth.

MS. KIWALA: Withdraw the objection.

BY MR. BROWN:

A When Goodrich announced in January 1973 that they had found three cases of angio in their plant, this announcement was made in the light of studies which had been ongoing since 1964 when it was first found that some workers in Europe who had been exposed to vinyl chloride in PVC plants had developed a problem called acro-osteolysis or AOL.

That caused a considerable program of epidemiology to be put in place both in Europe and the United States.

As an outfall from that, some European producers started a bioassay of rats and mice with vinyl chloride to say if they could reproduce AOL in the rats.

That failed. But they found cancer in some of the rats. That was reported in 1970 and didn't make much of a stir, apparently because they used extremely high doses, 5,000, 10,000, 15,000 parts per million, in their studies. Very high doses.

Furthermore, the tumors which were found were tumors which originated in and spread from something called the zymbal gland, which is in the ear of a rat

1 and furnishes the oil with which a rat grooms itself.

2 Since humans don't have such a gland, the  
3 position was, well, then this probably doesn't hurt  
4 humans.

5 Dr. Viola's work, which was reported in 1970  
6 and '71, then alerted the industry to the potential  
7 problem but didn't seem to point at any specific  
8 problem.

9 However, epidemiology studies and bioassays  
10 at lower exposures were initiated.

11 In 1973 it was found that other tumors at much  
12 lower exposures developed in rats and mice, hamsters  
13 and rabbits. This caused considerable concern.

14 In 1973 a very detailed epidemiology program  
15 was started amongst the PVC workers in the United  
16 States.

17 Late in '73, in light of all this past history,  
18 Goodrich found that they had a cluster of three cases  
19 of angiosarcoma, which is very rare.

20 Only about 20 cases of it occur in the United  
21 States each year. To have three cases in one plant  
22 over a two or three year period was a very strong  
23 warning signal.

24 At that time we started ordering chromatographs  
25 and took measurements of our workers and joined in

1 the epidemiology program.

2 One outfall from this was something called the  
3 angio registry.

4 Angiosarcoma of the liver. ASL. Angio. I'll  
5 use all those terms interchangeably.

6 NIOSH, the National Institute of Occupational  
7 Safety and Health, started a listing of all of the  
8 cases which were developed, including among others  
9 those which were read during Mr. Watson's deposition.

10 After this went on for a while and after OSHA  
11 and EPA had promulgated their standards for vinyl  
12 chloride, vinyl chloride ceased to be a sexy topic  
13 for NIOSH and the Center for Disease Control and they  
14 dropped the angio registry.

15 Fortunately for us, it was picked up by Dr.  
16 John Stafford of Imperial Chemical Industries, ICI,  
17 in Great Britain.

18 He and now his successor, Dr. Bryan Bennett,  
19 maintain that registry.

20 Most of the free world has cooperated very  
21 well with maintaining the registry. So we believe  
22 that we have a good handle on all of the cases which  
23 have occurred in the United States, in Western Europe,  
24 and in several of the other countries.

25 Now I'm ready to answer your question.

1 Q All right, sir. If you would, please.

2 A There are some 37 cases of angio which have  
3 been put on the registry in the United States.

4 Of these a couple or three have been found to  
5 be improper. A couple are still alive. What we know  
6 is that there are about 33 or 34 or 35 cases of vinyl  
7 chloride related ASL in the occupational area in the  
8 United States that have been found and recorded.

9 Based on those data, it is clear that the  
10 average latency period is a little over 25 years from  
11 the first time of exposure until the diagnosis of  
12 angiosarcoma.

13 Unfortunately, the diagnosis almost always is  
14 at just before death. It's a very fast acting  
15 disease once the latency period has run its course.

16 We have not had in the United States any case  
17 of angio which has occurred with a first exposure  
18 date after 1964.

19 Mr. Boren's case is quite typical. His first  
20 exposure date is 1963.

21 MR. BROWN: Mr. Barr, I think that's all  
22 the questions I have. Thank you, sir.

23 CROSS-EXAMINATION

24 BY MR. KIWALA:

25 Q Doctor, is the reason that you are not getting

1 the reported angiosarcoma cases after 1964 because the  
2 latency period hasn't run yet or because the exposure  
3 after 1964 was not sufficient to cause the disease?

4 A I think it's some of both.

5 I do not believe that the exposures in all  
6 cases were reduced sharply enough in the mid '60's as  
7 the result of the AOL studies to have taken all  
8 persons outside of the area of hazard.

9 Now, you have to consider the fact that of the  
10 25,000 persons who have been exposed to vinyl chloride  
11 -- and at least 2,500 of them have been exposed at a  
12 very high level for a very long period of time -- there  
13 are only about 30 who have developed the disease.

14 Therefore, there seems to be some sort of a  
15 personal susceptibility that has to be involved here  
16 as well as occupational exposure.

17 Just as not all cigarette smokers develop lung  
18 cancer -- only about 10 percent of them -- only about  
19 one-tenth of one percent of the people who have been  
20 exposed to vinyl chloride have developed angio, for  
21 which I am personally grateful.

22 There will continue to be more angio cases in  
23 the future as we see the end of the longer latency  
24 period. But remember, I said that the average latency  
25 period was 25 years, which means that half the latency

1 periods have been less and half have been longer.

2 The fact that we have seen nothing less than

3 21 years recently gives us some hope that some of the  
4 steps we took in the '60s will begin to ameliorate  
5 the problem.

6 Q Do you have in your possession or at your  
7 control any monitoring studies on what Mr. Boren was  
8 exposed to once you started instituting studies?

9 A I do not personally have those in my control.  
10 They are kept in the corporate medical department.

11 Q Again here or in Calvert City?

12 A Those records are prepared in the plant and  
13 submitted to and maintained by the corporate medical  
14 department.

15 Q Is there a medical department at Calvert City?

16 A Correct.

17 Q Who would be in charge of the statistics in  
18 Calvert City so we don't have to come back here again?

19 A They are not in Calvert City.

20 Q Okay.

21 A I suspect that copies of those records may be  
22 in Calvert City. I don't know.

23 For a while it was necessary under the OSHA  
24 Rule, as you well know, that if a person was exposed  
25 to more than a permissible amount, they had to be

1 notified.

2 Now, the permissible amount was 50 ppm from  
3 April of 1974 until April of 1975.

4 After that it was reduced to 1 ppm, an eight  
5 hour time weighted average.

6 People were going to be monitored once a month.  
7 In that monitoring if they were exposed to more than  
8 that, they were required to receive a letter from  
9 their employer. And they did in our case.

10 That letter was prepared at Calvert City.  
11 Therefore, they will have records of those who were  
12 exposed in excess of that amount, but they will not  
13 necessarily have maintained the records for those  
14 exposed to less than that amount.

15 Q Based on the research you have done and your  
16 own personal opinion, do you think that an exposure  
17 of 1 ppm is likely to result in angiosarcoma?

18 A I am firmly convinced that there would be no  
19 untoward ill effect whatsoever of 1 ppm vinyl chloride.  
20 It takes many times that to have any effect.

21 Q So you think that in Mr. Boren's case, it was  
22 the exposure that he had received when he first  
23 started working rather than the exposure he received  
24 toward the end of his work life?

25 A Yes. There is no question in my mind that the

1 initial high exposure which these workers received  
2 in the '50s and '60s are what is responsible for the  
3 angio cases we are seeing today.

4 If you understand the mechanism of how the  
5 cancer develops and spreads, I think you would agree  
6 with that.

7 Q Would Mr. Boren have been exposed to vinyl  
8 chloride on a daily basis in his job as chemical  
9 operator or would it only have been when he was  
10 working as a reactor cleaner or stripping operator  
11 or working with the blend tanks?

12 A No. If he was within the PVC operations, he  
13 would have been exposed to at least some vinyl chloride  
14 at all times during his work.

15 It would have been at much higher peaks when  
16 he was inside the reactor.

17 Q So a chemical operator as compared to utility  
18 operator, anybody that was a chemical operator was  
19 working around vinyl chloride?

20 A It depends on which utility you are speaking  
21 about.

22 Q Okay.

23 A We had utility workers in the PVC plant who  
24 were the ones who cleaned reactors, an entry level  
25 job. They got all the dirty work.

1 Q Okay.

2 A Now, we had a utility area, which is where he  
3 went in 1982, where he would not have been exposed.

4 As long as he was in the PVC plant, he would  
5 have had vinyl chloride exposure.

6 Q And it is your testimony then that he was in  
7 the PVC part from '62 until '82?

8 A January of '63 until May of '82.

9 Q So January of '63 when he came on as either a  
10 material handler or an operator?

11 A When he changed from material handler to  
12 operator, he then became exposed.

13 Q And you are, of course, aware that in 1974  
14 there was a Federal regulation promulgated that  
15 limited exposure to 1 part per million?

16 A No, that is not correct.

17 You are correct it was promulgated in '74. It  
18 didn't become effective until '75.

19 Q But you are aware of that?

20 A I am aware. I was there.

21 MS. KIWALA: I have no further questions.

22 (Witness excused.)

23 (Concluded.)

24

25

ERRATA SHEET

| <u>PAGE NO.</u> | <u>LINE</u> | <u>CHANGE</u> | <u>REASON FOR CHANGE</u> |
|-----------------|-------------|---------------|--------------------------|
| 3               |             |               |                          |
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\_\_\_\_\_  
JOHN T. BARR

COMMONWEALTH OF PENNSYLVANIA ) SS.  
COUNTY OF )

Subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_,  
1985, by the said John T. Barr.

\_\_\_\_\_  
NOTARY PUBLIC

My Commission Expires:

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5  
6 I, TED REWAK, a Shorthand Reporter and Notary  
7 Public in the State of Pennsylvania, certify that the  
8 foregoing is a true and accurate transcript of the  
9 deposition of JOHN T. BARR, who was first duly sworn,  
10 at the place and on the date hereinbefore set forth.

11 I further certify that I am neither attorney  
12 nor counsel for, nor related to or employed by, any  
13 of the parties to the action in which this deposition  
14 is taken, and further that I am not a relative or  
15 employee of any attorney or counsel employed in this  
16 case, nor am I financially interested in the action.  
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TED REWAK, Registered  
Professional Reporter