UNITED STATES DISTRICT COURT

DISTRICT OF MASSACHUSETTS

Civil Action
No. 82-1672-S

SKINNER, D. J.
And a Jury

ANNE ANDERSON, ET AL

V.

W. R. GRACE & CO., ET AL

Forty-First Day of Trial

APPEARANCES:

Schlichtmann, Conway & Crowley (by Jan Richard Schlichtmann, Esq., Kevin P. Conway, Esq., and William J. Crowley, III, Esq.) on behalf of the Plaintiffs.

Charles R. Nesson, Esquire, on behalf of the Plaintiffs.

Herlihy & O'Brien (by Thomas M. Kiley, Esq.) on behalf of the Plaintiffs.

Hale & Dorr (by Jerome P. Facher, Esq., Neil Jacobs, Esq., Donald R. Frederico, Esq., and Deborah P. Fawcett, Esq.)

Foley, Hoag & Eliot (by Michael B. Keating, Esq., Sandra Lynch, Esq., William Cheeseman, Esq., and Marc K. Temin, Esq.) on behalf of W. R. Grace & Co.

Courtroom No. 6
Federal Building
Boston, MA 02109
9:00 a.m., Friday
May 9, 1986.

Marie L. Cloonan
Court Reporter
1690 U.S.P.O. & Courthouse
Boston, MA 02109

MR. FACHER: Lack of foundation.

THE COURT: Overruled.

MR. FACHER: The question isn't clear.

THE COURT: I think it is not perfect, but I think it is clear enough. Overruled.

MR. FACHER: Can we have a time period, your Honor?

Q During the pump test?

A During the pump test, some water will begin to migrate from the river into the underlying aquifer, but because the peat layer is relatively impermeable, it will move rather slowly.

Q Have you formed an opinion whether, in fact, water from the river reached Well G during the pump test?

A Yes, I have an opinion on that.

Q What is that?

MR. FACHER: Objection.

THE COURT: Overruled.

A I don't believe that any water has physically moved from the river to Well G or had during the pump test.

Q What is the basis of that opinion?

A The low permeability of the peat layers.

THE COURT: If the pumps had been operating for 10 or 12 years off and on, as it occurred in the 1960s, would you expect water from the river to have

F2-2

reached Wells G and H?

THE WITNESS: I think under those circumstances, water would have moved from the river to Wells G and H.

THE COURT: And what would have been the effect of any pollutants in the river on Wells G and H over a period of time of that magnitude?

THE WITNESS: Unless the concentrations in the river were truly enormous, I don't believe it would have any impact whatsoever.

end F

G
VW/jm

THE COURT: At this point would the organics, the deep layer becomes saturated with pollutants?

THE WITNESS: That is theoretically possible.

THE COURT: At that point then, the pollutants would pass on into the lower layers?

THE WITNESS: That is correct, if it could be saturated.

Q Now, if that in fact occurred, if it did become saturated, would there be a memory left in the system left of that contamination from the river?

MR. KEATING: Objection. A memory?

THE COURT: A memory.

MR. KEATING: I object. In the system? I object.

THE COURT: It is perhaps somewhat a poetic reference. I will let it stand.

A If organic chemicals moved from the river through the peat layer, it would be reasonable to expect we would find the organic chemicals in the peat layer at this time.

Q If they pass through the peat layer into the underlying soil, would you expect to find it in the soil as well?

MR. FACHER: The soil under the river?

MR. SCHLICHTMANN: The soil under the peat.

THE WITNESS: Is anyone objecting?

MR. KEATING: I will. I slipped up. Thank you.

THE COURT: Okay. You have come through, Mr. Keating. I will overrule the objection.

MR. KEATING: It does not always work out.

A Organic chemicals, if they in fact were to make it through the peat layer into the underlying soil, the underlying soil would also have some kind of a chemical fingerprint coming from the river.

Q Do you have an opinion, Doctor Pinder, as to whether or not the Aberjona River contributed to contamination of Wells G and H?

MR. KEATING: Time period.

Q At any time.

A Yes.

Q What is that opinion?

MR. FACHER: Objection.

THE COURT: Overruled.

A I cannot think of any circumstances within reason that would result in the river providing contamination at Wells G and H remotely close to what we see.

Q Why is that?

A Well, in order to be specific, in order to get contamination of, say, 400 parts per billion of TCE in the well field, the river would have to be in thousands of

parts per billion at the location of the wells, which means that somewhere the river itself would have to be tenths of thousands parts per billion, unless the chemicals are being deposited there at that time. I simply see no evidence of that whatsoever.

Q Why couldn't it carry such large concentrations in the river?

A Well, it is because --

MR. FACHER: Objection.

THE COURT: Overruled.

THE WITNESS: It is because the free flowing river water very rapidly volatilizes the organic solvents. And they simply can't survive for significant distances in flowing water.

Q Now, Dr. Pinder, on this diagram you show Well H?

A Yes.

Q Could you indicate to the jury where Well G would be located in reference to the jurors?

A Well, G would be located in the jury box.

Q In the jury box?

A More or less.

Q And you have indicated on the map the drawdown by Well H?

A Yes, sir.

Q And do you have an opinion as to whether the drawdown

caused by Well H would be similar, regardless of whether Well G was pumping at the same time?

MR. FACHER: Objection.

THE COURT: Overruled.

MR. FACHER: May I be heard on this, your Honor?

THE COURT: I think we have been through this.

A It is my opinion that the cone of depression you see here would look very similar to what it is now, if in fact G was not pumping.

MR. SCHLICHTMANN: I am going to replace the Beatrice exhibit that was previously referred to by Mr. Drobinski and put it right over this one.

(Pause.)

Q I show you a diagram and ask you to explain what is depicted on that diagram.

A This is a cross-section similar to the preceeding one but taken along a different line in the valley. I think we better point out where that line is.

This particular section is taken from S80, to the west of the Beatrice property, through to S94, which is on the other side of Well G. So we are looking at a section that goes from S80 through Well G to S94.

MR. FACHER: Is it possible to move back a little bit physically so counsel can see where the line is?

THE COURT: Can you manage to roll the several elements of that thing back?

(Pause.)

Q Now, what is indicated on the top diagram?

A You have the cross-section from S80 through S94. It illustrates the material properties that were found along this cross-section much as previous one but, but it does not have the colors. So it is not quite as obvious what everything is.

The bottom segment is also designated as bedrock segments. It is overlaying by a sandy gravel layer, and coming through like this (indicating).

And then a silty, sandy gravel layer with some clay also that follows that same type of geological profile.

And then a sand and gravel aquifer that comes down and back up on the other side like so (indicating).

And then we have a fine, medium silty layer at the top. So the salient features you have are a thick zone very permeable material. It is overlaid by a peat layer shown on the top, and you see also the water

level. You probably would note that the water level is quite flat compared to the one we saw before. This is because it is now in the river valley and the topography is flat. And consequently, the water table tends to be very flat.

If you were able to measure very carefully, you would find the water table does, in fact, slope toward the river. And there is a general discharge situation where the water is moving into the river.

I guess landmarks like the railway enbankment are worth noting, and Well G, located over here is another good landmark.

Q Could you indicate to the jury the groundwater flow on that top diagram as it existed prior to the pump test?

A The general flow would be right to left towards the river. I lost the river.

Right to left towards the river like this (indicating); and left to right toward the river like this, discharging into the river (indicating). Also, some will be coming down the valley. You will notice a slight component going down the valley.

Q Now, what is depicted on the diagram bottom?

A The bottom is the same cross-section. The difference here is that the water levels specifically the water table

as indicated by the top of the blue section is drawn with information obtained during the pumping test. So you observe a general and significant slope from right to left towards the well, and from left to right towards the well, even though the river is intervening. You also notice that the water level is below the river, under the river.

Q Why is that significant?

A I think it is significant because it means that water that previously would have discharged to the river is now moving under the river and entering Well G. I think this is important because it means that we have a mechanism, groundwater mechanism that will carry contaminants that are residing on the Beatrice side of the river across the river to Well G.

End G
VW/jm

Q Could you show the jury that pathway that they would follow, the contaminants would follow down to that drawdown?

A Well, the general flow would be just left to right under the river into the wells (indicating).

Q Now, there is an indication there of the Aberjona River and the peat layer?

A Yes.

Q What is the effect -- what was the effect of the river during the pump test at this part of the aquifer?

A Well, it plays exactly the same role as it played in the other cross-section. In this circumstance, with the water level below the river, there is going to be a tendency of the water to move down towards the aquifer, being impeded by the peat layer, but nevertheless moving, albeit slowly down towards the aquifer.

Q And are the same statements that you made about the effect of the contaminants in the river applied to this part of the aquifer as well?

A Yes.

Q For the same reasons?

A Yes.

Q You may return to the stand, now.

(Witness resumes witness stand.)

MR. SCHLICHTMANN: We'll take a moment before proceeding to take down the exhibit, your Honor.

MR. FACHER: Objection.

MR. KEATING: Objection, your Honor.

THE COURT: Overruled.

A My opinion is that within three years of the time that chemicals were first found on the Grace site, concentrations in the tens to hundreds of parts per billion range were in the well field, and that within, I'd say, three to four months, chemicals that were on the Beatrice property would be found in the pumping wells assuming the pumping well was pumping over that period of time, concentrations that are combined concentrations in the tens and hundreds of parts per billion.

Q What is your opinion as to the concentrations that historically occurred at Wells G and H from that period until the closing of the wells in May of 1979?

MR. FACHER: Objection.

MR. KEATING: Objection.

THE COURT: Overruled.

A Well, my opinion is that the chemical concentrations centrally increased during that period of time until they reached concentrations at least equal to what we see in 1979, and that the concentrations themselves probably fluctuated significantly, and at some times were higher than what we see now and at some times would be somewhat lower.

Q Do you have an opinion as to how much higher or how much lower?

MR. KEATING: Are we talking about now or 1979?

MR. SCHLICHTMANN: Now, during the period he testified to.

MR. KEATING: I thought he said 1979, and then he said "now."

MR. SCHLICHTMANN: Just strike the period from the beginning to the end of the fluctuating period. I was asking his opinion as to how that fluctuated.

MR. FACHER: Objection.

THE COURT: Overruled.

THE WITNESS: I think it would be helpful to use an exhibit on this, because I --

MR. SCHLICHTMANN: Well --

THE COURT: Answer the question the best you can.

THE WITNESS: All right. I will answer it as best I can.

A I think the concentrations were probably at least an order of magnitude higher than what we observed now, as to some periods in the past.

Q What do you mean by an order of magnitude?

A A factor of ten.

MR. KEATING: Am I to take "now" as 1985-1986?

THE COURT: Yes.

THE WITNESS: May I clarify?

THE COURT: Yes, please do.

THE WITNESS: I'm talking about up to 1979.

MR. KEATING: Fine. Thank you.

Q That it would have been fluctuating by order of magnitude of a factor of ten?

A Yes, sir.

Q Now, Dr. Pinder, you talked about the fact that it would fluctuate. What would -- in your opinion, what would cause the fluctuation?

A I think the major --

MR. FACHER: Objection.

THE COURT: Overruled.

A I think there are basically two reasons. One is a natural fluctuation that is due to the irregular rate of contamination of the groundwater by precipitation which causes these slugs to move through the system, and the chances of us catching the very highest concentration and the very lowest concentrations are just very, very small.

And secondly, the pumping rates at the pumping

wells themselves will cause fluctuations in concen[illegible]; the reason being that when the well is turned off, the flume will recede in case of Beatrice, recede back to the west; in the case of Grace, will tend to propagate over the well fields. So when they are turned on, you will tend to get a sudden shot of contamination through the system due to this covering effect from Grace, and then there will be a period of time before the contamination from Beatrice actually gets back to the well again.

So, there are these two mechanisms of fluctuation that I identified.

End L-1
MBC/jm

L2-1

Q Now, Dr. Pinder, yesterday I asked you questions about the travel times of chemicals; do you recall that?

A Yes, sir.

(Witness refers to document.)

Q Now, you gave us some figures for different chemicals.

Could you explain to the jury briefly the type of formula you were using or what you factored into that opinion?

A Yes, I would be very pleased to do that. Yesterday I was asked by the attorney and also by the Judge to give travel times for contaminants other than TCE.

You may recall that I gave, for example, a travel time for TCE of three years from Grace. I then did a mental calculation for the remaining chemicals as to how long they should take. In so doing, I left off a porosity term in my head that should have been in that calculation. So, I would be very pleased to try and correct that mistake.

Q Does it affect the travel time in some way?

A It affects the travel times not catastrophically, but I think significantly, at least from my point of view.

Q Would you like to make those corrections?

THE WITNESS: Would that be all right, your Honor?

THE COURT: Certainly.

MR. KEATING: If the doctor is going to be referring to these notes, I would ask at some point that they be made available so that they can be looked at.

THE COURT: Certainly.

A The travel time in terms of the Grace site to the well field would be for trans, 1.03 years; tetra, 9.67 years; chloroform, 1.78 years; TCA, 2.43 years. And in terms of the Beatrice calculations, I would like my testimony to read that the TCE was three months; trans, 1.03 months; tetra, 9.67 months; chloroform, 1.78 months; and TCA, 2.3 months.

Q The corrections, then, is it fair to say, you have reduced the travel times for tetrachloroethylene for a few years -- or by a few months, in the case of Beatrice?

A Yes, sir.

Q And that you increased the travel times for trans-dichloroethylene for Grace from a few months to a year or more?

A Yes, sir.

Q And trans-dichloroethylene from the Beatrice site from a few weeks to a month?

A Yes, sir.

Q And could you just explain to the jury what caused you to make that recorrection?

A Well, I just was contemplating my testimony and it

suddenly occurred to me that I had made a mistaken, and so I wanted to correct it.

Q No, what was the mistake that you actually made?

A I actually left off a constant when I was doing the multiplication in my head, that affected everything.

Q That is a constant --

A It is the porosity of the soil which was .2, which affected, somewhat, everything.

MR. KEATING: You will save that for us, I hope, Doctor?

THE WITNESS: Yes.

MR. KEATING: Thank you.

Q Now, Dr. Pinder, you have given several opinions and you have talked about the basis of those opinions, and you referred to lots of different kinds of data.

Do you have any -- approximately how many pages of data have you reviewed in doing your work in this case and in forming your opinion?

MR. KEATING: I object. How many pages of data. I object.

THE COURT: Overruled.

A Well, it is an enormous number. It is probably a significant percentage of what is in this box back here.

You say there is 12,000 pages back there? I would imagine I have seen probably a good third of it,

anyway.

Q And of the different kinds of data points that you have used in your opinion, do you know approximately how many numbers of data points that you have used in your opinion?

A You mean data points that I have somehow used in my conceptualization and calculations?

Q Yes.

A Very large numbers; tens of thousands, I would say.

Q And do you expect that there are any errors in those data points?

MR. FACHER: Objection.

MR. KEATING: Objection. I object, your Honor.

THE COURT: Overruled.

A It is difficult for me to conceive of them not -- there not being somewhere, someplace, a mistake in that data. But by the same token, I don't know of any data that was more carefully checked than that was.

MR. KEATING: I object to that, your Honor, as nonresponsive.

THE COURT: It is nonresponsive. It is stricken. It should be disregarded.

MR. KEATING: Thank you.

Q What kinds of errors -- let me ask you this. What kinds of errors during your analysis of the data have you