United States District Court

District of Massachusetts

CIVIL No. 82-1672-S

ANNE ANDERSON, for herself, and as parent and next friend of **CHARLES ANDERSON**, and as Administratrix of the Estate of **JAMES ANDERSON**; **CHRISTINE ANDERSON**; **RICHARD AUFIERO**, for himself, and as parent and next friend of **ERIC AUFIERO**, and as Administrator of the Estate of **JARROD AUFIERO**; **LAUREN AUFIERO**; **DIANE AUFIERO**, for herself, and as parent and next friend of **JESSICA AUFIERO**; **ROBERT AUFIERO**; **KATHRYN GAMACHE**, for herself, and as parent and next friend of **AMY GAMACHE**; **TODD L. GAMACHE**; **ROLAND GAMACHE**; **PATRICIA KANE**, for herself, and as parent and next friend of **MARGARET KANE**; **KATHLEEN KANE**; **TIMOTHY KANE**; and **KEVIN KANE, Jr.**; **KEVIN KANE**; **DONNA L. ROBBINS**, for herself and as parent and next friend of **KEVIN ROBBINS**, and as Administratrix of the Estate of **CARL L. ROBBINS, III**; **MARY J. TOOMEY**, for herself and as next friend of **MARY EILEEN TOOMEY**, and as Administratrix of the Estate of **PATRICK TOOMEY**; **RICHARD J. TOOMEY**; **JOAN ZONA**, for herself, and as Administratrix of the Estate of **MICHAEL ZONA**; **RONALD ZONA**; **ANN ZONA**; **JOHN ZONA**; and **PAT ZONA**, Plaintiffs

versus

CRYOVAC, Division of **W. R. GRACE & CO.**; **W. R. GRACE & CO.**; **JOHN J. RILEY COMPANY**, Division of **BEATRICE FOODS CO.**; **BEATRICE FOODS CO.**; and **XYZ** Company(ies), Defendants

Deposition of **GEORGE F. PINDER**, fourth day, taken on behalf of the Defendant pursuant to the applicable provisions of the Federal Rules of Civil Procedure, before Nancy L. Eaton, Notary Public in and for the Commonwealth of Massachusetts, at the offices of Hale & Dorr, 60 State Street, Boston, Massachusetts, on Thursday, February 13, 1986, commencing at 11:05 a.m.

NANCY L. EATON

Registered Professional Reporter

13 Short Street Reading, MA 01867 (617) 944-7182

APPEARANCES

SCHLICHTMANN, CONWAY & CROWLEY,
by **STANLEY ELLER, Esquire,**
171 Milk Street, Boston, MA 02109, for the Plaintiffs.

HALE & DORR,
60 State Street, Boston, MA 02109,

LOWENSTEIN, SANDLER, BROCHIN, KOHL, FISHER, BOYLAN & MEANOR, by **MICHAEL L. RODBURG, Esquire,**
65 Livingston Avenue, Roseland, NJ 07068,
for Beatrice Foods.

FOLEY, HOAG & ELIOT,
by **AMY WOODWARD, Attorney,**
One Post Office Square, Boston, MA 02109,
for W. R. Grace & Co. & Cryovac, Division of W. R. Grace & Co.

Also Present for Portions of Day:
William Cheeseman, Esquire, Michael Keating, Esquire, and
Mark Stoler, Esquire, for W. R. Grace.

I N D E X

Witness	Direct	Cross
GEORGE F. PINDER	5	

Exhibits

I N D E X

Exhibits

that. By this afternoon we mean two o'clock.

MR. ELLER: I didn't call the Xerox company. I will call from right here and ask somebody to come over and pick them up and have them copied.

That way there will be no problem.

(Interruption for telephone call from 11:21 AM to 11:23 AM).

Q. Doctor Pinder, have you completed your work on your three-dimensional model?

A. I believe that we have essentially completed the work.

Q. Do you intend to testify at trial on the basis of the three-dimensional model?

A. No.

Q. The three-dimensional model, your work on it and the output from it will have no relevance to anything that you will say at the trial?

A. I don't know how to answer that question.

(Mr. Cheeseman joined the deposition).

A. I don't understand the question. Could you break it up, please?

Q. Will you be testifying at trial that you did a

three-dimensional model?
A. Probably.
Q. Excuse me?
A. Probably.
Q. Well, now is the time to tell us, Doctor Pinder.
A. I did. I said probably.
Q. What will you be saying at trial about your three-dimensional model?
A. I don't know what I'll be saying at trial about the three-dimensional model.
Q. You have completed work on it, correct?
A. I have essentially completed the work on the model, that's correct.
Q. Have you calibrated it?
A. We have gone through calibration of the model, that's correct.
Q. You have calibrated it, correct?
A. Yes.
Q. And do you have an output run from your three-dimensional model which you believe represents to the best of your ability real world conditions in the vicinity of wells G and H?
A. I believe we have a model that is consistent

with the intended use of the model as a vehicle for illustrating my opinion.

Q. Do you have an output run from your three-dimensional model which you believe represents to the best of your ability the real world conditions at wells G and H?

A. I already answered your question as best I could.

Q. It is a question which can be answered yes or no unless you explain to me why it can't. Can you give me a yes or no answer to the question?

A. No, I can't give you a yes or no answer to the question.

Q. Why can you not give me a yes or no answer?

A. Because I find your terminology ambiguous. If you want to break it down.

Q. What about any terminology is ambiguous?

A. Amy, I am not going to tell you how to ask your questions. If you ask me a question that I can answer correctly, I will do so, otherwise I can't help you.

Q. The question I'm asking you is which term in my question do you find ambiguous?

A. It is the combination of the terms that make it

ambiguous.

Q. Tell me every term in my question that you find ambiguous.

A. Would you read back the question, please?

MR. ELLER: Objection.

(Testimony was reread).

A. If we break it into the first part, I can answer that and we can go into the subjective part as a separate question.

Q. Tell me what part of the question you can answer.

A. The question as it is stated I find impossible to answer. I suggest that you break it into two parts and I don't know how far I should go in telling you how to ask your questions.

MR. ELLER: You don't have to explain to her.

Q. Tell me which portion of that question you can answer yes or no.

MR. ELLER: Objection.

It is your question. Break it down so that he can answer it. You don't have to explain to her how to ask her questions.

Q. Are you going to answer my question or not?

different pumping periods at the Grace -- at the G and H wells. And consequently in response to those different pumping scenarios, you have different flow fields, so to provide you with a complete picture of how we accommodated those different pumping periods and their resulting flow fields, we tried to give you examples of as many of those as we used.

Then also you'll find on there three ways of looking at the problem. One is looking at simulation assuming the existence of the Grace site contamination only and a run indicating the effects of the Beatrice site only and then a run that shows what happens if both sites are assumed to exist in a temporal fashion consistent with the assumptions that I have documented to you before.

Q. Do you intend to testify on the basis of any of those computer runs at trial?

A. Without being coy, Amy, I'm just not sure what you mean.

(Interruption for messenger from 11:40 to 11:41).

A. I'll try to answer your question as forthrightly

as I can. If it doesn't satisfy you, we'll have to break it down.

I intend to use the model essentially as it is presented to you to illustrate my opinion but not to use it as a basis for my opinion.

Q. What will you use as the basis of your opinion at trial?

A. I will use the information that I documented to you in one of the earlier depositions which is basically observed field information and assumed values of field co-efficients such as presented in the documentation that you have before you today.

Q. Are you referring to this set of documents?

A. Yes, that's correct.

Q. Let's have these marked sequentially.

(Packets were marked Exhibits 16 through 22).

(Off the record discussion while exhibits were marked).

Q. I am showing you what has been marked Exhibit 16. Would you identify that, please?

A. This is a geographical representation of the

A. Yes.
Q. Is your opinion that it would take three years for TCE in solution to get from Cryovac to wells G and H an opinion that would it take that long for them to get there when wells G and H were not pumping?
A. That's correct. My calculations assume G and H are not pumping. If it were pumping, it would get there much sooner.

(Interruption for phone call).

(Mr. Keating left the room).

Q. You testified that you used an average permeability value from Cryovac to wells G and H of 75 feet a day, correct?
A. That's my recollection, yes.
Q. You testified that permeabilities would be higher within the Aberjona River valley than they are in the Cryovac site, correct?
A. That's correct.
Q. In the calculations that you did in order to arrive at your opinion on travel time, did you use a value for dispersivity?
A. Yes.
Q. Is that reflected on Exhibit 16?

(Witness pointed).

Q. The value used for dispersivity is 67.50?

A. That's correct.

Q. In your three-dimensional model, did you use a value for dispersivity?

A. Yes.

Q. What value did you use in the three-dimensional model?

A. It is approximately the same. It would be reflected in the output, if you want to get the exact values. It is approximately the same number.

Q. I'm sure we'll be able to find it.

A. It is within a factor of two.

Q. How did you arrive at those values for dispersivity?

A. Well, I based it on experience I had had with modeling other contaminant transport problems in similar material where I was able to obtain those values from calibration.

Q. Is the value for dispersivity something that you find from a book somewhere or an article?

A. You can find them in books and articles. I think most of us in the field know them from

personal experience more than the documented literature because many of the important projects that have been done have unfortunately been associated with litigation or private clients and so it is difficult to get these numbers into literature.

Q. What does the value of dispersivity represent?

A. Well, that's a very good question. Basically it describes the variability of the pore velocity from the average velocity associated with what we call a representative elementary volume. Try and help you translate that.

What you should visualize is, say as a tracer or a contaminant moves through a porous media, it takes many complicated pathways. It just doesn't move in an average way. Consequently, the average velocity is a number that doesn't reflect accurately the intricate movements of the contaminants at the pore level or even at the say the level at which you might find stringers of sand and gravel, so both mathematically and physically what it is describing is the variability in the velocity field from the average Darcy velocity as

compared to the very complicated pore velocity.

Q. Is dispersivity something that can be measured in the field?

A. It is measurable in the same sense that permeability is measurable.

Q. Is the dispersivity value that you used in this case derived from field measurements that were done in this case?

A. Not at all, no.

Q. Is dispersivity something that can be verified by field measurements?

A. Theoretically it could be.

Q. Have you made any attempt to verify by field measurements your dispersivity values that you used in this case?

A. Yes.

Q. What attempt did you make to so verify them?

A. Well, I did I guess what every modeler does. I observed the contaminant plume as it was generated by the computer with this dispersivity in it and observed that it was consistent with my understanding of the physical system and the observations that I was aware of in the system, and I think even at one point, Amy, we changed

those values substantially just to see if they had any significant impact on the forecasts, just to give us a sense of the sensitivity of the solution to that parameter and it was remarkably insensitive to it.

Q. Remarkably insensitive?

A. Yes. Any mathematical expression, some parameters are much more important than others and that just doesn't happen to be one of the really sensitive ones.

Q. In this particular -- in your particular calculations in this case, are you talking now about your three-dimensional model?

A. In general, any kind of simulation of a transport and groundwater system this is commonly the situation, and I think specifically in this case.

Q. So for your three-dimensional model, you think you would have gotten the same results or substantially the same results even if you had used a different figure for dispersivity?

A. As long as it was a reasonable figure from the point of view of our physical understanding of the system, I think it could be said that the

results were not dramatically different. Just trying to express to you the general feeling and not the specifics.

Q. What's the highest number for dispersivity that you think would be reasonable in this case?

A. Oh, it could be as high as probably in the hundreds of feet.

Q. What's the lowest?

A. The lowest that I think you could use here would probably be 50.

MR. RODBURG: Excuse me, I didn't hear the witness.

THE REPORTER: 50.

Q. It wouldn't change your results substantially if you had used 50 instead of 67.5 or whatever it was you used in your three-dimensional model?

A. It would be a very small change indeed.

Q. And is the same true for your one dimensional calculations?

A. I was actually thinking of those. It would hold true for both.

Q. Do you have any opinion as to whether the chemical epichlorohydrin was ever present at wells G and H?

on data and insight and calculation.

Q. Okay. That's your opinion then as to what the initial concentrations were at the nodes for which there are nonzero values anywhere in file six?

A. Again, remembering that we're talking about average behavior over relatively large areas, this is my current feeling as to what is the most probable range of concentrations that were there.

Q. And can you tell by looking at file number 6 what times zero was other than it was sometime in 1960, can you identify a month?

A. No, I can't till you that but it will be very evident from runs that your consultants will make. They will have all of this information provided to them.

Q. Have you assigned initial concentrations at any node other than the top layer of your model?

A. I would imagine that if I were to examine the file, I would find we have concentrations in other layers in some areas.

Q. On what data do you base that?

A. I guess it would be again the recognition that

we're looking at average behavior both vertically and horizontally. To the degree that I feel that that reflects the average behavior, I would incorporate it.

Q. Is it correct that you have used a recharge rate of 24 inches a year in the output runs that have been marked Exhibits 26 through 32?

A. That without examining the outputs I would say that's within reason to what we in fact used.

Q. If that recharge rate was incorrect by a factor of two, how would that affect your velocity calculation?

A. It will affect it somewhat. It is not a one to one correlation and in fact precipitation is one of the things that we did look at the sensitivity of and again it is relatively insensitive to precipitation.

Q. When you looked at the sensitivity of the model to the assumption as to recharge rate, what exactly did you do?

A. We just basically changed the precipitation rate and --

Q. By how much?

A. I don't recall.