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

Fortieth 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.) on behalf of Beatrice Foods.

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., Thursday
May 8, 1986

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

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GEORGE PINDER, RESUMED

DIRECT EXAMINATION BY MR. SCHLICHTMANN, CONTINUED

Q Dr. Pinder, yesterday I asked you questions about transport times for contaminants at the Grace site, do you recall that?

A Yes, sir.

Q Do you have an opinion as to how long it would take for trichloroethylene introduced at the Grace site to travel to the well field of G and H?

A Yes, sir.

Q What is that opinion?

A That it would be no more than three years.

Q Do you have an opinion as to the transport time for tetrachloroethylene introduced at the Grace site to travel to the well field of G and H?

MR. KEATING: I object based upon our conference earlier.

THE COURT: I don't know if there was that limit.

end B

MR. KEATING: Look at Line 23 and 24, then the first three lines on the next page.

THE COURT: No, this is no limitation on time. I will permit the question.

MR. SCHLICHTMANN: Do you have the question, Dr. Pinder?

THE WITNESS: Repeat it.

Q Do you have an opinion as to transport time for tetrachloroethylene introduced at the Grace site to travel to Well Field G and H?

A Yes, sir.

Q What does that mean?

A Based on retardation, it should be approximately four times longer.

Q Do you have an opinion --

THE COURT: Four times longer than the trichloroethylene?

THE WITNESS: Yes, sir.

THE COURT: So it would take 12 years?

THE WITNESS: Yes, sir. Approximately.

Q Do you have an opinion as to the transport time that it would take trichloroethane introduced at the Grace site to reach Well Field G and H?

MR. KEATING: Same objection.

MR. SCHLICHTMANN: Trichloroethane, TCA?

THE COURT: What is the 1,1,1 stuff, 1,1,1, trichloroethane?

MR. SCHLICHTMANN: Yes.

MR. KEATING: The same point, your Honor.

THE COURT: Overruled.

How long?

THE WITNESS: It would be about three-quarters as long as the trichloroethylene, so it would be probably two and a half years, roughly.

Q Do you have an opinion as to the transport time for trans-dichloroethylene introduced at the Grace site to travel to Well Field G and H?

MR. KEATING: Same objection, your Honor.

THE WITNESS: Yes, sir.

THE COURT: The objection is overruled and the answer stands.

THE WITNESS: How long?

Q What is the opinion?

A That approximately would be eight times faster.

THE COURT: Eight times faster than which?

THE WITNESS: Eight times faster than the trichloroethylene. It would take one-eighth of three years.

THE COURT: Or three-eighths of a year.

THE WITNESS: Yes.

Q Do you have an opinion as to the transport time for

chloroform introduced at the Grace site?

THE COURT: Four and a half months, three-eighths of a year, something like that?

MR. KEATING: Excuse me, is that the end of the question, Mr. Schlichtmann?

THE COURT: I interrupted him. I am talking about three-eighths of a year.

MR. KEATING: Okay.

THE COURT: Four and a half months?

THE WITNESS: Yes, sir.

Q Do you have an opinion as to the transport time for chloroform introduced at the Grace site to reach the well field of G and H?

THE COURT: That is making the assumption that it was?

MR. SCHLICHTMANN: Yes. For chloroform.

A Yes, sir.

Q How long?

A About twice as fast as trichloroethylene, so that would be about a year and a half.

Q Do you have an opinion as to the transport time it would take trichloroethylene to travel from the Beatrice site during the pumping of Well G to reach the well field?

A Yes.

Q What is that?

MR. FACHER: Objection, your Honor.

THE COURT: Overruled.

MR. FACHER: I don't know whether your Honor has heard the basis for the objection.

THE COURT: I think -- Didn't we go through this --

MR. FACHER: In some respects, we did.

THE COURT: -- yesterday?

MR. FACHER: Pardon me?

THE COURT: Didn't we go through all of this yesterday?

MR. FACHER: I don't think we went through all of it. I went through more than three-eights of it.

THE COURT: All right, come on.

(CONFERENCE AT THE BENCH AS FOLLOWS:

THE COURT: I get it from the aggressive decrease in the size of the bandage that you are getting better.

MR. FACHER: I don't want the jurors to have too much sympathy.

The questions keep differing a little bit, therefore, I have to make objections to it. The question now is the contaminant introduced at the Beatrice site, the travel time to reach the well field with just Well G pumping. A, that is a different question than we have been

previously talking about.

There was no test of just Well G pumping.

THE COURT: That is right. He doesn't have any foundation for knowing what would happen if just Well G was pumping.

MR. SCHLICHTMANN: H doesn't affect the transport time. I will state that for the record.

THE COURT: I have not heard that.

MR. FACHER: And the other thing, I want to bring it to the Court's attention, there is a difference between the "well field" and "Wells G and H." An introduction into -- these slippery phrases have got to be brought to your Honor's attention because the form and substance of these questions are of some importance. They are argued, and I hope not misused.

There are 14 wells in the well field, maybe more.

MR. SCHLICHTMANN: A piece of earth between G and H.

MR. KEATING: I didn't know that.

THE COURT: Have that defined. Be as meticulous as you can about exactly what you mean.

MR. KEATING: Could I just say the basis for my earlier objections was at the time of his last deposition, he had formed no opinion that any of those

chemicals had ever left our site. As long as it is hypothetical.

THE COURT: It is based upon an assumption. That, you should make clear, too.

MR. SCHLICHTMANN: May I say this for the record, when Dr. Pinder was deposed in December, he made an opinion as to all five of the chemicals represented. What he is showing you is a selection from one deposition in which Dr. Pinder asked to lcok at his documents and he wasn't allowed to look at them. And he gave an opinion off the top of his head, and he said he had to look at the documents and he couldn't tell them.

THE COURT: You made a statement as to the --

MR. SCHLICHTMANN: That is Dr. Pinder --

THE COURT: Look, you show me where it is. What I saw leads me to certain conclusions. Let's finish up this. I am not keeping any of this out. Let's finish up this little go-round.

END OF CONFERENCE AT THE BENCH.)

THE COURT: Let's get some of these terms defined.

Q Dr. Pinder, I used the term "well field." Would you tell the jury what your understanding of the term "well field" of G and H is?

A That term designates the area in the immediate

vicinity of the G and H wells.

Q And when I say --

THE COURT: How immediate is "immediate"? Are we talking feet or inches?

THE WITNESS: No, tens of feet, sir.

THE COURT: How many tens of feet?

THE WITNESS: I would say I would visualize it in the order of 50 feet radius around each well and the intersecting area between the two.

THE COURT: How far apart are the wells?

THE WITNESS: I would have to look on the map, but it is in the order of 150 feet, something like that.

THE COURT: All right.

Q I used the term "introduced into the site, introduced into the groundwater."

A I beg your pardon?

Q If I used the phrase "introduced into the site," is that a phrase that means something to you, contaminants introduced into a site?

A Yes.

Q What does that mean to you? How are you using the phrase?

A I use it to mean the chemical was somehow put on the surface of the ground analagous to the ink being put on the sponge, that sort of thing.

Q Now, Dr. Pinder, you gave an opinion yesterday concerning the contribution of contamination from the Beatrice site to the Well Field G and H.

A Yes, sir.

Q Do you have an opinion as to whether the pumping of Well G, by itself, without the pumping of Well H, would affect the water table rating between Beatrice and the well?

A Yes.

Q And what is that opinion?

MR. FACHER: Objection.

THE COURT: I will permit it. Overruled.

Q What is that opinion?

A I have forgotten the question. I'm sorry.

Q The question is: Do you have an opinion as to whether Well G will affect the water table rating between Beatrice and Well G without Well H pumping?

A Yes.

MR. FACHER: Objection.

THE COURT: Overruled.

Q What is that?

A You still have the pressure generated with G in the absence of H.

THE COURT: Let me ask you this. The test was conducted with both G and H pumping together?

THE WITNESS: Yes, sir.

THE COURT: Now, did that create one cone of depression or two?

THE WITNESS: It created two, which kind of intersected with each other. It would form like a figure eight.

THE COURT: Did the cone of depression around Well H affect the water table slope from Beatrice, from the Beatrice land?

THE WITNESS: It would affect it, sir.

MR. FACHER: Do you mind if I object to your Honor's question?

THE COURT: Sure.

MR. FACHER: You don't mind, but you overrule?

THE COURT: Yes, it has been overruled.

So you have done no study with just Well G pumping?

THE WITNESS: We did, sir, in the preliminary to the pump test, the step tests that they conducted earlier upon individual wells.

THE COURT: When was this?

THE WITNESS: This was just prior to the full test.

MR. FACHER: I object. There is no foundation for this, your Honor.

THE COURT: Well, I don't know.

MR. FACHER: This is entirely new material.

THE COURT: It is entirely new material.

Were you present when this was done?

THE WITNESS: No, sir, I was not there.

THE COURT: Do we have any records of this prior testing?

MR. SCHLICHTMANN: Yes, your Honor, I believe it has been filed.

THE COURT: We have had no testimony about it, no mention about it in all the work that we did on Monday and Tuesday?

MR. FACHER: Not a word, your Honor.

MR. SCHLICHTMANN: The issue is whether it is necessary for his opinion.

THE COURT: Well, it just seems like if H affected -- he just said now H affected the result, and you asked him the question about G pumping by itself.

MR. SCHLICHTMANN: Yes.

THE COURT: I will exclude it.

We have not been offered any foundation about the conditions under which G was pumped by itself.

MR. SCHLICHTMANN: May I inquire as to whether he would be able to use the information obtained by the pump test to make that information that he has?

THE COURT: That was not subject to the review

that we had. I will exclude it.

MR. SCHLICHTMANN: May I have a side bar on the situation?

THE COURT: No. Next question.

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THE COURT: Is there any reference in any of the deposition material as to a pre-pump test, where these things were drawn down one at a time?

MR. SCHLICHTMANN: Yes. The parties were fully involved in the pump test. They participated in the pre-pump and pump test.

THE COURT: I have seen nothing in the record. At the recess, if you can show me there is a record on this, I might consider revising it. Right now we have offered no foundation. We have no -- we have had days and days review of these documents. There has been nothing that has been shown to me or mentioned to me about a separate test. As far as I know, it has not been on the record revealed to counsel.

Next question.

Q Dr. Pinder, based upon the information you obtained from the pump test, were you able to calculate whether or not Well G affected the water table gradient of the Beatrice site, irrespective of Well H?

THE COURT: Disregarding the pre-pump test.

A Yes.

Q Do you have an opinion based upon that information as to whether or not Well G affected the water table gradient from the Beatrice site, irrespective of Well H?

A Yes.

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Q What is that opinion?

MR. FACHER: Objection.

THE COURT: I will sustain the objection until I get an explanation of how he separates out.

MR. SCHLICHTMANN: May I establish foundation now or do you want to do a voir dire?

THE COURT: Go ahead and establish it, if you can.

MR. SCHLICHTMANN: Okay.

Q Dr. Pinder, what information did you obtain during the pump test concerning the cones of depression formed by Wells G and H?

A Could you ask the question again?

Q What information did you obtain during the pump test concerning the cones of depression formed by Wells G and H when they were pumping?

A The information we obtained was water levels.

Q Did you form an opinion based upon that information as to the nature of the cone of depression formed by Well G?

A Yes.

Q And is that cone of depression independent of the cone of depression of Well H?

A No.

MR. FACHER: I object to the leading nature.

D2

THE COURT: The answer is no. We will let it stand.

Q Dr. Pinder, do you have an opinion as to the length period, the length of time it would take for trichloroethylene introduced at the Beatrice site to travel to Well G during the time both Wells G and H were pumping?

A Yes, sir.

Q What is that?

MR. FACHER: Objection.

THE COURT: Overruled.

A Trichloroethylene would be approximately three months.

Q Do you have an opinion as to the travel time for trichloroethane during the period of-- to travel from the Beatrice site to the well field of G and H during the time Wells G and H were pumping?

A It would be three-quarters of--

MR. FACHER: Wait a minute, sir.

THE WITNESS: I could do this algebra if you want.

MR. FACHER: I don't mind. I would like to get my objection in first.

THE COURT: Overruled. I don't think it takes algebra.

Q Do you have an opinion--

MR. FACHER: Not the three-quarters.

Q Do you have an opinion as to the time of travel it would take tetrachloroethylene introduced at the Beatrice site to travel to the well field of G and H during the time that Wells G and H were pumping?

A Tetrachloroethylene moves about one-fourth the speed of trichloroethylene, so it would be four times longer or approximately a year.

MR. FACHER: I'm sorry, I have to object. The witness answered the next question. My objection.

THE COURT: Objection is overruled.

Q Do you have an opinion as to the travel time for trans-dichloroethylene introduced at the Beatrice site to travel to the well field of G and H during the time Wells G and H were pumping?

A Yes, sir.

Q And what is that?

MR. FACHER: Objection.

THE COURT: Overruled.

A It takes approximately one-eighth as long, so it would be three-eighths of a month.

Q Do you have an opinion as to the time of travel of chloroform introduced at the Beatrice site to travel to the well field of G and H during the time Wells G and H were pumping?

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A Yes.

Q And what is that opinion?

MR. FACHER: Objection.

THE COURT: Overruled.

A Chloroform moves about twice as fast as trichloroethylene so it would take approximately three-halfs or one and a half month.

Q Now, Dr. Pinder, yesterday you reviewed for the jury the soil characteristics affecting contamination of the groundwater, do you recall that?

A Yes, sir.

Q Do you have an opinion as to how long it takes for, how long it would take for trichloroethylene disposed of on the ground at the Grace site to contaminate the groundwater?

MR. KEATING: Objection, your Honor, foundation.

THE COURT: May I have the question again?

(Question repeated.)

THE COURT: The groundwater at the Grace site.

MR. SCHLICHTMANN: The groundwater at the Grace site.

MR. KEATING: Objection, your Honor.

MR. FACHER: I object on a different basis

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than Mr. Keating.

MR. KEATING: I would object on the foundation problem that we had discussed earlier about activity.

THE COURT: I don't know what your grounds are, but I will sustain the objection on the grounds of the vagueness of the question.

How long does it take to contaminate the groundwater? I don't know. How much of the groundwater? I suppose the first drop beneath the surface is groundwater. And I suppose a drop 100 feet down is also groundwater. I don't know what you are talking about.

MR. SCHLICHTMANN: All right.

Q Dr. Pinder, when I say contaminate the groundwater, I mean the water table, the surface of the water table at the Grace site. Do you have that understanding?

A That is fine.

THE COURT: You still have an objection to that?

MR. KEATING: Yes, I do. I didn't have an objection to that little dialogue. If the question is to follow, I have an objection.

THE COURT: All right. We will wait for the next question.

Q Dr. Pinder, would you tell the jury briefly what is the

THE COURT: It does not attempt to be a 90-degree section of the valley?

THE WITNESS: No, sir. It is designed to try to indicate what the earth is in cross-section from these (indicating), between these two points.

THE COURT: Okay.

Q Would you explain to the jury what is shown, what is depicted in this cross-section in the top diagram?

A The first thing to look at is the general features. This is the area behind the Grace building (indicating). This is a cut through the corner of the building itself, so you see two sides as you slice through the corner of the building. You move downhill to this parking lot and continue on down until you begin to get in the area of the plane of the river where things flatten out. It is almost a horizontal line as you go across the river.

The river is designated by this small blue area. If you look carefully, you will see a different pattern and colors. We have a gray pattern here (indicating).

There is a brown pattern with dots and a few circles. Then you have a dark color pattern with larger and smaller circles. This orange color through here with small circles and large circles, that is a sand-like pattern. Then a darker green and finally a lighter green, all of these patterns have a reason for being --

for being designated as kinds of materials that you would encounter if you were to dril a hole through the earth going down.

A key to what these represent is indicated by the letters that are on the various materials. For example, this light brown one is sand, silty sand and gravel. And this is sand and till. I suppose you don't know what till is. It is a glacial deposit from this part of the country.

We move up to a sand and gravel deposit, coarser material. This area up here is designated fill, which means it is manmade material.

The sand colored pattern is fine sand and local silt, which means some area will be silty.

This darker green is organic silty sand.

This very fine green is below the river and swamp, which is what we call peat, which is glacially organic material.

The dark colored material is what we call, is what is designated as bedrock. It is the original rock that existed in this area before it was carved out by the ice and subsequently covered by these kinds of materials.

The geometry of the bedrock is interesting and actually quite important to see under the Grace site. It is quite high in elevation and gently

dipping down toward the river. Then you have a relatively deep cut where we now have gravels and sands. This is probably the result of glacial scouring, that is a glacier coming through and it scoured out the rock that was there. When the ice retreated, sand and gravel were deposited, forming these kinds of what are technically called glacial deposits.

The important thing is they are usually quite good aquifers because they are sand and gravel. That means they are able to transmit water readily.

They are fairly thin up through here (indicating), but as you go down they get thicker and by the time you get to the river itself, you have a very significant thickness of very permeable material.

You have observed we have the cut through Well H, which is located here. You have some idea of the kind of materials that were actually encountered when Well H was drilled.

I think that captures the main geological and topographical features.

Q Does this section have any significance for your opinion as to contaminants transported from the Grace property to the G and H well fields?

A Yes.

Q Would you explain that to the jury?

MR. KEATING: Objection.

MR. FACHER: Objection.

THE COURT: Overruled.

A It is natural for people in my profession to try to use an understanding of geology to determine what the characteristics of the aquifers would be. It is part of my general learning process with a project like this to study these materials and to determine their distribution in a general sense, their thickness and their general properties. What actually does this sand and gravel designate? How important is it? It is also, I think, important to understand the general topographical nature because we know from our early discussions that the groundwater table tends to follow the topography. We might naturally suspect as we see in this section below, that the water table would tend to hug the surface of the ground through here and then gradually dip down slowly toward the river (indicating).

Q Is that illustrated in the second diagram?

A The second diagram is basically the same as the first, except that now we have colored in the saturated zone. That is where all the pores in the soil and rock are occupied by water. You see there is a line that comes along like so (indicating), going on down and eventually intersecting the river because the river is one

representation of the water table.

We can determine from that, from the principles we have outlined earlier, the general groundwater flow is going to be from where the water table is the highest elevation to where the water table is the lowest elevation. Under natural conditions the water table is very flat. This scale, and that is the permeability material, will allow water to move relatively slowly there through this segment. When it reaches this general area, it would discharge and move rapidly.

Q What is depicted on the third diagram?

A The third diagram is similar to the second, but the major difference is that in the third diagram we have plotted the water table during pumping tests. So this water table is an analysis to the water table that I used in constructing the flow pattern for you earlier.

Now, you see the overall level has dropped. You see now there is much more of soil exposed that may be due, in part, to pumping tests and may be due to -- may be due in part to meteorlogical events. What is important to note is that the flow, particularly in the neighborhood of the river, has changed and now instead of the slope ending up with its lowest point at the river, the lowest point is now at Well H. So this is that cone of depression that we talked about capturing flow from either direction. You

can tell whether the water is moving through it by determining which way the water table is moving.

end L

Q So you can see the difference between the natural state and the state under pumping stress.

Q Dr. Pinder, there are, again, things on the board, colored signs, et cetera. Could you indicate what is indicated there?

A We have the same color coding that we had earlier.

Q Does that follow this key?

A Following the same key as we had before. We can see the maximum concentrations of the same five contaminants presented for each of the wells that we have in this cross-section. So you can see, for example, this particular well, we have 650 parts per billion of the trichloroethylene. It basically changes depending on where you are in this cross-section.

MR. FACHER: I'm sorry, your Honor, I assume this is just explaining the chalk and we don't have to object with respect to evidentiary rulings.

THE COURT: I have not heard anything other than an explanation so far.

Q Dr. Pinder, what is depicted at this part of the cross-section concerning contaminants at the Grace site?

A The wells that we see represented here are some of the wells that we saw in the chalk. The salient features here is in GW2 we have essentially no contamination. A small amount of contamination at 27. As we go across the building,

we pick up a much more significant concentration. This well, for example, is up in several thousand. Several thousand here. As we move through the aquifer, we have concentrations that are in the order of a hundred parts per billion of trichloroethylene, right down to Well H. I think this is consistent with the pattern we've looked at rather roughly in our figure when I was trying to draw the circles and so on.

Concentrations on the Beatrice site are not as high as some of the ones we mentioned in these particular wells. The highest one being only 650 parts per billion in BSW7.

Q I show you an overlay that I am placing over the exhibit, and would you tell us what that depicts?

MR. KEATING: I just want to look over your shoulder.

A Let me refer back to our original figure.

The last segment that has been put on is an alternative path from GW3 to 20. In other words, we went from here up to here, rather than from here over to here, so we could get two perspectives, one along the line between here and here, one along the line between here and here. It just gives us some additional information on the geology, because you can see now the distribution of earth materials along that particular line, and also some additional

chemistry, in particular, this rather high well of 8,000 occurring just to the north of the Grace building. It just provides us with some additional insights into the chemical distribution along the path of flow across the Grace site and particularly through the Grace building.

MR. KEATING: Could I, on that point, your Honor, it is in the nature of an objection, I take it there is no dispute the doctor wouldn't testify differently, these well measurements are not measured from within the confines of the building. It is not clear in that last statement as if these are measurements under the building. They are all on the periphery?

THE WITNESS: You are absolutely right.

Q Where are they measured?

A Well GW28 we know as a fact is to the south of the building, has been projected over onto this line. In other words, the information here has now been transferred to this straight line, and that is why it appears that it is in the building, but it is out here.

MR. KEATING: Outside the perimeter?

THE WITNESS: Outside the perimeter of the building.

Q Along the south wall of the building?

A Yes.

Q And, Dr. Pinder, again, would you be able to illustrate

on these diagrams the contaminant transport from the building to the Well H field?

A Yes.

Q Could you do so? I think you have to move that exhibit.

A I want to use this exhibit.

Q All right.

A This particular section G from BW7 to the Grace site is rather close, what we anticipate to be the actual flow direction, so you can talk about flowing along this cross-section in a way that is consistent with our understanding of the flow field.

With that in mind, let me put this back.

If we start on the northeast corner near the Grace site, you can see there is a consistent drop in the water table until you get in the area of S22. Then, from S22 on down there is, again, a consistent drop in the water level until you reach the Aberjona River.

On the western side you see the water table is much shallower, that is, it doesn't tip as much, but goes consistently toward the river. Under normal circumstances, we have water discharging in the direction of the river from the western side and also from the eastern side.

This S22 indicates that at this particular point the flow line, a parcel of water moving from, say, here

over to here, has decided to take a path that goes around this particular well which has a higher value. It does not mean the water is doing this. It basically means the water is going around. Not unlike the hill that I mentioned behind the Grace site where water tends to go out in different directions.

When you look at the cross-section with pumping, the flow is entirely, I think, downhill. You will see if you started to roll a marble along this blue interface, it would roll very nicely all the way down to Well H. If you started to roll one from this side of the river, it would roll very nicely down into the river to Well H. That confirms our general observation that the flow from this site is clearly toward Well H in this instance when Well H is pumping.

MR. FACHER: I have to object. We are now dealing with testimony rather than an illustration and not in response to the question.

THE COURT: It is responsive, but I will not permit it. I agree with his testimony, but it is confirmatory of what we already have.

Q Do you want to complete that sentence?

A The only other thing I would like to mention is we have to remember the groundwater flow basically carries a contamination, so there is very little doubt under this

particular pumping situation of contamination in the groundwater. Once it got to the groundwater, it would move towards Well H from either of these directions along this cross-section.

Q And would it also move from the Grace site without pumping?

A It will, in fact, move from the Grace site without pumping. The reason is if you look at the water elevation here and you compare it to the water elevation down here, it is downhill; with the exception of this particular point, which is a local high and which you have to see things in two dimensions to appreciate. I feel quite comfortable that contaminants originating in the groundwater at this location would eventually get to the pumping well.

Q Without pumping?

A To Well H without pumping.

MR. SCHLICHTMANN: This would be an appropriate place for a break.

THE COURT: All right.

I want to mention one point that has come up a great deal and will come up a great deal more on the subject of objections on both sides. This applies particularly to both sides.

The lawyers have not only the right, but the duty, to make these objections. It can be aggravating to

have everything interrupted, but if they don't make the objections each time, their clients lose their rights to carry an appeal. The objection has to be made at the time and it has to be made each time. So this is part of the procedure. It is a consequence of the adversary system of trying cases.

By the same token, they have a duty to scrutinize each other's visual presentation, because a great deal can depend upon the total impact of a visual presentation of this sort on the form of the presentation. It has to be scrutinized to make sure it is not misleading in some way. In short, this is an example or could be an example of the median becoming the message, which is why I referred to Professor McLuhan earlier in the day. So these are all necessary parts of the trial process. We will all just have to bear with it. It has a neutral effect as far as your decision. You shouldn't worry about these things. And my rulings, equally. I rule according to my judgment of the evidentiary rule, whether it be right or wrong, and also my judgment as to the propriety of these visual specimens. Those aren't points in the case. It isn't the way it works. It is a totally neutral process. It is separate from your determination of the merits of the case.

Thank you very much. We will see you tomorrow at 9 o'clock.

(Whereupon the jury left the courtroom.)