STATE OF OHIO
IN THE COURT OF COMMON PLEAS
THE COUNTY OF FRANKLIN

ANNE ANDERSON, ET AL.,	)	
	)	
Plaintiffs,	)	
	)	
vs	)	CASE NO.: 82-1672-5
	)	
W. R. GRACE & BEATRICE FOODS,	)	
	)	
	)	
Defendants.	)	
	)	

DIRECT EXAMINATION OF:

DR. THOMAS R. GRAY
DR. CYNTHIA J. MORRIS
DR. LINDA C. OLVERA
DR. GREGORY DANIELS
DR. TAD W. IGNATZ
DR. JAMES R. RUSSELL

Taken on Saturday, May 30, 1998, at The Ohio State University Law School, Columbus, Ohio, at 9:00 a.m., before Massie Page, Court Reporter.

APPEARANCES:

HARTER, SALLOUM & ASSOCIATES
126 East Broad Street
Columbus, Ohio 43215
For the Plaintiffs Anne Anderson, et al.,
BY: BILL HARTER, JANINE SALLOUM AND JULIA LUETKE

ALSO PRESENT: DR. THOMAS R. GRAY
DR. CYNTHIA J. MORRIS

PARTIN, MITZEV & ASSOCIATES
236 High Street
Columbus, Ohio 43215
For the Defendant W. R. Grace
BY: JACEDA PARTIN AND VASCO MITZEV

ALSO PRESENT: DR. LINDA C. OLVERA
DR. GREGORY DANIELS

ADAMS, SULLIVAN & ASSOCIATES
45 Front Street
Columbus, Ohio 43215
For the Defendant Beatrice Foods
BY: KENYA ADAMS AND SHANNON SULLIVAN

ALSO PRESENT: DR. TAD W. IGNATZ
DR. JAMES RUSSELL

INDEX

INDEX OF EXHIBITS

PLAINTIFF'S EXHIBITS

DEFENDANT'S EXHIBITS

OPENING STATEMENT

BY JANINE SALLOUM

May it please the Court, Counsel, members of the jury. Water, it is a symbol of nature in its purest form. Everything depends on water to live. When we think of water we think of life. How many times in a day do we use water? Whether it's to bathe, wash the dishes, clean our clothes, cook or even to dry. We must use water dozens of times a day. Can you imagine that the water that you use every day could be seriously harmful to your health? The family of Jimmy Anderson did not consider it; neither did the family of Robbie Robbins, nor Patrick Toomie nor Jared Daferro, nor Roland Damash. None of these families suspected that their water could be causing serious health hazards and yet all of the people we just mentioned are now dead. Jimmy, Patrick, Robbie Jerad and Roland, they all died from a rare form of leukemia. The two other plaintiff's in this case, Kevin Cain and Michael Zonna have also been diagnosed with leukemia and are fighting it on a daily basis. What do all of these families have in common aside from the fact that they dare trust their drinking water? They live in the town of Woburn, Massachusetts. Even more remarkable, all of the families in this town live in the same neighborhood and they received their drinking water from Woburn Municipal wells G and H.

Let me tell you about the town of Woburn. It has a population of 36,000 and is approximately 18 miles north of Boston. By the 18 hundreds Woburn was famous for leather production and shoe manufacturing. These industries are dependent on chemicals in order to utilize the leather. The defendants before you today are two companies in the area,

W.R. Grace and Beatrice. Some of the chemicals used in the leather industry include: trichloroethylene or TCE, tetrachloroethylene or PCE and dichloroethelyne or DCE. All of these chemicals were found at the property of the two defendants and all of these chemicals were also found to be contaminating wells G and H.

The Environmental Protection Agency classifies these chemicals as suspected causes of cancer, including leukemia.

Members of the jury, we are before you today because of two companies, Grace and Beatrice, improperly disposed hazardous chemicals used at each plant. The chemicals traveled underground and ended up in the drinking water of wells G and H, and from there you already know the rest of the story.

From there the neighbors of Woburn dare to trust their drinking water, a mistake that they paid for with their lives. At the plaintiffs in this case we will present to you two expert witnesses that have extensively studied the problem at hand. You will hear first where the water enters the ground at the area of the two sites, how the water flows to the wells of G and H and he will also establish the time that it takes from the water to go from the sites to the wells. Our next expert witness will talk to you about the chemicals in question. She will tell you how much chemicals have been found and the speed at which those chemicals traveled. Now members of the jury, at this point your job becomes the most crucial. In order to prove that these chemicals caused cancer in these families represented, you must find that it is possible for the chemicals to have reached the wells in enough time to have been ingested by the people that drank the water. In other words, you must determine that the chemicals reached wells G and H prior to 1972. The corporate defendants will also have

their own witnesses. They will have many different theories on how water flows and the time that it takes to get to the wells, and they too will give you information about the travel times of the chemicals but remember they are trying to show you that the chemicals never reached the wells. As you listen to their witnesses give testimony I ask you to keep in mind three things. First, how did they get the numbers that they are relying on; Second, are the witnesses taking all of the important matters into consideration; And finally, were each of the individuals consistent within their own story and with the story between each of the witnesses.

The victims have had to deal with devastating losses. Four of the five people dead were children. These families we are representing were scared and unsure of what was happening to them. When they began to believe that the defendants caused this poisoning they were unsure of what to do. They were a tiny neighborhood in a population less than the students here at Ohio State. So what can they do in this instance against this corporate giant? The answer is simple; the families want to teach these companies that they cannot continue doing business in this manner. They must take responsibility for what has happened. We ask that you hold them liable for contamination to wells G and H. And finally, I would like to show a map of the area, if that so pleases the Court. What I am about to show you is a map of the area of Woburn Massachusetts. If you look over here in this approximate area is where the one site that we are speaking of (can that be seen?) this is the neighborhood of Woburn Massachusetts. The two sites that we are speaking of today, the Grace company is located in this approximate area and the other company that we are speaking of, the Beatrice site is located in this approximate area. The exact points will be

shown to you later. The important thing on this map is the red dots right here just below wells H and G. Those red dots right there represent each of the victims of leukemia.

Now members of the jury, I ask you to think about how many people you have known that have died from leukemia. More importantly, how many in your neighborhood that you know have died from leukemia. Something must be going on in Woburn Massachusetts. We are here today to determine what that something is and to make the corporations stand and take responsibility for the deaths that have ensued. Thank you very much.

OPENING STATEMENT

BY KENYA ADAMS

May it please the Court, Counsel, members of the jury: my name is Kenya Adams and I represent Beatrice Foods. The events that occurred in Woburn Massachusetts are tragic. Any death of another human being is a travesty however, we must be careful to blame those who are truly at fault. Beatrice Foods is innocent. Beatrice did not substantially contribute to the contamination of the two municipal wells G and H. Beatrice Foods is devoted to serving its customers and its community, after all many of Beatrice employees lived in the Woburn community during this time and also drunk from the same water supply system. There has been a long history of pollution in Woburn Massachusetts water supply dating back as far as the 19th century. This pollution was largely in response to early industrialization in the Woburn area. Many of the businesses that support this industrialization were located to the north of the Beatrice property, and at least one company located in the proximity of wells G and H used one of the chemicals that was found in wells G and H regularly in the course of their business practice, however ignored evidence of industrial pollution the city of Woburn built wells G and H. We will show that Beatrice Foods did not play a part in the contamination of wells G and H. There has never been any witnesses or reports that Beatrice nor John Riley who owned the land before Beatrice and who currently owns the land ever purposely or knowingly disposed of any illegal chemicals on or around the property. John Riley stated that his family property was never used as a dump by his business and a former John Riley employee stated that Riley complained that another company to the north of his property put waste material on the property.

The plaintiffs will not be able to show you by preponderance of the evidence that Beatrice knew about these chemicals nor dumped any of those chemicals on its property. Even assuming that the chemical contaminants were dumped on our property because there is no evidence that anyone affiliated with Beatrice or John Riley dumped the chemicals we will still show that we did not contribute significantly to the contamination of wells G and H. There are two expert witnesses we will show that the chemical contaminants that were found on our land stayed on our land or went down stream in the Aberjona river instead of traveling to wells G and H.

The Beatrice property is located west of wells G and H and is separated from those wells by the Aberjona River. We will show that the Aberjona River was a barrier to the chemicals by inhibiting them from going into wells G and H.

Our experts will further show that these two separate wells and located on the Beatrice property caused the chemical contaminants and the ground water to flow towards the Beatrice wells and not to wells G and H.

The plaintiff has the burden of proving to you by preponderance of the evidence that Beatrice Foods dumped toxic chemicals on this land and that these chemicals seeped into the ground water and traveled to wells G and H by 1979 and not by 1972 as the plaintiff previously stated. Simply put, the plaintiff will not be able to meet this burden because the evidence just doesn't exist to convince you by preponderance of the evidence that Beatrice is at fault. Accordingly at the close of all the evidence we ask that you return a verdict against the plaintiff and in favor of Beatrice Foods. Thank you.

OPENING STATEMENT

BY MR. MITZEV

May it please the Court your Honor, members of the jury, counsel. Members of the jury, plaintiffs counsel is right, this is about water, about the way water entered the ground system, about the way water was consumed by the inhabitants of Woburn Massachusetts. It is also about a history of the land that we kind of touched on a little bit on what the site was all about, what Woburn Massachusetts is about. It is about industry. It is about being one of the oldest and first colonies in the Massachusetts Bay. It was settled and like any other first settlement what was deemed profitable was taking up as industry. In this case it was leather tanneries, piggeries, farmland. You are looking at vast areas of open wilderness. The first time people had seen this and of course there was a river so that you had all of the elements that you needed for a perfect settlement so it was settled. Little by little industry grew, prosperity grew and industry had more needs, one of them was basically more river water. They put a large canal in and all of a sudden it became a small settlement to one of the largest industrial places in the northeast.

Naturally when you are dealing with prosperity, when you are dealing with a growing industry, a nascent industry, you are dealing with a very accelerated pace and that means you move ahead and think about the consequences later. Only in the mid 1960's, 1970's does the entire United States start thinking about the consequences of our period of industrialization. All of you have had history courses in the industrialization period of the 1800's the early 1900's but many of you may have read Upton St. Clare's "The Jungle" where the meat market was introduced, the terrible working conditions, the terrible pollution

conditions. Is it because people simply didn't give a dam, maybe, but it was also because the state of the technology, the state of mind frame hadn't reached those levels either so both people that were looking out to better themselves and people that were looking simply for industry were proceeding ahead with the exact same rational which is "we do what we think is right and we try the best we can in a field we really have no previous experience of". All of this was new. What does this all mean to us today? Well after 130 years at Woburn Massachusetts we had extensive pollution, land pollution, water pollution, air pollution, it was a filthy place. I wouldn't have lived there. I wouldn't want my family to live there but it had such a history of industrialization that that's all that area knew. As a result there were consequences to the environment. I think one of the first maps that we took a look kind of got a view of the area but if you look back even 20 or 30 years before literally was just farm land, groves of trees, groves of shrubs just everywhere, wetland. Now we know wetland should be protected areas, river basins should be protected areas, back then it was just natural resources and who better than the American capitalist to exploit natural resources, that seemed to have been the American way.

Well the American way has had consequences. All of us know that we recycle today. We try to drive cars with more efficient fuel economy, we try to eat better ourselves. We know there are consequences to everything that we do.

Again, what was the state of Woburn at the time that wells G and H were built. This was the state, imagine if you will a large Industri-Plex or in layman's terms a large series of industries scattered throughout the entire area. Most of them were tanneries, again I think at one point Woburn Massachusetts was the second or third leading tannery and leather

supplier in the United States. This town of 30- to 40,000 people was the second largest place in the U.S. for tanning leather goods, providing leather goods, etc. What did that mean? It meant hides. It meant literally hundreds of thousands of hides or animal skins. They had to be processed and cured with salt and other chemicals, so chemical industries were built up in that place.

Was technology changed? Chemicals changed? More efficient ways were devised. All that meant constant processing. Where did all of these effluents, all of these chemicals go? Well they had to go somewhere and they did. Most of the tannery's basically had large vats on kind of protected grounds, marshland, wetland, river basins, lagoons. Seemed like perfect dumping sites, so they dumped. EPA reports of the late 70's and early 80's reveal that vast stores of hides were found in decaying, rotting composition, probably 30, 50, who knows how many years old. And again these are just natural skins, they had been treated with the most noxious chemicals you and I could ever imagine. So what happened? All of these chemicals leached down into the soil, into the water, into the air, creating nothing but pollution. So again, the effect over 130 years is just a very contaminated place. Now you have people that live there that were residents and they needed water.

Why Woburn is only 12 to 15 miles away from Boston again we are talking about an area that was self subsistent because you have the essentially industry there, so really people weren't living there other than supporting the industry and then you had a river so that you could kind of flow things in and out, you were pretty self sustained, but as people decided to go and make those places residences, they needed a water supply. They had a municipal well for western Woburn, a part of Woburn that we're not exploring today, but really they

did not have enough water from rivers, from reservoirs, from lagoons to meet the needs of eastern Woburn so the city decided that they needed to put some wells up. Kind of looked around, saw what the most logical places are to dig wells and it turns out that where they located them is where there was essentially a depression in the river basin. Everything kind of flowed to this general area. So it seemed the most likely place with some basic kind of consulting work they find out this is where we get the most amount of water, again doing some preliminary test and could satisfy the residents of eastern Woburn.

Was there the technology to see how healthy the water was? Well, yes and no. I suppose you could dig, you could test the water, you could taste the water, but certainly the main concern was for providing the water supply. A people that really for an America that didn't feel that pollution, contaminants, that was always on their back burner, it was never really a priority, never seemed like it would be a major issue. It stands to reason that Civil Rights should have been discovered , you know, 100 – 150 years ago but it was only until the 1960's that we decided to do something in that form and the same with essentially the environment. The environment really started being addressed in the late 60's early 70's and really throughout the late 70's and the 80's. So part of that time it was not our main focus. We were a growing nation. We were becoming a world power and certainly pollution and drinking water was last on the agenda.

Was that proper? I am not here to argue one way or the other in that regard, that's the consequence of America and we're all part of that. It happened however. The result is, the wells were dug in a reasonably scientifically based manner at the time and it turned out that the water was not fit for consumption. From the earliest onset the water was bad, it

tasted bad, it smelled like rotten eggs. This is interesting because we will offer evidence in this trial that the chemicals that you are to evaluate today, TCE, PCE, DCE, all these strange names, they are chemicals with very distinct chemically odors and rotten eggs, everyone kind of notices rotten eggs, sulfur or kind of a sulfur smell to it, well that's kind of the layman's terms.

We will show you later that this smell was not really the chemicals that were being discussed today but rather chemicals that had been dumped over this period of time. We will show you in this trial that all these rotting hides, all these other chemical industries that were dumping, they were producing what was called a hydrogen sulfide, very noxious gas. What was on top of the ground in lagoons would float up. People that were near to it were like ooh that's nasty and would walk away. What was buried however, did not escape into a vapor, into the air, it went underground and underground means only one thing, into the water.

So from the very earliest resident's complained but, again it's reaching the end by whatever means necessary, and in this case the municipal division of Woburn decided that water supply was more important than trying to see if this water could taste any better. So they chlorinated it. They did other things to it. People complained. Sometimes they shut off the wells. Essentially every since these wells were put into operation no one was happy with the product.

Should there have been an alarm, again that's something we're going to talk about in this case. Specifically W.R. Grace is a company that has a lot of different interests, who have plants in Woburn Massachusetts, Upstate Massachusetts and around the world. We are

a multinational company. We have a lot of different interests. At the Woburn plant we package food, you go to your grocery store and all those little containers of packaged sterile food, that's us. We do something called Cryovac where we seal all of the food, make sure it's fresh, make sure it's sterile, make sure it's perfect and it meets all of the requirements. We used the products that are in this case today. We use TCE, PCE and DCE but what we used them for is basically the cleaning of our machinery. Essentially what you will find out is that these products are degreasers. In fact, I brought some with me. It's from the Sunnyside Corporation. It's called Carbosol but essentially it's TCE. It's a cleaning and degreasing solvent. You can get this at the hardware store, $2.95, available today, available all of the time. If you have been locally, you have been watching television or you do any dry cleaning at all and you are fed up with the expenses, there is a product called Dryel. You toss it in your dryer, toss your clothes in, you put it in a big bag, turn the heat on, it comes on. The next thing you know you come out with fresh, sweet smelling clothes that are clean. That's TCE. So it's in your clothing ladies and gentlemen. It's got a lot of different uses for it. So we use it to clean parts and what we didn't use or what was mixed with solvents, we disposed of and we are not denying that we disposed of it improperly. We would go to the back of our place, essentially have a small area and dispose of it.

Plaintiff's counsel is going to bring testimony that completely inappropriately against the responsibility we had to you and to the consumers of the water supply. We are going to show you that beyond the state of the EPA at the time and the mental technology of the people who were really dealing with the stuff; painters, janitors, parts technicians. Science does not support the conclusions that the plaintiff's recently have reached. Our

technology has come a long way. They do have experts that are going to talk about water paths and water flows but essentially we are going to use science not in a fuzzy way but in a very real way and at some point this is going to seem possible very technical and very complicated. We are not asking you to be honor students today, we are simply asking you to be members of the jury who are sitting and listening to facts. Who are willing to present them as clearly, and we're not going to try to put anything by you. We are going to show you that the various science and the various technologies of geology of all of this area that we are going to talk about has come a long way and it's very, very accurate. And what does this accuracy mean for W.R. Grace? It means that what we disposed of did not reach those wells.

We are going to show you that the dumping that happened up stream and with alternative chemical companies was in a far greater and more severe level. We are going to bring EPA reports, which show that the EPA has declared certain areas of Woburn Massachusetts as Superfund sites. These are areas of such terrible pollution that they don't even – it's of the highest priority, and there is certain chemicals like arsenic and benzene and mercury and heavy metals that are so bad for you that it literally screams bloody murder and that's what they address. Those are of the first highest priority and we are going to show you that these chemicals, the arsenic's, the heavy metals are also in the Aberjona River Valley in the very sediment from which water in wells G and H is being pumped and then consumed.

Those rotting egg smells were coming from chemicals that the EPA considers of the highest priority. All of these things we are going to show you today. And lastly, I want to

tell you again something that defense counsel for Beatrice brought out. There is a human side to us and it's tragic. It's a tragedy when anyone loses a life. This is, on scale, many scales greater but you are here as legal deciders. You are going to find out what the truth is and then you are going to find law that will bind with that truth and give you an answer.

Were it simply for the facts, I don't see how you couldn't decide for these victims, how you wouldn't want to help them. But you have to be here as legal deciders and that means understanding the law and that's what we are going to help you with today. She mentioned things like preponderance, burdens of proof, we are going to discuss all those things. But I invite you to keep your minds open, that what you will hear will be very tragic. We certainly want to keep it within the frame of why we are here and be legal deciders and that's the role you are playing today, really the most important role. We are telling you a story and you are going to understand as best you can find out what the law is that goes with the story and make a decision and you will make the right decision jury's always do. You won't make a mistake today, whatever you decide.

So I think we should begin. Thank you.

THOMAS R. GRAY,

Having first been duly sworn, testifies as follows:

DIRECT EXAMINATION

BY JULIE LUETKE:

Q: Please state for the jury your full name?

A: My name is Dr. Thomas R. Gray.

Q: What is your profession?

A: I'm a Hydrogeologist.

Q: What degrees do you hold?

A: I have a Bachelor's degree from the University of Illinois in Geology. I have a Master's in Science from the University of Chicago in Mechanical Engineering. I have a Masters in Geology from Kansas State. My Ph.D. in Hydrogeology from Purdue University.

Q: Have you published anything concerning the subject at hand?

A: Yes, I have. My Ph.D. dissertation, which is very relevant to this issue, involved a situation much like Woburn, it was published in part in several journals. I have also, as a consultant had several of my articles published in various geological and hydrogeological publications.

Q: What other professional publications are you familiar with?

A: I'm a member of the Geological Society of America. I'm also a member of the Association of Professional Environmental Engineers and the National Ground Water Association.

Q: What kind of work experience do you have that relates to the problem on hand?

A: As a Senior Hydrogeologist with the U.S. Geologic Survey I provided consultation in determining the situation regarding the selection of a high level nuclear waste depository in Nevada. I have also consulted independently in various ground water situations very similar to the Woburn case.

Q: Have you studied the facts that are in question today?

A: Yes, I have. I have extensively, physically examined the area in question around the Woburn wells.

Q: Have you formed an opinion upon the facts on hand?

A: Yes, I have.

Q: At this time I ask the court to accept Thomas Gray as an expert for Hydrogeology pursuant to Rule 70.02 Federal Rule

THE COURT: Any objections. So noted.

Q: Are you familiar with the area?

A: Yes. I have spent quite a bit of time physically examining the area.

Q: Could you please orient the court towards the situation at hand?

A: Yes, I could. I have a graph, which I would like to show the court, which I think will assist in this.

THE COURT: You may proceed.

MS. SULLIVAN: Your Honor, with all due respect I feel compelled to object to this _____ of evidence before the jury has been ordered into evidence.

THE COURT: Miss Luetke?

MISS LUETKE: We just would like to show the jury the situation given and it's one of the slides the expert prepared from which we don't want to enter into evidence. It's just to orient him as what the situation is.

MS. SULLIVAN: You can't show evidence to a jury before it is offered into evidence and you cannot offer anything into evidence before a sufficient condition has been relayed for us

MISS LUETKE: We then now would like to enter the slides into evidence.

THE COURT: Will counsel approach. All right counsel the objections here is appropriate objections but what is necessary is how you want to submit it into evidence. You may not necessarily plan to offer into evidence but you are just using them to explain exactly what is going on.

MR. HARTER: First of all sufficient bases for the evidence has been that W.R. Grace has failed to realize exhibits and this exhibit is going to be helping expert witness preponderance for evidence record most of evidence to counsel defendants provide plaintiffs exhibits before this trial takes place, first of all. And second of all the defendant's counsel, Mr. Mitzev has seen the slides before him and has agreed or failed to voice any objection to the slides.

THE COURT: Would it solve it to be able to take a brief look at exactly was put before you.

MISS SALLOUM: What had happened was both defendants took both sets.

MR. MITZEV: What happened you r Honor. we put two copies in plaintiff's box. Beatrice's counsel one took a copy and Beatrice counsel two accidentally took the other copy. We tried to rectify that this morning. Regardless your Honor has stipulated a 3 o'clock deadline for jury returning a verdict definitive period for any of all evidence put on that objection have probably however anything that is arguable that haven't had a chance to have my experts review, I certainly cannot allow into evidence.

MR. HARTER: If I could correct the record, the deadline that was set for expert exhibits was actually noon Thursday. The deadline was set for jury instructions was 3 o'clock Friday. At noon on Thursday no exhibits exchanged hands from her parties, that I am certain. Therefore the deadlines have passed. I think that a possible solution is to call a recess at this point, five or ten minutes, I think would be sufficient. I believe Dr. Gray only has five slides. We would be happy to allow opposing counsel to see these slides and consult with their expert witnesses of the content of the slides if that would rectify the situation.

THE COURT: Any objections to that? That is what I was going to suggest. We are going to take a five-minute recess to allow counsel to review the slides in question. At this time we are going to excuse the jury for just five minutes, reminded that you shouldn't discuss with each other about the case or speak with counsel regarding the case.

MS. SULLIVAN: Your Honor, with all due respect could you call our expert witnesses back in.

THE COURT: Ms. L please continue with your direct examination of Dr. Gray.

BY MS. LUETKE:

Q: Dr. Gray have you prepared any slides?

A: Yes, I have.

Q: May I approach opposing counsel?

THE COURT: Yes.

Q: Are these the slides that you have prepared?

A: Yes, they are.

Q: I ask the court to have these slides entered into evidence as plaintiff's exhibit 1-5.

THE COURT: Any objections? So admitted.

Q: We were trying to orient the jury towards the area in question, so could you please do that.

A: Yes. I have a slide prepared, which I think will assist me in doing this.

Q: What does that slide show me.

A: This slide is an aerial photograph of the area of Woburn surrounding the wells and includes the Grace and Beatrice properties. This is the slide about which I was speaking. Again this is an aerial photograph taken in 1985 of this area of Woburn. The two green dots show well H and well G. The purple outlined area here is the 15 acres which is owned by

the Beatrice Company. The area outlined in purple in the top right corner is the area of the W.R. Grace plant.

Q: What is the ground made of in this area?

A: The ground is, predominantly, several different types of sediments. Some samples which I would like to show to the jury if I may? These are samples, which closely represent types of materials that are found in this part of Woburn, and I assume the jury may pass these around.

THE COURT: Any objections?

MS. SULLIVAN: The last one wasn't too effective so I guess not.

MR. MITZEV: Your Honor, no objection to the qualification. We have a comprehensive list of various elements. I believe there's one, there's one, on plaintiff's counsel's table.

MS. LUETKE: We would like to explain to the jury the general sediment first so they understand what actually is at question here.

MR. MITZEV: Fine.

A: These samples will demonstrate what I will show you on the diagonal layer. The first sample I will show you is sand. Sand is the predominant sediment in this area of Woburn. The sand that you find below the subsurface of Woburn is not significantly different from the sand that you have all seen on the beach. It has a very small grain size. It has a lot of space in between the grains. This sample shows a mixture of small particles and large particles. This is also very common sediment in the area of Woburn. This jar is a rather sticky mucky material called peat in the area, is found in the area mostly below the

channel of the Aberjona River. There is also a material in question called dyamid. Dyamid is essentially a combination of sand and gravel and some more compact material, something similar to a silt, perhaps a clay. I also have a slide prepared, which I believe will show how these materials are distributed throughout the area. If you took a slice out of the map that we just saw, lifted it up and looked up to the side you would see something like this. This is what geologist call a cross-section. It's a side view of the area below the surface. The surface is indicated.

MR. MITZEV: Your Honor, I object. Is this geology 101 or is this in response to a question?

THE COURT: Sustained. Specific questions for the witness and explanation.

Q: Would you please show the jury where these sediments that you explained to us are found in the area in question?

A: Below the surface, which is your top line, predominant area is sand, which I have indicated is the color yellow. The areas with the red dots indicate areas where gravel was found in the wells that were drilled into this area. The area of diamec was here near the Grace property, a small area found near this one well. There is no evidence of extending far beyond that well.

Q: Thank you. How does water flow?

A: The diagram that I have prepared will show, again this is an aerial view. This is a ground water map, which shows the situation of the ground water near Woburn.

Q: Could you please explain what you marked on this map?

A: Here we have, of course, the 15 acres of Beatrice property, Grace property up here, well H and well G. the curved lines are lines showing the elevation of the ground water below the surface. From highest lines being up to values of 90, 80 and 70 feet in the northeast corner down to the middle elevation, the curved line show 40, 50, 60 in the middle and also near the Beatrice property. And the lowest elevations values in the mid 20's and low 20's at wells G and H.

Q: So you are saying that the water flows from the highest elevation to the lowest elevation?

MR. MITZEV: Objection Your Honor that's leading the witness.

Q: Would you please state clearly how the water flows at this special photograph.

A: Water will follow the scientific law that will travel from highest elevations of highest pressure to lowest pressures driven by gravity. It does so. It travels from the highest areas of elevation to the lowest as it does, as a scientific law it will travel at a 90 degree angle to the lines which represents elevation. As it does, it travels from the high elevation down to the lowest elevation and from a high elevation to a lower elevation here.

Q: Does it matter that the materials you have shown us are present in different parts of these elevations to the flow of the water.

MR. MITZEV: Objection Your Honor that's leading the witness.

THE COURT: I will overrule it.

A: Yes, it does matter. The materials I have shown you will affect the speed at which water will flow as it goes to high elevations to low elevations. However, it will not change

the course. It won't reverse the course and it won't stop the water. It will only affect the speed at which the water travels naturally from high elevation to low elevation.

Q: What happens when the water reaches the well?

A: I have a diagram right here that shows side view of the wells, similar to the type that we have in the Aberjona valley. The water will travel again from the high elevation down to a low elevation as it gets close to the well they change the elevation, goes down rather quickly until it reaches the well. Here is the surface of the earth.

Here is the original water table, the original water surface before pumping.

Q: So the lower line is showing well while pumping.

A: That's correct. The solid line shows what the water surface would look like while the well is pumping and you can see it has been drawn down towards the well. Hydrogeologist calls this cone of depression, which is a condition that exists while the well is pumping. At the bottom of the well is the opening, which the Hydrogeologist calls the well screen.

Q: Could you state clearly what the difference is when the well is turned off?

A: When the well is turned off what will happen is, it will very gradually begin to return to its natural condition which is something in this case more like the bottom dotted line. This is not an immediate effect. This takes anywhere from several months to, in some cases, several years to return to it's original condition. So this cone of depression will persist for some time.

Q: What path does the water take when it flows from the higher to the lower elevation?

A: If I may return to my diagram showing the specifics of the Woburn area. I am going to return to the Grace property in this corner, the Beatrice property down here, the two wells. This slide, the red arrows would indicate the flow of water as it flows from both the Grace property and this section of the Beatrice property into the wells.

Q: Why does the water travel this way?

A: Again, it will follow that very essential scientific law that the water has to travel at a 90 degree angle to the changes in elevation which are represented by these curved lines. It's simply a analogy to a down hill flow.

Q: Could you please explain why these lines aren't straight?

A: The elevation lines are not straight essentially because what we are seeing is that cone of depression, a circular area here which is drawing the water down into the wells. The lines of elevation are responding to differences in the pressure in the wells and also responding to the materials through which the water is flowing.

Q: Based on your expert opinion, how long does it take the water from the Grace property to reach the well G and H while they are pumping?

A: While they are pumping, it is my opinion it might takes 2 ½ years to flow from beneath the Grace property into the area of the wells.

Q: Based on your expert opinion, how long does it take the water from Grace property to reach the wells G and H while they are pumping?

A: While they are pumping it is my opinion that water takes 2 ½ years to flow from beneath the Grace property into the area of the wells.

Q: Based on your expert opinion, how long does it take for the water from the Beatrice property to reach the wells G and H.

A: It is my opinion that that water flow will take approximately 90 days.

Q: From which part of the Beatrice property did you measure this?

A: My calculations were based on flow from the far side of the Beatrice property, which I consider a very conservative estimate. Agreeing that traveling from the far side has to travel this entire distance before it reaches the wells.

Q: Does that amount of time that you just gave us change when you get closer to the wells?

A: Yes, it does. A shorter flow path will also excel, a shorter trip water has to take. A shorter trip will make shorter travel time.

Q: No further questions. Thank you.

CROSS EXAMINATION

BY MS. SULLIVAN:

Q: Dr. Gray, in your professional opinion would you characterize wells G and H as confined or unconfined aquifer?

A: These areas exist in an unconfined aquifer.

Q: In your opinion would you characterize the Aberjona River as a river that gains water at its head water and gradually loses water as the water flows to a stream?

A: Under pumping conditions –

Q: This is under absent pumping conditions.

A: Without pumping the Aberjona River gains water into the stream. So at what you are calling the headwater, the amount of water would be less than what it would be down stream. It gains water between the upstream point and downstream point.

Q: No further questions.

BY JACEDA PARTIN:

Q: Dr. Gray, isn't it a fact that you said the sediment found was predominantly varied when asked what type of sediment was at the location. Did you indeed use the term predominantly varied?

A: I don't recall saying that.

Q: I would like to refer him to his testimony.

THE COURT: Are you referring to the previous testimony this morning?

MS. PARTIN: Yes.

DR. GRAY: May I say what I recalled saying?

THE COURT: Counsel do you recall what question you're referring to.

MS. PARTIN: I believe the question asked was, the type of sand in the Woburn area and he responded with predominantly varied.

A: I would say that the materials in this are are varied. I believe I said it's predominantly sand. But they do vary from area to area.

Q: No further questions Your Honor.

THE COURT: Any redirect? Dr. Gray you are excused. Plaintiff call your next witness.

BY JANINE SALLOUM:

Q: State your name and occupation for the record please.

A: I am Dr. Cynthia J. Morris and I'm a Geochemist.

Q: Would you tell the court a little bit about your education.

A: I got my Bachelor's degree at the University of California in Santa Cruz and I received my Ph.D. at the University of California at Berkeley.

Q: And upon graduation what types of jobs have you occupied?

A: I was a research intern with Texaco Petroleum. Then I worked for Dow Chemical as a consultant and I worked for an Environmental Engineering firm called Sachs, in Germany as an Environmental Consultant. I currently work for the United Nations Environmental Program in Nairobi, Kenya as a consultant.

Q: And what do you do right now with the United Nations?

A: I am on a special team for contaminant waste disposal and I also am part of various UN projects that deal with industrial pollution.

Q: Do you have any professional publications or affiliations?

A: Yes, I have written four papers.

Q: Are you familiar with the facts in this case?

A: Yes, I am.

Q: Have you formed an opinion about the questions presented here today?

A: Yes, I have.

Q: Your Honor, at this time I ask that the court accept Dr. Cynthia Morris as an expert in Geochemistry pursuant to Federal Rule of Evidence 702.

THE COURT: Any objections. So noted.

Q: Dr. Morris have you prepared any slides to assist you with your testimony today?

A: Yes. I have.

Q: Are you going to refer to those slides?

A: Yes I will be.

Q: May I approach?

THE COURT: Yes.

Q: Counsel are these the slides that you have prepared today?

A: Yes, they are.

Q: Your Honor. I ask that these slides be submitted into evidence plaintiff's exhibit 6 through 11.

THE COURT: So admitted.

MS. SALLOUM: Thank you.

BY MS. SALLOUM:

Q: Why don't you begin by telling us about the chemicals that are involved in this case.

A: Okay. There are four chemicals in question that we are talking about today. That were found in wells G and H. There are trichloroethylene (TCE), dichloroethylene also known as DCE and tetrachloroethylene which is also known as PCE and then vinyl chloride which does not have another name.

Q: Why should we be worried about those types of chemicals?

A: The EPA has deemed them carcinogens, which means they can cause cancer in humans.

MS. SHANNON: Objection Your Honor that is not the proper EPA classification to my knowledge. I believe it is a misleading statement.

THE COURT: I will overrule it as such, proceed.

Q: Has the EPA set up any standards for which to classify these chemicals?

A: Yes the EPA has a group of standards by which they classify all chemicals and these four chemicals in question fall under that classification and I have a slide that shows – Your Honor may I show this slide?

THE COURT: Yes please.

A: Thank you. Can you all see that? These are the EPA carcinogenicity, which is a big term for classifications for all chemicals, even chemicals such as sodium chloride fall under this classification system. The chemicals in question today are all either Group A Carcinogens or Group B carcinogens. Group A means it's a known human carcinogen. Group B means it's a probable human carcinogen.

Q: Has the EPA determined acceptable levels of these chemicals.

A: Yes, they have. I have another slide that shows that. These are the EPA maximum containment levels of the four chemicals in question today and parts per billion, that means one in a billion parts. So if there was a country of a billion people – if I could use the analogy – that means one person in a country of a billion people. That's how many parts per billion we are talking about or two parts per billion. For vinyl chloride which is a Group A carcinogen, that means it's a known carcinogen, the mcl according to the EPA, is two parts per billion. For DCE, it's a Group B carcinogen and the EPA allowable limit is two parts per billion. TCE is also a Group B carcinogen and it's mcl is one part per billion. The last

one, PCE, is also a Group B carcinogen and it's mcl is also one part per billion. So that means one person a the country of a billion people.

Q: Would you please tell the court the amount of chemicals that was found at the site in question?

A: I have another slide to show. This is a sampling of some of the wells on each of the properties. I will start with W.R. Grace – cover up the rest just for clarification. I took six wells from each of the property and some of the chemical levels that were found at each of the wells of each of the properties, for instance, TCE at the Grace site in the second well that I sampled ranged from 700, 800 and 900 to 440,00 parts per billion. PCE ranged from 2.5 parts per billion to 10,000 parts per billion. DCE ranged from 500 parts per billion to 10,000 parts per billion. And vinyl chloride ranged from 2.4 parts per bill to 10,000 parts per billion.

Q: And finally the wells.

A: Yes. These concentrations are a sampling of what was found at wells G and H which are also referred to as well S 39 and S 40. TCE was found at 188 and 400 parts per billion respectively. PCE was found at 55 and 292 parts per billion. DCE was found at 56 and 43 parts per billion and vinyl chloride was found at five and ten parts per billion.

Q: Doctor, when you are using these measurements as your samples who are these measurements accumulated by?

A: This is data came from the EPA.

Q: Do the chemicals in question travel differently than water does under ground?

A: The chemicals in question travel with the water on the same flow path as water does but they do travel at a different speeds than water.

Q: What affects the speeds of these chemicals under ground?

A: Various factors affect the speed of the chemicals such as the material through which it's flowing.

Q: Okay. Given the amount of chemicals you testified to be present at the sites in question and the type of land these chemicals sit on, what are the travel sites? What are the travel times for the chemicals from the Grace site to the wells, taking all your factors into consideration?

A: I have more slides that show that. Given the geologic makeup of the Grace site, we are dealing with two different types of sediment under the Grace site. Under the Grace site there is relatively compacted sediment which significantly decreases the travel time of the chemicals in question.

MR. MITZEV: Objection your Honor. I feel that in this case Ms. Morris is going beyond the scope of her expertise.

THE COURT: In response.

MS. SALLOUM: She is an expert in Geochemistry and that means how the chemicals interact in the water, she has calculated that in relation to geochemistry.

THE COURT: Any comments counsel? Objection overruled, you may proceed.

BY MS. SALLOUM:

Q: You may proceed. You were telling us about the travel times.

A: Yes. Just to set up how I got these travel times I must explain to you that the sediment underneath the Grace site is relatively compacted compared to the rest of the valley. But the main point of my testimony is the chemical travel times, which I have calculated here. As we said earlier, the EPA allowable limit for the chemicals in question are one and two parts per billion. What I have done here is I have set up a chart that shows the travel times of the chemicals. On the X-axis here we have the time, number of days and on this chart it's really years because 365 days is one year. 730 days is two years and so on. And here on the Y-axis I have zero concentration to 400 parts per billion. But what is really important to note and think about on this graph is one and two parts per billion would be barely off of zero. Because this graph goes from zero to 400 parts per billion so one of two is really imperceptible on my graph. After 730 days DCE begins to move off of the zero mark which is above the EPA allowable limit and at that time it's through the compacted sediment.

TCE after three, roughly 3.4 years is through the compacted layer and PCE in 4.5 years is through the compacted layer.

Q: Now once the chemicals travel off of the compacted layer have they reach the wells yet?

A: No, they still have to travel through the rest of the valley which is essentially sand, gravel and a little bit of silt.

Q: Will you please give us the times for that?

A: Yes. Once the chemical goes through the compacted layer then this is the travel time for the remaining distance. The travel times are speeded up considerably because they can

move much faster through this looser sediment. DCE after roughly 56 days, so that's less than two months, is out from the point at the end of the compacted layer to wells G and H. After 84 days TCE is off the compacted layer or out of the compacted layer to wells G and H. And after roughly 130 days PCE, the slowest chemical is out of the compacted layer and to wells G and H.

Q: So did you make similar calculation for the Beatrice site?

A: Yes. At the Beatrice site, first of all we are dealing with a much shorter distance, Beatrice is much closer to wells G and H than is the Grace site, but that's travel time. Plus the sediment under the Beatrice site is much more conducive to chemical flow. Again I have the same kind of chart here, zero to one hundred parts per billion. After only eight days DCE has reached wells G and H. After 13 days TCE has reached wells G and H and after 20 days PCE has reached wells G and H above the EPA allowable limits.

Q: So now I ask you how would your calculations change if you were to completely shut off wells G and H? First start with the Grace site.

A: With respect to the Grace site, in my opinion, I don't think that shutting off the Grace wells or having them pumping would change the flow of the chemicals.

Q: I'm sorry, you said with the Grace wells?

A: Can I say that again?

Q: Please.

A: Okay. In my expert opinion I don't think the flow would be affected in any way.

Q: And why would it not be affected?

A: Because the basic geologic makeup of the land is relatively the same.

Q: And what about from the Beatrice site, if the wells were to be turned off how would that affect the travel time of chemicals?

A: I again don't think it would affect the travel time of the chemicals considerably.

Q: Now doctor I want to make sure I understand. Is it your expert opinion that the chemicals dumped from the Grace site, taken into account the compacted layer and the sand layer, total travel time of 5 ½ years?

A: Yes. For the slowest chemical, 5 ½ years.

Q: And is it your expert opinion that chemical dumped at the Beatrice site contaminated wells G and H within 5 ½ years?

A: Yes.

MR. MITZEV: Objection Your Honor, plaintiff's counsel is wrapping it up in a nice little package and based on the statistics coming up with years when we are dealing with months and weeks. I have heard no testimony that concluded that 5-½ years was that total time added. Questions like that weren't asked nor was it dumping contamination. Those weren't questions that I heard referred to but now she can summate for clarification purposes.

THE COURT: Response.

MS. SALLOUM: I'll rephrase.

BY MS. SALLOUM:

Q: Is it your expert opinion that the pools of chemicals found, according to your statistics, on the Grace site contaminated wells G and H within a certain period of time?

A: Yes.

Q: Taking your calculations into consideration for the two separate layers of land, what was that total amount of time?

A: The total amount of travel time from the Grace site to wells G and H with the compacted layer and the rest taken into consideration was two years and two months for DCE. Three years and four months for TCE and five years and four months for PCE.

Q: Doctor could you make the same clarification for the chemicals from the Beatrice site to wells G and H?

A: In my expert opinion the chemicals from the Beatrice site made it to wells G and H within three months.

Q: Thank you. No further questions at this time.

CROSS EXAMINATION

THE COURT: Mrs. Adams.

BY MRS. ADAMS:

Q: Hi, I'm Kenya. I just have some questions I would like to verify with you to make sure I'm understanding. You stated in your opinion that specified levels of TCE, DCE, PCE were detected on the Beatrice property, is that correct?

A: Yes ma'am.

Q: And was it based on these concentrations that you calculated the travel times of the contaminants?

A: Yes, it was.

Q: And you also stated in your opinion that you consulted data from the USGS December 1985 pumping test. Is it that you gathered the particular concentrations? Did you gather concentrations from this particular data?

A: No, the concentrations of the chemicals were taken from a EPA test.

Q: EPA test, okay. And let's see here, now going back to the different types of chemicals in terms of - - in your testimony you gave - - that TCE, DCE, PCE and vinyl chloride were carcinogens?

A: Yes.

Q: But actually I just wanted to verify - - actually the only known carcinogen is vinyl chloride and the other chemicals are probable but not determinant of actually being carcinogens.

A: No that's not correct. If I could clarify. A Group B carcinogen is deemed, at this time, a probable carcinogen because the weight of evidence has been done with predominantly animal studies and not human studies. At this time we are still waiting further human studies to conclude.

Q: So you are still waiting for the human studies because obviously none has been done on humans?

A: Right, with that bringing many other factors into account why there are not sufficient human studies done at this time.

Q: But still, no human studies have been conducted?

A: Not, no human studies just not a sufficient amount.

Q: A sufficient amount to determine beyond a preponderance?

A: Yes.

Q: Well since vinyl chloride is an absolute carcinogen, were any found on the Beatrice property?

A: Yes.

Q: Well, let's see here. Well may I approach, this is concentrations of vinyl chloride prior to - -

MR. HARTER: Your Honor, at this time I would like to see what the witness is being shown.

MS. SHANNON: For the record Your Honor opposing counsel has the information.

MR. HARTER: We have a lot of information. I 'm not sure exactly what is being shown. Thank you.

Q: Okay. It's on concentrations of vinyl chloride prior to USGS pumping test. Here is where our property, the Beatrice Riley property would lie and these just show all the concentrations the vinyl chloride. Could you tell us if there are any located on the Beatrice Property?

A: Not according to this map. But this map is made from one set of data, there are numerous sets of data.

Q: Okay, thank you. And I have few more questions. You stated in your opinion that Beatrice Foods engaged in and allowed the dumping of volatile organic chemicals on the property as early as 1964?

A: Yes.

Q: And are you aware that Beatrice has their own two wells pumping on their own property?

A: Yes, the Riley wells.

Q: Okay. And you also previously stated in your deposition that when wells G and H were pumping the Riley wells did not have a significant effect on the chemicals- -

A: In terms of?

Q: - - in the ground water.

A: Yes.

Q: Okay. And to your knowledge was the water in the Aberjona River ever checked for chemicals?

A: During the pumping test, is that what you are referring to?

Q: Yes.

A: Yes they were checked and there were no volatile organic compounds found in the Aberjona River.

Q: So you are saying that they were checked?

A: Yes. To my knowledge, yes.

Q: And to your knowledge was the ground by the wells G and H tested before they were actually built?

A: To my knowledge, no they were not.

MS. SHANNON: To clarify the right question we are simply looking for ---- the wells on the west side of the river banks in between Beatrice property which lies to the east of the river bank.

MR. HARTER: Your Honor at this time I am not sure who is cross-examining Dr. Morris, first of all. And second of all the question is, it may be confusing to have the two maps of the area already introduced into evidence. Counsel would like to refer to one of those, I think that would help the witness and myself and the jury.

THE COURT: I would sustain the objection and ask that counsel confer on specifically what the question is.

MS. ADAMS: We will strike the question.

BY MS. ADAMS:

Q: Okay. And just general questions. Ms. Morris you scientist sometimes don't agree on everything do you, you have varying opinions, like in terms?

A: Yes, there are varying opinions.

Q: Sometimes scientist will have one opinion and you will disagree with but another scientist will have a different opinion, right?

A: Yes.

Q: Thank you. That's it.

THE COURT: Ms. Partin are you crossing?

Ms. Partin: Yes.

BY MS. PARTIN:

Q: Dr. Morris, science is not exact is it?

A: To my knowledge, no.

Q: Okay. In drawing your conclusion you are relying on the accuracy of statistics that you personally didn't compile, that were compiled many years ago, aren't you?

A: Yes I am but...

Q: That's fine, thank you. And these statistics are very important in drawing your conclusions, aren't they?

A: Yes.

Q: You have no way of assuring 100% accuracy, do you Dr. Morris?

MR. HARTER: Objection Your Honor. The EPA test data has been stipulated to be accurate. I think this question is unduly argumentative as a result this asking Dr. Morris to say that stipulated facts may not be correct.

MS. PARTIN: I'm asking for 100% accuracy. I'm trying to show that science is not exact. I'm asking specific questions. I specifically said within 100% accuracy. There's no way that that test could be within 100% accuracy that's virtually and legally impossible.

MR. HARTER: In that question Your Honor, questions that science is not exact has already been asked and answered.

THE COURT: I will sustain the objections on that.

MR. HARTER: Thank you.

MS. PARTIN: I'm going to refer now to my co-counsel.

MR. MITZEV: May I have a moment to confer Your Honor.

THE COURT: All right.

BY MS. PARTIN:

Q: Dr. Morris, what does the EPA deem the top three carcinogens?

A: In terms of...

MR. HARTER: Objection Your Honor. This is irrelevant. We are only dealing with the four carcinogens in this case.

MS. PARTIN: She has commented on both Class A and Class B carcinogens and has attested to her wide range of knowledge and I would mind that my question be ruled irrelevant.

THE COURT: I will overrule the objection.

A: Could you please state the question to me.

Q: Sure. What does the EPA deem the top three carcinogens?

A: There is no top three all time carcinogen chemicals deemed by the EPA. I can't answer that question.

Q: Okay. thank you. No further questions Your Honor.

THE COURT: Any redirect?

MS. SALLOUM: May I have one minute to confer.

BY MS. SALLOUM:

Q: Isn't it true that you found vinyl chloride on the Beatrice site?

A: Yes.

Q: Isn't is true that the EPA has determined TCE, PCE, and DCE as probable causes of cancer?

A: Yes.

Q: Isn't is true that nicotine is in the same class?

A: Yes.

Q: No further questions.

THE COURT: Any re-cross?

MS. ADAMS: No. Not at this time.

THE COURT: Ms. Partin?

MS. PARTIN: We are fine. No further questions.

MR. HARTER: Your Honor, at this time all the plaintiff's witness has been called. We will ask for a ten minute recess to recess.

THE COURT: Is the plaintiff resting?

MR. HARTER: The plaintiff is ready to rest at this time. We've called all of our witnesses and afforded the defendants called its case in chief, ten minute recess?

THE COURT: Ten-minute recess.

MR. HARTER: Thank you.

(recess taken.)

THE COURT: We are going to go back on the record before we bring in the jury. Ms. Sullivan you stated that you had a motion.

MS. SULLIVAN: No Your Honor, thank you anyway.

THE COURT: All right, I will go get the jury. Counsel for Beatrice you may call your first witness.

MS. SULLIVAN: Thank you Your Honor. Counsel for Beatrice call Mr. Ted Ignatz to the stand. For the record Beatrice exhibit #1 is before us right now, it has been stipulated as relevant and admissible and we therefore offer it into evidence.

THE COURT: So admitted.

BY MS. SULLIVAN:

Q: Could you please state your name for the record?

A: Yes, my name is Tad William Ignatz.

Q: What do you do Mr. Ignatz?

A: I am currently the director of the Hydrogeologic Division of Delta Environmental Consultants.

Q: And you got your Bachelor's degree at the Ohio State University in 1968?

A: Yes I did.

Q: And your Masters in Geology from Harvard in 1970?

A: That's correct.

Q: What did you do after you got your Masters?

A: After I received my Masters degree I worked for the United States Geological Survey for five years.

Q: You are no longer there?

A: No, I am not. I am currently with Delta Environmental Consultants.

Q: Tell us a little bit about what you do on an ordinary day.

A: On an ordinary day I am in charge, as I said, of the Hydrogeologic Division, so I am in charge of assigning teams to the various projects which my division has. During a normal week I try to get out in the field at least three days of the five. During a normal work week I like to get out in the field and observe what my teams are doing and actually assist with some of the work that they're doing because the field work is really what we do.

Q: Based on this witness qualifications I would move to have this witness qualify

as an expert to Federal expert evidence to Rule 702.

THE COURT: No objections?

MR. HARTER: No objections Your Honor.

THE COURT: So noted.

BY MS. SULLIVAN:

Q: Let's turn to what brought you here today.

A: Okay.

Q: You have studied the area known as the Aberjona River watershed in Woburn, Massachusetts?

A: Yes, I have.

Q: Are you familiar with the Riley Tannery and the 15 acres of land owned by them adjacent to the river?

A: Yes, I am.

Q: Could you point out on defense exhibit #1 where the Riley Tannery is located on this photograph?

A: Yes, I can.

Q: Feel free to stand.

A: The tannery itself is located - -

Q: Pardon me. Can you see?

A: The tannery itself is located right in this area, right here in this lower corner. And the 15 acres roughly outlined start right here, come over to this railroad track here, run down along this right in here.

Q: Wells G and H.

A: Wells G and H are noted right here on the opposite side of the river, which flows right through the middle of it. You probably can't view it from there, it's quite small. It does go right through the middle.

Q: It has been stipulated that there were traces of the chemicals TCE, DCE and PCE found in wells G and H, that is correct?

A: To my knowledge, yes that's correct.

Q: And there were concentrations of these chemicals found on the 15 acres of property owned by the Riley Tannery?

A: Yes, that's also correct.

Q: Your Honor, at this time I would like to read into the record two portions of the stipulated facts.

THE COURT: That's fine.

MS. SULLIVAN: On April 8, 1986, John Riley owner of the tannery testified that his family property was never used as a dump by his business and that others must have illegally disposed of material on the property. Edward Foley, a former tannery employee testified that Riley complained that the Whitley Barrel company put waste materials on his property. For the record that was stipulated facts number 35. Secondly, in 1981 US EPA and its subcontractor completed an initial study of area near wells G and H and an area further north of the water shed. Both areas are on the US EPA Superfund list. The study describes the regional extent of contamination and the regional directions of ground water flow.

For the record that was stipulated facts number 20.

Q: Mr. Ignatz, returning to the question of the 15 acres of property do you in your professional opinion believe the Superfund site north of the watershed could contribute to the contamination - -

MR. HARTER: Objection Your Honor that is a leading question. This is no longer foundation material. I ask for no leading questions from here on out.

MS. SULLIVAN: Rephrase Your Honor?

THE COURT: Yes.

Q: Mr. Ignatz, returning to the question of the 15 acres of property in your professional opinion could there be other contributing factors to its contamination?

A: Yes, there could possibly be other factors that would have led to the contamination of that site.

Q: Such factors would include?

A: Any of the industries to the north of the basin.

Q: How significant a role do you believe the industries north of the basin played in the soil contamination that was downstream?

A: I believe they played a very significant factor.

MS. SULLIVAN: For the record. I am marking this for identification as defendant's exhibit #2 Your Honor. Permission to approach Your Honor.

THE COURT: Yes.

Q: Mr. Ignatz do you recognize this chart?

A: Yes. I do.

Q: What does this chart signify?

A: This is a hydrographic of the Aberjona River dating from 1939 through 1996.

Q: Did you compile this chart?

A: No. It was actually compiled by the United States Geological Survey and was downloaded from their web site.

Q: Do you and your professional opinion have any reason to consider the data as compiled by the US Geological Survey as accurate or inaccurate or compiled to a scientific degree of certainty?

A: It is accurate.

MS. SULLIVAN: I move to have this admitted into evidence as defense exhibit #2.

MR. HARTER: No objections.

THE COURT: So admitted.

MS. SULLIVAN: Permission to approach the jury?

MR. HARTER: Your Honor at this time I believe counsel is testifying to the jury what that evidence is. That is the witness's role.

THE COURT: I will sustain the objection. The witness should describe the exhibits to the jury.

MS. SULLIVAN: Apologies.

Q: Mr. Ignatz could you stand and explain to the jury what this chart signifies?

A: Okay. This is a hydrographic for the Aberjona River. What this shows is the flow that it is measured at a gauging station by the United States Geological Survey. All these

peaks vary, show various discharges. On this side here you see discharge in CFS, that's cubic feet per second. That's a measure of how much water is flowing down river.

Q: Mr. Ignatz?

A: Yes.

Q: By discharge do you mean flooding and ..

MR. HARTER: Objection Your Honor, that's another leading question.

MS. SULLIVAN: I'll rephrase Your Honor.

Q: Could you clarify what you mean by discharge?

A: Discharge does not necessarily mean flooding. The river is almost always flowing so there is some discharge. During the flood event the discharge increases. A flood event as you can see there is a very very high peak. This would be a very large flood. The CFS is somewhere probably above 900 cubic feet per second. Probably 950 cubic feet per second. That is a very large flood. That's the largest flood this basin has had, and the record which is here which is 1930 to 1996. All of these lower ones are also floods. You have lower level floods that are all in here. Now these greatly affect the Aberjona River Basin because in the map in the area in question is a very low-lying area. It is a marsh type area, a wetland type area. Once the water gets into this it spreads out onto what is the flood plane of the Aberjona River.

Now what can happen with these floods, up basin there are several industries which have already been mentioned in opening statements by both counsel. There are several numerous streams, whether they be tributaries or actually the Aberjona River itself which

flow through all these areas. There are ones that flow through the Industri-Plex complex just north.

MR. HARTER: Your Honor this is becoming a narrative, I ask that the question and answer process begin.

THE COURT: I will sustain the objection

Q: To your knowledge you mentioned the industrial complex in the north watershed.

A: Uh hum.

Q: To your knowledge were the chemicals TCE, DCE or PCE used in that industrial complex.

A: To my knowledge, no they have not been found. However, test on that site was done fairly early some of these chemicals were not even tested for on that site and many of them wouldn't have been tested for until after the 1960's.

Q: Regarding the lack of knowledge, regarding what chemicals were actually in the industrial complex, you believe that they would none the less have an appreciable effect...

MR. HARTER: Your Honor, yet again this has turned into a leading question.

MS. SULLIVAN: I was restating it.

MR. HARTER: That's a leading question.

THE COURT: I will sustain the objection.

Q: The watershed north of the Aberjona river area in question would have an appreciable effect down stream?

A: Yes, due to the flooding frequency, which have increased considerably since 1960.

Q: Specifically would it have an appreciable effect on the quality of land surrounding wells G and H.

A: Yes, because as the floodwater reaches that area they spread out over the flood plain which is a low-lying area, which slows down the flow of water, which allows the water to percolate into the ground water system.

Q: You stated that it would have an effect on the land, is that correct?

A: It would on the land as well as beneath the land, surface.

Q: So would that affect the water?

A: Yes it would affect the ground water underneath that site.

Q: In your opinion, what is the affect from the water drawn from wells G and H from soil to the west bank.

A: To the west bank of the river? To the west bank of the river I do not believe that any water is drawn into the wells from the west side of the river.

Q: For the record, Beatrice property - -

A: - - is to the west of the river.

Q: In the plaintiff's case in chief they asserted that naturally occurring ground water gradients are substantially affected by a cone of depression created by the two wells pumping. Do you agree with this assessment.

A: Yes.

Q: The plaintiff's experts also asserted that in their opinion wells G and H would pull contaminated ground water from the Beatrice property, do you agree with this assessment?

A: No, I do not.

MS. SULLIVAN: Let the record show that I am marking defense Beatrice exhibit #3 for identification. Permission to approach.

THE COURT: Yes.

Q: Could you describe what this chart is?

A: Yes, that is a potentiometric profile which I constructed using data from the United States Geological Survey on water level measurement in various wells along a cross-section that runs from the Beatrice site through well G.

Q: In your professional opinion, do you have any reason to believe that US Geological Survey data was anything but accurate to the north compiled by thought with scientific certainty?

A: It would be accurate.

Q: Okay. Defense offers this exhibit into evidence.

THE COURT: No objections. So admitted.

Q: Mr. Ignatz what does this map tell you?

A: This map is, as I said, potentiometric profile. Now what is shows is the effect or actually these lines here are measures of ground water of the ground water table and this is as if you were to take a slice right through the ground, be able to separate it like this and to sit and stare at it, so you are starring at it. Actually you would be under ground starring at it this way. So it is actually a representation of what is happening beneath the surface.

Q: And the other cone there, could you describe for the jury what those two cones represent?

A: Yes. Well G is right here. This is well G. The water table itself is this line right along here. You can see that it dips down, this is portraying well G when it is pumping so it is actually drawing water out of the subsurface and it draws down water and forms this cone of depression which was already mentioned, which was right here.

Also what is implied on this map is this area right here. There are two pumping wells on the Riley tannery site and the 15 acres.

Q: Mr. Ignatz?

A: Yes.

Q: The two pumping wells on the Tannery site, did they run continuously?

A: Yes.

Q: Of wells G and H?

A: They did not run continuously.

Q: When wells G and H were switched on, the cone of depression...

MR. HARTER: I'm sorry was that a question, a thought?

THE COURT: Counsel.

MS. SULLIVAN: Your Honor, I'm rephrasing it in my head.

THE COURT: Would you like to withdraw the question?

MS. SULLIVAN: No, your Honor.

Q: The cone of depression, would there be an appreciable lapse of time between turning on or turning off the wells.

A: With - -

Q: - -wells G and H?

A: With wells G and H concerning the cone of depression?

Q: Right.

A: Yes, there would be a considerable amount of time with both the cone of depression forming and returning once the wells are turned off. This cone of depression is active when the wells are pumping. When the wells are not pumping this will actually recover and this water table will actually just follow straight across here and will actually rise into the river. The Aberjona River sits right here on this.

Q: Would you explain to the jury the difference between a confined and unconfined aquifer?

A: Yes. A confined aquifer has a confining bed usually above and below it. So there is a bed of mostly impermeable substances such as a very, very dense clay, which would sit here then the actual aquifer material, which would be a sand, or a gravel would be here beneath it. And then there would be another bed, impermeable bed such as bedrock or a clay layer beneath it. So you have these two layers like this and the actual water is flowing in between them. That is a confined aquifer. An unconfined aquifer, there is no confining layer.

Q: Do the Riley wells have, in your opinion, a confined aquifer or unconfined.

A: Unconfined aquifer.

Q: And wells G and H.

A: Also unconfined.

Q: Are the Riley wells similar in size as well.

A: They are not similar in size. Wells G and H combined actually pump slightly more than the Riley wells. The Riley wells combined do not pump as much water as both wells G and H when they are both pumping.

MS. SULLIVAN: Let the record show that I am marking these as exhibits five and six ,your Honor.

Q: Do you recognize these?

A: Yes, these are two separate potentiometric maps, which were designed both with the wells pumping, and one without the wells pumping. This one is prior to the pumping test, which was conducted after a pumping test conducted by the United States Geological Survey.

Q: Did you compile those charts?

A: I did draw them using data from the pumping test.

Q: From the US Geological Survey - -

A: - -from the US Geological Survey test.

Q: You have no reason to believe that that is unconducted scientific project.

A: That's correct.

MS. SULLIVAN: Offer these over to expert defense exhibits four and five.

MR. HARTER: Which one is four?

THE COURT: So admitted.

A: This view as we have already covered is what is beneath the surface. Now what I will show is, this is as if you were looking down from a helicopter, so to speak. Now

looking down from above. These lines also represent the potentiometric surface, so these now are - -

Q: Mr. Ignatz?

A: Yes.

Q: What does potentiometric mean?

A: A potentiometric map is a map of the water, the ground water surface. So all the lines and the numbers next to the lines represent the water level surface.

Q: The water level - -

A: - - beneath the ground surface, yes.

Q: Could you describe the relation to me, the two exhibits you have before you.

A: Yes. What you're looking at, I will actually use this one. Is during, this is with the wells pumping so you can note these lines here, I will put the other one up with wells G and H. Obviously right here you don't see all the circles that you are going to see on this next exhibit. Those are the cones of depression that are forming.

JUROR: Sir, we're having a problem seeing. Can you stand more by the screen.

A: Okay. These circles here, now this is what would happen after the wells have been pumping. You get this to form around these wells. Now to try to take this one and tie it in with the one I showed previously, this one here, potentiometric profile. If you were to take this line here, right there, which is flowing here. This is a confined cone of depression from the Riley well.

Q: Mr. Ignatz, could you explain to the jury again which on the previous exhibit is the Riley well.

A: Yes. On the previous exhibit, this right here, this area is water that would be collected. Anything that gets in here would be collected by the Riley well.

Q: In your opinion does the pull from the Riley well affect ground water flow?

A: Yes, it does.

Q: In relation to the pull of well - -

A: - - of wells G and H? Yes they each, both wells G and H and the Riley wells will have their own cone of depression which will in turn collect water.

So there will be water flowing to the Riley wells even if G and H are not pumping. That's what this is showing here. This circle is actually flow to the Riley well – and you can – I have denoted it if you can't see. Right there is flow out of the plane towards the viewer, towards Riley's well. So I will put this map up. Riley's well sits right here. This is a flow line of water that is flowing here. That flow line right there if you were to take this map, flip it this way, you would get this and here is that flow line. Same flow line.

Q: I have no further questions.

THE COURT: Does the jury have any questions?

THE JURY: We are fine, thank you.

MR. HARTER: Am I doing the only cross examination at this time?

THE COURT: You are crossing at this time and I think the option will be open.

BY MR. HARTER:

Q: Couple of questions for you Mr. Ignatz.

A: Yes.

Q: You don't have a Ph.D.?

A: No, I do not.

Q: Ever testified before a trial?

A: Yes.

Q: How many times?

A: I have testified four previous times.

Q: Usually you testify for the defense, is that right?

A: I do.

Q: You are testifying for the defense today?

A: Uh hum.

Q: Now, according to your deposition isn't it true that you are being paid $100 an hour for your work on this trial?

A: I am being paid for my time that I spent on exhibits.

Q: You're working and you're being paid $100 an hour?

A: Yes.

Q: And you spent 190 hours preparing for this trial?

A: Preparing for the trial?

Q: Yes.

A: Since the time I first took this project on, combined and doing site evaluations etc., yes. That is a good estimate, yes.

Q: So you're being paid about $19,000 for - - and this is the end result?

A: Yes.

Q: Thank you. Now did you ever see anybody besides Riley dump on the Beatrice property?

A: I did not observe anyone, no.

Q: But there was TCE, PCE, DCE dumping on the Riley property?

A: There were traces of those chemicals found.

Q: Found - - they were probably dumped there?

A: They were found by the site.

Q: Now on defense exhibit #1 here, would you mark for me where the Grace property is?

A: The Grace property would be right there.

Q: And the Beatrice, 15 acres, where is that?

A: Right there.

Q: And where the Industri-Plex upstream dumper is?

MR. HARTER: Your Honor, at this time I would like to republish defense exhibit #1 to the jury, if I could?

Q: We'll estimate, Mr. Ignatz, that wells G and H are right between Grace and Beatrice. And the Industri-Plex site is further away from the wells. Mr. Ignatz you indicated earlier that corporation's way up stream at the Industri-Plex were what you believed to be the contaminators?

A: Uh hum.

Q: Have any data to indicate that TCE was found upstream?

A: No.

Q: Have any data that PCE was found upstream?

A: No.

Q: How about DCE?

A: No.

Q: Let me try and understand. None of your data indicates that these chemicals were dumped upstream?

A: They were not found upstream. That does not indicate that they were not dumped at one time.

Q: Okay. When something is dumped and it gets carried, its true that it doesn't move all at once, right?

A: That's correct.

Q: Some is going to remain where it is dumped and some is going to move?

A: For the most part that is correct, however it is possible for all of it to move off site if the time permits. It depends on when it was tested for and if it was tested for.

Q: But none was found upstream?

A: Not when they tested.

Q: Okay.

A: They did not test for it, however.

Q: Were these chemicals found at Beatrice?

A: Where they found at Beatrice?

Q: Yes.

A: They were found on the 15 acres owned by Beatrice.

Q: And if I could, very briefly, go back to one of your slides here. This is when the well is pumping?

A: Correct.

Q: And the Grace property is here, is that right?

A: It is actually slightly higher than that. It is actually right in here.

Q: Okay. Now it seems to me the Grace property is here?

A: Yes.

Q: And its going to flow, hypothetically, any chemicals dumped at Grace is going to flow directly along this line that you have drawn in red?

A: They would flow down through hydrology.

Q: And when they get here they're going to pick up this red line and flow along the red line, is that right?

A: Yes.

Q: What's right here?

A: That's well H .

Q: Okay. What's this?

A: That is another flow line coming from - - on the other side of the railroad tracks.

Q: And what's right here.

A: That would be the northern edge of the 15 acres.

Q: And what's this red line flowing to?

A: That's also a flow line.

Q: It's flowing to where?

A: Well H.

Q: Okay. And you have been paid $19,000 to get this opinion. is that right?

A: Yes.

Q: Okay. No further questions.

THE COURT: Does counsel for Grace wish to cross-examine?

MR. MITZEV: Not at this time Your Honor.

THE COURT: Any redirect?

MS. SULLIVAN: Yes.

BY MS. SULLIVAN:

Q: Mr. Ignatz would you please clarify for the jury what in your professional opinion the contaminants on 15 acres contributed to the wells?

A: In my professional opinion they did not contribute to the contamination at the wells.

Q: Could you state why you have that opinion.

A: Yes. My opinion is that they were either collected by the Riley well itself or they would flow into the river or actually captured by the river itself and then taken down stream.

Q: And the river itself contributes to the wells.

MR. HARTER: Your Honor that's a leading question. It's actually not a question but were it a question it would be leading.

THE COURT: Rephrase it.

Q: You stated that the either the chemicals would flow into the Riley wells or they would flow directly into the river?

A: That's correct.

Q: Where after they flow into the river, would they flow to?

A: They would then be carried down the stream into the river.

Q: And not - -

A: - - not to the wells. They would be caught in the river and actually flow down river towards the south, in the river itself.

Q: No further questions.

THE COURT: Any re-cross?

MR. HARTER: May I have a moment your Honor?

THE COURT: Yes.

BY MR. HARTER:

Q: Do you have any data that indicates how much of these contaminants were found down stream?

A: The river water was never tested for contaminants.

Q: So you don't have any data that supports that either?

A: I don't have any measurements of the water.

Q: Thank you Mr. Ignatz. No further questions.

THE COURT: Thank you Mr. Ignatz, you are excused. We are approaching the lunch hour, so I think that we will recess until 12:30.

(lunch recess.)

THE COURT: Call your next witness

MS. ADAMS: Yes, your Honor. I call Dr. Russell.

BY MS. ADAMS:

Q: Please state for the record your full name?

A: Dr. James R. Russell.

Q: What is your specialization?

A: Hydrology.

Q: And what exactly do you do, a hydrologist. What does a hydrologist do in simple layman's terms?

A: Basically we just explore the different methods and ways that ground water travels.

Q: Have you come to court to state your opinion?

A: Yes.

Q: What classes or courses did you take that relate directly to the issue at hand?

A: Well I do have a Ph.D. in Hydrology but I have also taken various other courses throughout and had a lot of experience in theory.

Q: Okay. is the Ph.D. the highest degree obtainable in your field.

A: Yes ma'am.

Q: How many years have you worked as a ground water expert or Hydrologist?

A: After I completed my education. Roughly seven years.

Q: Okay. Tell us your work experiences since you became a Hydrologist, ground water expert.

A: Well I worked for the USGS, the United States Geological Survey, for a couple of years until around 1992. And then I was hired for PPG Corporation headquarters branch in Pittsburgh and I worked for them for a couple of years until recently I went on to becoming a science professor.

Q: Okay, thank you. Have you ever been asked to determine the permeability of ground water or the composition of a subsurface and the flow of ground water through this material?

A: Several times I have throughout my career.

Q: Okay, and how many times have you testified in court as a Hydrologist in trials similar to this one?

A: This would be my third time.

Q: And where are you currently employed?

A: Currently I am employed for Ohio University.

Q: Okay. At this time, Your Honor, we would like to qualify Dr. Russell as an expert witness.

THE COURT: Any objections?

No.

THE COURT: So noted.

Q: Thank you. Well lets turn to the issue at hand. Dr. Russell are you familiar with the ground water problems that have plagued Woburn Massachusetts?

A: Yes.

Q: And in your opinion would there have been any other factors that would have significantly contributed to the contamination of wells G and H?

A: I am sorry, could you repeat that?

Q: Would there have been other factors besides Beatrice that would have contributed?

A: Yes.

MR. HARTER: Objection. Your Honor. I don't believe that any factors have been identified by Dr. Russell as to what contributed to the contamination of G and H. before we talk about those other factors.

MS. ADAMS: I just wanted to go into an overview, those factors will come up. just and overview of his opinion if Beatrice was involved in the contamination.

THE COURT: I will let that generally stand as an overview of proof for now and let your objection stand if you don't produce it.

Q: What is the composition of ground material under the Beatrice property?

A: Under the Beatrice property it is a lot less permeable. Material is more Consolidated and compacted through that part of the region. It's materials are mostly clay, silt. some sandy silt and it is more compacted together than the rest of the region.

Q: Okay. You have two exhibits today that illustrate the type of material that is found under Beatrice and I will mark the exhibits as 6 and 7.

THE COURT: Defense. defendant's exhibit.

Q: Defendant's exhibit 6 and 7. Forgive me but I'm new at this. And I am now showing Dr. Russell exhibits 6 and 7. And do you recognize these?

A: Yes. I do.

MS. ADAMS: Your Honor, we offer defendant's exhibit into evidence.

THE COURT: I will admit it.

MS. ADAMS: And may I have permission to show the exhibits to the jury.

THE COURT: Are you doing them on the overhead or - -

MS. ADAMS: On the overhead.

THE COURT: Yes.

Q: And can you tell us what these are or explain to us on the overhead?

A: Yes. What I have completed here are geological cross-sections of the region of Woburn. If you take an area across and measure different lithologies across the region this would be what they are. As you can see by the Aberjona is the peat layers and more sand materials, and darker material over by Beatrice. On this side thicker clay and silt material that goes through well H.

MR. HARTER: Your Honor, this is getting kind of narrative, ask for some questions.

MS. ADAMS: I was going to do questions but I wanted to explain first what type of material was under there since he is an expert, but my next questions is...

Q: Why is the type of material important to know in order to know the direction of the flow of the ground water?

A: Well the materials - - the type of materials are imperative whenever you are figuring out ground water. The permeability and porosity, porosity being more the amount of spaces in the rock. Permeability – how water passes through those rocks, determines on how the water flows. In this case the water would flow more down through and head to the J curve instead of horizontally.

Q: Okay, and is this important to know in terms of how the chemicals flow?

A: Yes.

Q: And the water to?

A: Absolutely. A lot of people think that ground water kind of flows as veins or arteries but that's not the case. It kind of siphons through the different materials and whenever you are figuring out any type of equation or anything porosity and permeability are essential to figure out distance and exactly how fast anything flows.

Q: Okay now, just to clarify for us - due to the the type of material that is located under Beatrice, in what direction would the chemicals flow?

A: Beatrice, a lot of what happens on Beatrice is a function of its well. It has, there are two wells on Beatrice and the water gets pulled towards those wells. The other material, as it flows hinders that - The geological material, I'm sorry – hinders that flow of water because it doesn't flow as quickly as in other parts.

Q: Okay, thank you. Now let's talk about well G. You already mentioned that the Riley wells, already has been mentioned, that the Riley wells have their own two separate – excuse me – that the Beatrice/Riley property has their own two wells?

MR. HARTER: Your Honor, is counsel on the witness stand or is the witness on the witness stand? This continues to be a leading question.

THE COURT: Are you withdrawing the question.

MS. ADAMS: I'm withdrawing it.

Q: So, Riley has two wells?

A: Yes that's correct.

Q: Now in terms of well G, we have exhibits that have already been published or admitted into evidence, they will be 4 and 5. Now explain the cone – earlier a cone of depression was mentioned – explain the cone of depression of the Riley wells and if you

believe that the Riley wells had significant impact in preventing the contamination to travel to well G.

A: The cone of depression basically forms on how the water flows and this is a different way of looking at it. As we see through here are the Riley wells and that area is the Riley cone of depression.

Q: Excuse me, maybe you could step on the other side. Are you having problems (referring to the jury.)

A: Right in here would be the Riley wells, and as you can see water flows towards that point. It creates kind of a down slope to the water underground.

Q: Okay, now is well G an unconfined aquifer?

A: Yes.

Q: And why is that important?

A: Well as I mentioned before, the material, the geologic material was different on that. It would probably be the cone of depression, it wouldn't spread out quite as far despite whatever the pumping rates would be because the material is different.

Q: Okay now, what if some of the chemicals managed to get beyond the Riley wells cone of depression, where would the chemicals go?

A: When the wells aren't pumping, which the wells only pump together 15% of the time, water could not flow in that direction. Everything would flow down towards this. In case of the wells pumping – May I use the other exhibit Your Honor?

THE COURT: Yes.

A: In the case the others, it would possibly, any materials could flow towards well G, but again the lithologies and other factors mentioned play a part.

Q: And so just to clarify, the Riley wells cone of depression would be significant?

A: Absolutely.

Q: Okay and, now did the chemicals that were in question - - did the chemicals in question that were found in Beatrice ground water have a substantial effect on well H?

A: No.

Q: And why not?

A: There are too many barriers, actually to anything reaching well H. There is distance, again permeability, porosity and both wells on the right of the property play a significant role.

Q: Okay, and just to clarify once again were the Riley wells pumping continuously during the time span in question?

A: Absolutely.

Q: Okay and would this have an impact on the flow of the ground water, in terms of direction that the ground water would be traveling in?

A: Oh yes, because it creates, on this case, a pull in that direction. And in this case it kind of creates a cone of depression that pulls everything in that direction, towards the Beatrice property.

Q: Okay that's all of my questions.

THE COURT: Cross-examination?

MR. HARTER: Yes, your Honor.

BY MS. LUETKE:

Q: Could we please return to the exhibit that you used before that?

A: Before pumping?

Q: While pumping. So doctor, are you saying that the chemicals do flow to wells G and H when they are pumping? Because as I understand your red arrows go right into well G, right there.

A: No. I don't believe I am saying that at all.

Q: Could you please explain then, what is this?

A: That right there is well H.

Q: And these arrows go directly into well H?

A: Those are flow lines and material could go into well H.

Q: Isn't it true that in your expert opinion you actually also stated that while pumping most of the chemicals would go into the wells on the Beatrice property?

A: Yes that is my opinion.

Q: Thank you. Doesn't most state that we are not talking about 100%?

A: Most implies not completely.

Q: Okay. Isn't it true that in your deposition on May 22, 1998 you stated that chemicals that would be dumped on the north part of the Beatrice property could reach well G in three to four years?

A: No. I believe I stated that the materials from the north side could potentially escape and travel towards the east in that direction.

Q: We unfortunately don't have his deposition in written form to refer to so I don't know what I should be doing now.

THE COURT: Proceed.

Q: Isn't it true that you have no data concerning those two wells on the Beatrice property concerning their pumping capacity?

A: I couldn't tell you off hand an exact pumping record but I do know that the combined pull of the wells on the Riley property are similar to that of well H.

Q: So all you can tell us at this point is that they are continuously pumping?

A: Yes.

Q: Dr. Russell is it true that you were paid $100 an hour for spending 20 to 30 hours a week for the last 18 ½ weeks?

A: I was compensated for all the hard work and time I had to put into this case.

Q: Thank you, no further questions.

THE COURT: Is there any cross by Grace counsel?

MR. MITZEV: One question.

BY MR. MITZEV:

Q: The flow lines that you have indicated, they are for illustrative purposes only, is that correct?

A: That's correct.

Q: No further questions.

THE COURT: Any redirect?

MS. ADAMS: No. Your Honor.

THE COURT: You are excused Dr. Russell. Does Beatrice defense rest at this time?

MS. SULLIVAN: We do Your Honor.

THE COURT: Is Grace ready to proceed?

MS. PARTIN: Yes, Your Honor we are. At this time defense calls Dr. Linda Olvera to the stand.

THE COURT: (swears in the witness.)

BY MS. PARTIN:

Q: Could you state your full name for the record please?

A: Linda C. Olvera.

Q: What is your profession?

A: I am a Hydrogeologist.

Q: What are your credentials?

A: I have my Ph.D. in Hydrogeology. I have also worked as a geologist for the US Environmental Protection Agency on the toxic reduction unit and for the US Geological Survey as a Hydrogeologist and stream gauging ground water mapping and wellhead protection.

Q: In your profession with the US Geological Survey can you explain to the jury what wellhead protection is?

A: Wellhead protection is protecting wells used for drinking water for public and private citizens from possible sources of contamination.

Q: Have you ever done environmental consulting before?

A: Yes.

Q: With whom?

A: I am currently a senior Hydrogeologist for a local consulting agency.

Q: At your job, do you test the permeability of sediments?

A: Yes.

Q: At your job, do you map ground water flow?

A: Yes.

Q: At your job, do you calculate the speed of ground water flow?

A: Yes.

Q: Do you ever calculate the speed of chemical flow?

A: Yes.

Q: How often?

A: Daily.

MS. PARTIN: Your Honor, at this point based on Dr. Olvera's credentials and expertise, I would like to qualify her as an expert.

THE COURT: Any objections? So noted.

Q: Dr. Olvera please explain how you were procured for this testimony?

A: I was approached by the defense counsel.

Q: And how much were you paid?

A: $150 an hour.

Q: For how many hours?

A: Approximately 400 hours.

Q: And what length of time?

A: It's been over a year and a half period.

Q: Do you know the defendant's in any other capacity?

A: No.

Q: And are you here to day to state your opinion?

A: Yes.

Q: What is that opinion?

A: My opinion is that the contaminants at the W.R. Grace site did not contaminate wells G and H.

Q: I'm sorry, I could not hear that. Could you repeat that please?

A: The contaminants from the W.R. Grace site did not contaminate wells G and H.

Q: Okay, thank you. Based on your expertise and knowledge, tell me about the history of the geologic landscape.

A: It was formed during the last glacial period several thousand years ago. Several thousand yeas ago when the glaciers moved over the area they compacted the sediments, consolidated it and made it very dense, very solid, hard, very poorly permeable material.

Q: And how does this affect the sediments at the Grace site?

A: The effect would be that water or contaminants would move through these sediments extremely slowly.

MS. PARTIN: At this point, Your Honor, I would like to republish some of the soil samples.

THE COURT: Sure.

Q: Dr. Olvera, what in the world is that?

A: this is a sample of the sediment taken from beneath the W.R. Grace site. It is an example of the dense material, I was talking about earlier. As you can see it's very hard, dense, solid.

Q: What does dense mean again?

A: Very hard, consolidated, few porous spaces.

Q: Thank you.

MS. PARTIN: May I show this to the jury?

THE COURT: Yes, you may.

MS. PARTIN: Now Your Honor, I would like to refer to some stipulated data if I may?

THE COURT: Make sure that defense counsel and plaintiff's counsel knows what particular document you are referring to.

MS. PARTIN: Okay.

Q: Dr. Olvera, could you please tell the jury what that booklet contains?

A: It contains wells that have been dug around the site to show the different kinds of sediment underneath the site.

MS. PARTIN: Your Honor, at this point I would like to have these exhibits marked for identification. 1 through 4.

Q: Dr. Olvera are you familiar with the pictures?

A: Yes I am.

Q: Could you tell me what they are?

A: The first one is a geologic cross-section of the Aberjona river valley, it includes W.R. Grace site. I also have a potentiometric surface map of the area when wells G and H are pumping. A map that indicates the draw down affected when wells G and H are pumping.

MS. PARTIN: At this point I would like to offer exhibits 1 through 4 into evidence.

THE COURT: So admitted.

MS. PARTIN: Thank you Your Honor.

Q: Now doctor, could you explain to the jury the different sediments that are found at the Grace site? Please feel free to refer to those if you have any. (for the record she is illustrating an exhibit #1.

A: The arrows in yellow indicate the dense material.

Q: The dense material found where?

A: Underneath the Grace site and down at the bottom of the river valley.

Q: And what is the significance of the hard dense material?

A: This is the area in which groundwater would travel extremely slowly.

Q: Doctor, what is the flow path of ground water at the Grace site?

A: This potentiometric surface of the site, and as you can see they are not linear _____, which is located up here. They have traveled to the wells curve linear pass down.

Q: Could you restate that in some terms that would be easy to understand. How are they traveling again?

A: The flow of water is not linear.

Q: Meaning its

A: Curved down from the valley.

Q: Thank you. What effect does that have with respect to this case?

A: As they curve that increases, the flow path length and would in turn increase the length of travel time.

Q: Thank you. Dr. Olvera what are some of the factors used to determine the rate at which water travels?

A: The sediments and the gradient.

Q: What specifically about the sediments?

A: Their composition.

Q: Thank you. Let's start with the composition of the sediment. Please explain the different types of sediments surrounding the Grace site?

A: As I explained earlier, the sediments within the Grace site sits is very dense, very poorly permeable material and down through the valley it's more sandy with fine grain, silt which makes it more permeable than at the Grace site, down towards the well it's sand and very, very permeable.

Q: What is the significance of this material?

A: Water would move extremely slowly through the dense of the Grace site. More rapidly in the middle of the valley and very rapidly down by the wells.

Q: Doctor would you please refer to your cross section describing the various sediments you have and an illustration of that?

A: The gray areas are where they are more permeable than the yellow and the green found in this area. It is sandy. It is extremely permeable.

Q: How is that significant with respect to this case?

A: Well with respect to this case up here the ground water would take two years to travel down. When it gets to the more permeable material it would move at a much faster rate.

Q: What does "up here" refer to?

A: The Grace site.

Q: At the Grace site would you please put your finger exactly where the Grace site is for the jury to see.

A: (indicating.)

Q: At that site what is the top layer of sediment?

A: Dense glacial till.

Q: And what does that mean again?

A: Poorly permeable material.

Q: With respect to this case, that means water travels how?

A: Extremely slowly.

Q: So as we go and move further away from the Grace site the composition becomes what?

A: More sandy with a fine grain silt.

Q: Doctor does that even matter in this case?

A: It is not very relevant because it would take as much as 15 years for it to move off the site.

Q: How long?

A: 12 to 15 years.

Q: 12 to 15 years, okay. Doctor would there be any reason why the soil that you tested for this case would differ from the soil at the site of the time in question?

A: No.

Q: Have you ever tested soil before?

A: Yes.

Q: Have you any special expertise in sediment permeabilities?

A: Yes, I did my doctorate thesis on permeabilities of reservoirs.

Q: What was the standard method of determining permeability.

A: There are two methods used, one is known as the slug test and the other a pumping test.

Q: Were those methods used here?

A: Yes.

Q: Doctor, you also mentioned the importance a gradient has on the travel of water. Would you please explain to the jury what a gradient is?

A: A gradient is the change in the elevation of the water, the level of the water over a certain distance.

Q: How does that affect the ground water flow?

A: Well, with an increased gradient it would increase the flow velocity.

Q: What is the gradient at the Grace site?

A: It's approximately .027.

Q: What's that mean?

A: That's relatively high compared to the other areas in the valley.

Q: Meaning what?

A: Meaning it would travel more rapidly.

Q: Where would the water travel more rapidly?

A: Up at the Grace site.

Q: Do you know the gradient of any of the surrounding areas?

A: Yes.

Q: How does the pumping of wells G and H affect the gradient?

A: The pumping would create a steeper gradient within a certain radius of the wells.

Q: Do the pumpings of well G and H increase the gradient?

A: Yes.

Q: How would it affect the gradient at the Grace site?

A: It would not affect the gradient at the Grace site, that would be beyond what is known as the cone of depression where the water begins to be drawn down. The water levels are affected by the pumping.

Q: And how do you know that?

A: We have taken some well tests. I have a slide, if I can refer to that?

Q: Sure.

A: This map indicates the draw down of water levels across the valley when wells G and H are pumping. Close to the wells there are as much as 16 feet. But as you get away, this line here represents where it's only four feet. Here is two feet. And up here is zero,

meaning its not at all affected. Up here is the Grace site, so it is not at all affected, as far as draw down by the pumping of the wells.

Q: Thank you doctor. Doctor are there any other factors affecting the rate of flow?

A: The conductivity. The hydraulic conductivity.

Q: Okay now doctor, what has your research indicated?

A: Research indicated that conductivity is extremely slow at the Grace site. More rapid in the middle of the valley and extremely rapid down towards the wells.

Q: Can you restate that means your -- words for us to understand - - What does that mean?

A: What is the hydraulic conductivity?

Q: Well, what does that mean for us with respect to the flow?

A: It means that it's so slow up in the Grace site that it would take many years for the water to move off the site.

Q: Thank you. Is there any significance in combining the above mentioned elements?

A: These elements combined are components of what is known as the Darcy's Law, which is the most fundamental law in Hydrogeology.

Q: How is this law used?

A: The components of Darcy's Law of conductivity, the gradient porosity, are used to determine flow velocities of water, ground water.

Q: How did you use Darcy's Law to calculate the rate of flow, in this case, at the Grace site?

A: With respect to these components, I used the different conductivity at the Grace site in the middle of the valley down towards the wells to determine the rate of flow from Grace down to the wells.

Q: Doctor, in your expert opinion, how long would it take for ground water to travel from the Grace site to the wells.

A: At approximately 15 years, which is a very conservative figure. And now it is probably more like 20 years.

Q: But now doctor, our discussion has been about the flow of water. But the issue in this case is about the flow of chemicals. Do the chemicals in question travel at the same rate as ground water.

A: No. They travel at a much slower rate.

Q: Why?

A: The chemicals in question are more dense than water. They are not visceral. They don't mix, like oil and water. They are more viscous.

Q: Doctor, was there any organic matter present at the Grace site?

A: Yes.

Q: In your opinion, how long would it take the chemicals to travel off the Grace site?

A: Between 30 and 40 years.

Q: Between 30 and 40 years?

A: I'm sorry, that's off the Grace site? Yes.

Q: Are there any other factors regarding travel time of the chemicals?

A: Degradation of the chemicals. DCE, one of the chemicals in question that was found in wells G and H, is when it gets into the ground water it degrades and it takes approximately 13 to 48 weeks as stated in the report by the Center of Disease Control. Therefore none of the DCE in the wells could have come from the Grace site because it would not have moved off the property in the 13 to 48 weeks.

Q: Now doctor, in your opinion, is Grace responsible for contaminants found in wells G and H?

A: No, Grace is not responsible for contamination of the wells.

Q: Thank you doctor. No further questions.

THE COURT: Cross-examination.

BY MS. SALLOUM:

Q: Doctor, isn't it true that permeability is what determines how fast a liquid flows through the ground material?

A: Yes.

Q: Is a permeability of .35 more permeable than .2?

A: Yes.

Q: So if it's more permeable something moves through it faster, right?

A: Yes.

Q: Which of these exhibits most clearly resembles the non - - you spoke of a compacted layer and then you spoke of beyond the compacted layer, a more sand like layer. Which of these examples more clearly demonstrates that?

A: The right.

Q: This one?

A: I really can't tell the difference between the two.

Q: So in your expert opinion these are a close approximation of the materials that are beyond the compacted layer?

A: Correct.

Q: Is it true on your deposition of May 22nd you gave this material (indicating.) a permeability level of .35?

A: Yes.

Q: Is it true on your deposition of May 22nd you gave this material (indicating.) a permeability level of .2?

A: Yes.

Q: Doctor, isn't it true that a higher level of permeability indicates that ground water can flow through it faster, yes or no please?

A: Yes.

Q: No further questions.

THE COURT: Any cross-examination? Redirect?

BY MS. PARTIN:

Q: Dr. Olvera, this is what again (indicating.)?

A: That is thick, dense.

Q: Okay. Does water travel faster through that or this (indicating.)?

A: Through this (indicating).

Q: Through this (indicating). What is at the Grace site?

A: This (indicating).

Q: So what happened at your deposition?

A: What happened is when you have more grains you have more pores.

Q: So?

A: It would be a higher pore - -

MR. HARTER: Objection your Honor. that is a failure to answer the question as to what happened at Dr. Olvera's deposition.

Q: Feel free to tell the jury what happened at your deposition.

A: I gave the correct permeability's that accounts for the flow of water through these sediments.

Q: But there's some confusion, we are trying to clear that up.

A: Well I tried - -

MR. HARTER: Objection your Honor that's not a question.

Q: Okay again, Dr. Olvera does water flow faster through this material (indicating) or that (indicating) material?

A: Through this (indicating) material.

Q: It travels faster through this (indicating) material. What is at the Grace site on the top level?

A: This (indicating) material.

Q: This (indicating) material. How long would it take for the water to get beyond this (indicating) material at the Grace site?

A: Approximately 12 to15 years.

Q: How long would it take for a chemical to get beyond this level?

A: Approximately 30 years.

Q: I have no further questions.

THE COURT: Re-cross?

BY MS. SALLOUM:

Q: Doctor, the words that you just told the court you indicated that water goes through this easier than this (indicating)?

A: Yes.

Q: The permeability level that you used in making your calculations actually show that this is more permeable than this (indicating)?

A: Actually, no.

Q: Then is 3.5 a higher level of permeability?

A: It's a higher number but that doesn't mean that it is faster - -

Q: Would you please show the court your flow path with the blue lines that you used? Would you please indicate the flow paths that are on - - where the water would travel on the flow paths on your map?

A: These are just sample flow paths but include the flow paths are indicated.

Q: Would you point directly along the flow path of where they would go, and what is that site that your finger is - -

A: Where, down here (indicating.)?

Q: The one where the two lines are going into.

A: I'm sorry, down here (indicating.)?

Q: Yes.

A: Into well G.

Q: So it is your testimony that when anything that is flowing from the Grace site to the wells follows that path into well G?

A: A potential flow path. Not necessarily these flow paths.

Q: Thank you. No further questions.

THE COURT: Thank you Dr. Olvera, you're excused. Would you like to call your next witness?

MR. MITZEV: The defense call Dr. Gregory Daniel's to the stand.

THE COURT: (swears the witness.)

MR. MITZEV: Your Honor, I move for a one minute recess as the juror has some personal business that needs to be attended to, if you can allow that discretion?

THE COURT: We will take a brief recess.

BY MR. MITZEV:

Q: Dr. Daniel's could you please state your name for the record?

A: Sure, my name is Gregory Ryan Daniel's.

Q: Sir, how long have you been procured in this litigation?

A: The defense, Grace, asked me to explore potential alternative sources of contamination for wells G and H.

Q: What makes you qualified to do such tasks?

A: I hold a Ph.D. in Geology from the California Institute of Technology. And I am currently a professor of geology at the University of Chicago.

Q: Any other related experience?

A: I spent two years working with the Michigan Department of Natural Resources to examine different resources within the state of Michigan. It gives me some hands on experience.

Q: And did you have any specialties?

A: My specialties are specifically in Hydrogeology, that's what I do most of my work with.

Q: Have you published?

A: Yes, I have.

Q: Can you name a couple of the publications?

A: Sure, a couple of the publications that I have is a book "It's Gotta Go Somewhere", which details contaminant movement. I've also have a publication in a very well respected journal in our field which specifically relates to down stream pollution in the Cuyahoga River.

Q: Did you also write "Water Contamination and You"?

A: Yes, I did.

Q: You did. How about this other title "It's Gotta Go Somewhere: the Complete Book of Contaminant Flow"?

A: I believe also listed on my resume' should be "The Big Book of Surface and Groundwater Flow".

Q: What are you currently working on outside of this case?

A: Currently my focus is in two areas; first it's in teaching classes at the University of Chicago, which I teach, which are some basic courses in both undergraduate and graduate Hydrology. I am also working in a corporation called Water Unlimited, which does basic groundwater consulting work for a number of agencies.

Q: Is there anything in particular about this case that interests you and excites you about signing on to work for Grace or for the case in general.

A: Well as a professor in Hydrology I was pretty much interested in any practical applications of any sort of groundwater movement and this seems to be a prime example of that sort of practical application. It's just a very interesting puzzle which I would like to have a small part in solving.

Q: I direct your attention to an area map of Woburn, Massachusetts. Do you recognize it?

A: Yes, I do.

Q: Can you identify the main features of the map?

A: Would you like me to get up and point to them or - -

Q: Generally, do you recognize the map for what it is?

A: Yes, it's a picture of the eastern half of Woburn, essentially.

Q: Now please tell me again, what work you did in relation to the Woburn case?

A: I was asked to explore alternative areas where the contamination of these wells come from aside from the different sites implicated in the lawsuit.

Q: Okay. Could you please identify which sites were implicated in the lawsuit?

A: The sites that were implicated in the lawsuit were the Beatrice site and the W.R. Grace site.

Q: Would you please identify them by pointing to them?

A: On the surface map right here (indicating) the W.R. Grace site is in this portion and the Beatrice site is down in this area (indicating).

Q: Based on your observations of the wells have you reached an opinion that has some kind of affect or input for us this afternoon?

A: Yes. The opinion I have reached is, it's far more likely the contaminants moved from this Industri-Plex area into wells G and H than it is for either of those sites.

MR. HARTER: Your Honor, If I may make a motion to strike that last statement as the witness is unqualified to publish or dismiss.

THE COURT: Counsel?

MR. MITZEV: Your Honor, I can strike that question.

MR. HARTER: Question stricken please from the record.

THE COURT: And response?

MR. MITZEV: Response, at this time I would like to qualify Dr. Daniel's as an expert and have his testimony offered as expert testimony based on the research done.

THE COURT: Objections? So noted. Proceed.

Q: Tell me a little bit about this area that you studied?

A: Well, the main area I examined was the Industri-Plex right here and I did a historical examinations of the various industries that were in that area which would contribute

pollutants that would travel downstream to wells G and H area. Essentially this area has a very long history of both industry and industrial pollution.

Q: Now Dr. Daniels?

A: Yes.

Q: When we talk about Industri-Plex, what does that mean?

A: The Industri-Plex is a group of various industries that are collected in this general area right here (indicating) which has been termed the Industri-Plex.

Q: Why are they there?

A: There could be a variety of reasons why they are there. There was ample wind for usage when they were first built there. Moreover, because of the Aberjona River there was ample access to water for these industries. Many of these industries require large amounts of water to make what they produce.

Q: What is the size of this Industri-Plex, do you know?

A: It's approximately 250 acres.

Q: 250 acres. You began with the history of the Industri-Plex, could you please tell the court what kinds of industries are situated there?

A: Sure. There are a number of industries that have been in the Industri-Plex. First and foremost there are several tannery complexes within this area because, as we previously mentioned, Woburn is a large producer of leather. Second, there are a number of chemical industries in the area. And third, there are some piggeries and other food production facilities.

Q: Do you know what the kinds of chemicals that were manufactured at these facilities?

A: At the chemical facilities?

Q: Yes.

A: There are a number of chemicals manufactured at these facilities since they are general chemical manufacturing companies. Some of the more specific of these, the chemical companies manufactured such items as metallic mercury, arsenic and lead for pesticides and they also manufactured various chemicals necessary for production of leather in the tanneries.

Q: Are there any other industrial sites that you can identify, on the map, for us?

A: There are some barrel sites just north of the Industri-Plex but still on the Aberjona river watershed. These barrel sites store large barrels, 55 gallon drum variety which are used, contain a number of materials.

Q: Okay doctor, you may sit down.

MR. MITZEV: At this point, Your Honor, I would like to mark into defendant's Grace exhibit 5. Mark into evidence please.

THE COURT: Sure.

Q: Doctor, I'm going to give you what appears to be a map and I would like you to just to tell me if you have ever seen that before?

A: This specific map or a map of this area?

Q: That specific map.

A: Yes. I have.

Q: Can you tell me who generated that map?

A: That map was generated by the EPA, Environmental Protection Agency.

Q: Has your research in this case indicated the use of that map in any capacity?

A: This map was used in a report done by the EPA in an investigation into the contaminants in this area and I believe it was used to identify the various conditions in this area, under investigation.

Q: Do you recognize the features on this map?

A: Yes, I do.

Q: Do you think you could correlate the features on that map and correlate them with the features of the large topographic map you have in front of you?

A: Sure.

Q: Would you please adjourn to the map? Using the EPA map and the overhead map for the large scale, could you please identify the Grace property?

A: Sure. As it's identified on this map (indicating), the Grace property lies in this area right here (indicating).

Q: Very good, how about the Beatrice property?

A: The Beatrice property, it is not identified on this map - -

MR. HARTER: Your Honor, at this time I think we've already been over this once before. I'm sure that this has been asked and answered, can we move on?

MR. MITZEV: Your Honor, if I'm permitted a little latitude the court will quickly see where I am headed with this in establishing the case.

THE COURT: I'll overrule the objection for now.

MR. MITZEV: Okay.

A: But it does specify as a wild wood area which is approximately right here (indicating).

Q: Does it specify any other industries within the two boundaries you have just created?

A: Yes it does. It specifies three other industries. First is the Olympia Trust area which

Q: Where is that?

A: That is about in this area right here (indicating).

Q: Anything else?

A: Yes, there is a New England Plastics Company and that's right here (indicating). And a Unifirst Company which is right here (indicating).

Q: Okay, thank you.

MR. MITZEV: Your Honor, at this time I would like to publish that EPA map to the jury for their perusal?

THE COURT: That's fine.

Q: You may be seated doctor. Based on your work in the area, has any contamination occurred based on the Industri-Plex?

A: Yes there is quite a bit of contamination based on the Industri-Plex.

Q: What kind of contaminants?

A: The sort of contaminants there are pretty much all the contaminants used in an Industri-Plex which has an exhaustive history of contamination in the Industri-Plex in terms of dumping just throwing chemicals on to the ground in large chemical lagoons.

Q: Has the EPA done a study on the effects of the Industri-Plex?

A: Yes, the EPA has done several studies on the Industri-Plex.

Q: Tell me the results of these EPA studies, based on your research?

A: The EPA identified in fact there had been a large amount of pollution in the Industri-Plex area, including large mounds of hides that were partially buried over and the dirt has sloughed off and now they are releasing noxious fumes into the environment. In addition arsenic lagoons and other traces of many other chemicals throughout the region.

Q: What action has the EPA taken on the contamination of these various sites?

A: The EPA has instituted a Superfund cleanup project for the sites.

Q: Could you please identify, to the court, what a Superfund project is?

A: A Superfund project is a project whereby the EPA contracts with landowners and potentially responsible parties. Those who are liable for the pollution in the area and then requires them to pay for the cleanup and remediation of the environment in that area.

Q: What contaminants in particular led this characterization of the site as a Superfund site by the EPA?

A: Probably the biggest contaminant they identified would be the presence of arsenic in this area.

Q: Based on your research, is arsenic a dangerous substance?

A: Yes, arsenic is a very dangerous substance.

Q: Has the EPA ever created some priority substances?

MR. HARTER: Objection Your Honor. Testimony is irrelevant. Arsenic is not in question. The chemicals in question are TCE, DCE and PCE.

MR. MITZEV: Your Honor, again if I am permitted a little latitude I will hope to show that there's a correlation between the contaminants dumped at various levels and contaminants found.

MR. HARTER: Your Honor, we're not talking about the contaminants – arsenic, lead or anything else. We are talking about TCE, DCE and PCE. Counsel has had a little latitude a few minutes ago and I think the testimony continues to be irrelevant.

THE COURT: Counsel I will sustain the objection this testimony referring to the chemicals that are not at issue.

Q: Is the EPA Superfund report discovered elements that are in question here, TCE, PCE, DCE, at various Industri-Plex sites?

A: In terms of specifically listing all the chemicals, normally EPA reports don't do an exhaustive list of all the chemicals in a particular site. They normally list the ones that are most prevalent or the ones that are most dangerous. So in this case they listed arsenic and other organic chemicals which could conceivably include the chemicals in question, in this trial.

Q: Was TCE found in any...

MR. HARTER: Your Honor at this time I would like to strike the last remark. It's clear that the witness is speculating as to what they could conceivably include when in fact he does not know.

MR. MITZEV: That's fine Your Honor, we can go on.

THE COURT: Then the portion of testimony that refers that "which would conceivably include the chemicals at issue in this trial" portion of testimony be stricken from the record. Proceed.

Q: Specifically with - - in relation to wells G and H, has your research indicated contamination found in the Aberjona River Valley , levels of TCE, PCE and DCE?

A: There is contamination in the Aberjona River Valley, all three of those chemicals.

Q: Did your research indicate where those were found?

A: Within the actual valley themselves?

Q: Correct.

A: I didn't do any specific research as far as the extent of the valley themselves. I merely examined what was going on at the river area. And what that showed was, along the river in the area we had data for, there was some contamination I believe of perhaps, I don't know exactly which chemical. Some chemicals are found in the riverbed. Some chemicals are not found in the riverbed.

Q: Did your work have anything to do with the floodplain that is presently comprised at the Aberjona River Valley?

A: Yes, I did research over and extending to the floodplain.

Q: What did your research reveal?

A: My research revealed that in the floodplain, the floodplain itself doesn't seem to be flooded quite often due to the fact that it is ever changing and very shallow.

Q: Your Honor, at this time I would like to publish evidence that has been previously admitted showing the flood changes of the Aberjona River Valley.

THE COURT: That's fine.

MR. MITZEV: Thank you. For the purpose of this demonstration can the jury see clearly?

Q: Dr. Daniels, what are we engaged with right here?

A: What this chart shows is peak levels of discharge in the Aberjona River at the Winchester station.

Q: What area does this cover, you just mentioned a Winchester station?

A: Winchester station is just south of the area in question in the wells G and H area.

Q: What do the peaks represent?

A: The peaks on this graph represent the areas for that instance of maximum discharge and what I mean by discharge is the volume, and I believe this is cubic feet a second, that is passing the point in the Winchester station in the river. So you have X number of cubic feet a second passing through the point in the Aberjona River.

Q: Does this graph illustrate any pattern?

A: It illustrates one large pattern that I can identify.

Q: Please.

A: And that is from the period from 1939 to approximately the period of 1979 and 1984 area. There is a very distinct increase in both the magnitude of the discharge and the frequencies of the discharge in terms of there being more discharge.

Q: Is there more flooding?

A: From this information one would conclude that yes there is more flooding in this area because there is more water.

Q: Could you identify what runoff means?

A: Runoff is surface water that falls . either as rain or snow and then melts, then runs off the ground - - not being soaked into the ground - - and then flows into the river.

Q: Correlating the data with the runoff information you just gave us. could you give an opinion as to what consequences this may have for the case at hand?

A: The consequences, I would say for the case at hand is as you can see by the increasing levels of the discharge there is going to be more surface runoff into the rivers themselves. And because there is more surface runoff there is more opportunity for that water running off to pick up contaminants from the surface at various sites, and then carry them down the river.

MR. MITZEV: At this point Your Honor, I would like to mark into evidence Grace defendant's exhibit #6.

THE COURT: So admitted.

MR. MITZEV: May I approach the witness Your Honor?

THE COURT: Yes.

Q: Doctor, I am going to give you a graphic. I would like to give you a moment to recollect and see if you remember it?

A: Yes, I do.

Q: Okay. Did you generate this graphic?

A: No I did not. This is generated by the information from the EPA.

Q: Did you use this graphic in your research?

A: Yes I did.

Q: Dr. Daniels could you please identify, for the court, what we are looking at?

A: Yes. What this chart identifies and what it looks at is the change in discharge between a point north of the well G and H area and a point south of the well G and H area. What it's measuring is the increase of water that occurs during that stretch of land.

Q: Do you notice the notation that says pumping begins at noon?

A: Yes, I do.

Q: What is the relevance of that notation?

A: The data for this was gathered during the pumping test that was administered by the U.S. Geological Service for the purpose of this trial.

Q: Okay. Do you notice where there is the indicator to the left of the pumping begin line?

A: Yes.

Q: What is the significance of that indicator graphically in relation to the right of the pump line?

A: With the one on the left shows before there is any pumping stress administered by the wells the Aberjona River picks up a flow of 740 gallons per minute between the northern edge of the wells G and H area and southern edge of the wells G and H area under conditions where there is no pumping.

Q: And then when there is pumping what happens?

A: When there is pumping you can see first a gradual decline, a pretty steep decline in the amount of water it picks up from the northern edge to the southern edge. And you can see eventually there is an area where it is actually losing water during that period.

That is the amount of water on the northern end is more than the amount of water on the southern end.

Q: Is the river losing water because of the pumping action of the wells?

A: Based off the evidence in this test, yes because it only loses water in this instance when there is pumping stress.

Q: Is this loss of water specifically under the wells?

A: This was monitored in the area north and south so the stretch that we're talking about, where the water is actually lost, does pass right on by the wells. If you examine flow patterns from that the most logical conclusion would be that the water is drawn from the wells at various points of the Aberjona where it lost the water due to the pumping stress and then flowed directly into the wells.

MR. MITZEV: I apologize Your Honor. A lot of exhibits have been laid down here and I need a moment to refresh my memory.

Q: Could you identify what you have in front of you?

A: It appears to be a potentiometric map of the water table at Woburn after pumping test in January 1986.

Q: How would it differ if the pumps were turned off?

A: If the pumps were no longer operating and there is no pumping stress - - as you can see there are two large depressions immediately to the east of the river, those being the O shaped depressions you see there potentiometric surfaces, those would no longer be there.

Q: What would be the effect on the water table?

A: The water table itself would rise if there is no pumping - - if the pumps were turned

off because the pumps would no longer draw the water out of the water table. Therefore it just has to be taken away.

Q: And if the water table rose what would be the effect on the river directly above that water table?

A: The effect on the river would be, as the water table rises the river would lose less and less water and eventually become, once again become the gaining stream. That is, it brings on water between its northern edge and southern edge.

Q: A gaining stream, please back up for a moment and identify the gaining stream.

A: Sure. A gaining stream is where the river actually gains water.

Q: Where does this water come from it gains?

A: It typically comes from the ground water.

Q: The ground water?

A: That's correct. The ground water flows up from the water tables, since the water table is now meeting the river under conditions of no pumping stress. And if it is indeed a gaining river and that it flows up into the river and that's how it gains water.

Q: And what happens when the pumps are on?

A: Well the water table falls below the surface of the river and then the river is; one, no longer gaining water and second, is leaching water from the river itself down to the water table.

Q: Does the river directly above the water table lose water if the pumps are on?

A: Yes, it does.

Q: Does it lose water directly beneath the pumps?

A: Yes, the wells aren't directly...

Q: I'm sorry, does the river, the Aberjona River loses water directly beneath where the pumps are located or in that vicinity?

A: It loses it in the vicinity. So if you had pumps next to each other. For example, if you take a look at the chart and see the two large depressions and you see the Aberjona River running through that area, the Aberjona River directly to the west of the two depressions, it would be losing water.

Q: Would it lose water upstream of the well area?

A: It would lose perhaps a small amount of water. The greatest loss would be directly in the areas of pumping stress, there (indicating).

Q: Thank you Dr. Daniels. I have no further questions.

THE COURT: Cross Mr. Harter?

MR. HARTER: Yes. Thank you.

BY MR. HARTER:

Q: Dr. Daniels, I have to admit I'm fascinated by your publications. I just wanted to let you know that.

A: Thank you.

Q: I see here you wrote the first one in 1976?

A: That's correct.

Q: The second one was, you say, published in a journal in '77?

A: That is correct.

Q: Next one book was published in 1978?

A: Uh huh.

Q: The next book was actually published by the University of Chicago Press in 1982?

A: Uh huh.

Q: And what year did you mention on your resume' that you got your Bachelor of Science degree?

A: Bachelors of Science was in 1982.

Q: So you had already published three of these books before you even got your Bachelors?

A: No, it is a typographical error on my part.

Q: I see, I'm sorry to waste the courts time on that. Are you being paid to be here today?

A: I am being compensated for my time.

Q: About how much?

A: About $100 an hour.

Q: About how many hours would you say so far?

A: Approximately 50 to 70 hours.

Q: So, take the average say 60 hours. You've been paid about $6,000.00, so far, by Grace?

A: That would be a fair estimate.

Q: Okay. Now doctor, do you know what the maximum allowable amount of TCE is - - parts per billion.

A: In – I don't recall the specific number right off the top of my head.

Q: How about DCE?

A: I do not recall that specific number either.

Q: How about PCE? Would you believe me if I told you it was two?

A: I'd like to see some evidence of that.

Q: Is it less than 440,000 parts per billion?

A: It could or could not.

Q: Would you want to drink water that had 440,000 parts per billion of TCE?

A: It depends on whether or not it's going to hurt me. I don't have any medical knowledge.

Q: Fair enough. The did a lot of bad stuff over at that industrial place, didn't they?

A: Yes, they did.

Q: Dumped some chemicals, didn't they?

A: I believe that would be a good characterization.

Q: How much TCE did they dump?

A: I don't have an exact count.

Q: Are you sure they dumped any?

A: I think it would be a fair assessment they did dump some.

Q: Is that an assessment or a guess?

A: I would say based on the sorts of industries that are there...

Q: Now doctor I am going to make this as simple as possible.

A: Sure.

Q: Can you point to anything other than what you write by your own hand that says

TCE is at the Industri-Plex?

A: First of all, there are no test that were done. I base my analysis off just that, an analysis of the dumping patterns of the industries there and the sort of chemicals that those industries used.

Q: So is that no, I can't point to anything that says TCE is dumped at the Industri-Plex?

A: It depends, what you meant by pointing to something specifically.

Q: Now they dumped TCE out the back door of W.R. Grace every night from 1960 to 1982.

MR. MITZEV: Objection Your Honor. That was not his testimony. I don't see how he could ask him about it on cross-examination.

MR. HARTER: I'm sorry.

Q: Have you reviewed the stipulated facts for this case?

A: In terms of what's been dumped, I perused them briefly.

Q: You perused them?

A: Yes.

Q: In that brief perusal did you notice where it says that "an employee from W.R. Grace dumped TCE out the back door every night from 1960 to 1982"?

A: I do remember seeing something that says "he dumped it out the back door".

Q: So we're sure they got TCE at Grace because he dumped in on the ground?

A: Yes.

Q: And do you remember that there is some leaky barrels over at Beatrice property?

A: I don't remember anything about that.

Q: Some pollutants on the ground?

MR. MITZEV: Your Honor, certainly if the facts are stipulated it wouldn't be very hard to refresh his recollection with a copy of the stipulated facts, so he didn't have to remember Sua Sponte but to rather just refer to the stipulations. That shouldn't be too hard for a gentleman of his caliber.

MR. HARTER: I'll withdraw the question Your Honor. I didn't mean to test his Sua Sponte.

Q: Now, Dr. Daniels did you do any test to see whether TCE flowed from Grace to the wells?

A: You mean going out and gathering soil samples and that sort of data?

Q: I mean anything. Any test that indicate TCE does or does not flow from Grace to the wells?

A: I did nothing to specify whether or not TCE does or does not flow from W.R. Grace to the wells.

Q: How about DCE?

A: No.

Q: How about PCE?

A: No.

Q: But they did a lot of bad stuff at the Industri-Plex?

A: That is correct.

Q: Doctor, would it be safe to sum up your opinion as saying "I am not sure whether my client did anything wrong but I know somebody else was doing it wrong too.

A: No, I don't think that's a fair summation in my opinion.

Q: Okay. No further questions right now your Honor.

THE COURT: Redirect?

BY MR. MITZEV:

Q: Dr. Daniels, what do petrochemical companies make?

MR. HARTER: Objection Your Honor that's beyond the scope of cross-examination.

MR. MITZEV: He certainly asked him if he was dumping TCE, if he knew they were dumping TCE or what other elements even existed at these sites. And based on his observations of the chemical companies I would like to see any research indicating such results.

MR. HARTER: Your Honor, the witness never stated that petrochemical companies where anywhere in Woburn, Massachusetts. That's what is beyond the scope of cross-examination. The witness has never mentioned was at the Industri-Plex.

THE COURT: I will sustain the objection to the form of the question, would you like to ask the witness does he know or does he have documentation of what other things specifically were done, then he can talk about that but if he doesn't then he cannot address that.

MR. MITZEV: I have no further questions your Honor.

THE COURT: Any re-cross. Dr. Daniels you are excused. Does Grace rest at this particular time.

MR. MITZEV: We rest at this point your Honor. Thank you.

THE COURT: Would the jury like a moment for closing arguments or would you like to proceed?

MR. HARTER: Your Honor, at this time a brief housekeeping matter. Do we have any jury instructions or a jury verdict form decided upon or will that not be done until after closing statements?

THE COURT: We'll look at it after closing statements but they probably already decided in that matter.

MR. HARTER: In that matter, then yes I'm ready to prepare the closing. If I may have just a moment to go through some of our slides.

CLOSING STATEMENT

BY MR. HARTER

Wow, wow, that all I can say. I sat right here, right here and I got a headache. I'm confused. And so I'm hoping that in working through this summation with you, I will be able to straighten some of this out for myself and if you're lucky maybe - if you're confused it will straighten out some for you.

If you remember back five hours ago, my co-counsel Janine Salloum, stood right here and told you what this case was about. This case is about four children and one father who were killed by drinking the public water. Joining the families of those people are two other children who are battling leukemia from drinking the public water. That sounds fairly straightforward but where does a rising gradient come into play and what's a retaining aquifer, and what's a potentiometric? I don't know quite honestly, I don't know. But I don't think it matters. I don't think it matters because in two witness within the course of one hour, we proved our case. You first heard from Dr. Thomas Gray. Here's a nutshell version of what Dr. Gray said. Water flows from Grace to the wells. Water flows from the Beatrice properties to the wells. Water flows from the two defendant's corporations to the public drinking wells. Five people died and two more got sick because they drank from the well. Still seems fairly simple to me. Our second witness, Dr. Cindy Morris told us you're only allowed to have two parts per billion of these chemicals, two and that's the benefit of the doubt. In some it's only one, but I don't remember which one and it's not really important because it's certainly less than - - I'll just pick one - - 16,000. And it's certainly less than 440,00 parts per billion. Two, more than two, you're probable going to get cancer.

Now 440,000 is a heck of a lot more than two and so we got – water flows from the defendant's sites to the wells. And when that water is flowing it's carrying things that will probably or in one case definitely cause you to get cancer. And then five people died of cancer and two more are battling cancer. And then Dr. Morris, to finish her testimony – we said "how long does it take to get there?" and she said "for Grace five years and for Beatrice a month". So, five years after it's dumped out of the back door every night at Grace, cancer causing or possibly cancer causing agents are in the well. A month after they are dumped at Beatrice, cancer causing or possibly cancer causing agents are in the wells.

Five years, we've got cancer in the wells. Still fairly simple, one hour. Then the defendant's took the stand. The defendant's took the stand and, if you'll pardon the analogy, they muddied the water. They muddied the water of the case. They said "hey, we didn't do it. Hey, it's too fast. Hey, it's too slow - - this and that, this and that." But do you remember the first witness that they called. Do you remember Mr. Ignatz. Mr. flippin the overheads around, right. And he gave some great ideas about Beatrice. He said "oh the water goes up and over and around and through and it doesn't get there fast enough and this and that. I asked Mr. Ignatz on cross, to explain that mystery red arrow that went from Grace to the wells. And he said "oh yeah that's how water gets from Grace to the wells." That's what we said. That's what we still say. That's how water gets to the wells from Grace. And then we heard Dr. Russell. And Dr. Russell does have a Ph.D. so we'll give him a little bit more benefit of the doubt than Mr. Ignatz. But when he got up, he said the same thing. My co-counsel, Julia Luke, asked him "what are these red arrows flowing from Grace and Beatrice to the wells?" and he said "oh, that's how water flows to the wells,

granted that's only when the wells are pumping." But were the wells pumping when water was coming out of them? Of course. So maybe now, you know today, there's no cancer causing in the wells. But certainly if people are getting drinking water the wells have to be working, common sense. And that's all Beatrice said. All Beatrice said was "Grace did it, wasn't us, comes from Grace. Then I think we took another break, but then Dr. Olvera took the stand. She did a good job, talked about calculations, talked about time travel. Oh it's going to take too long, 30 years maybe longer. And then - - very brief cross-examination by co-counsel, Janine Salloum, stood up and said "now, you had to do a calculation for this right? And Dr. Olvera said "yes" and then she said is permeability involved in that calculation? And Dr. Olvera said "yes", and Janine said "which of these did you assign to be more permeable or which of these is more permeable?" And Dr. Olvera said "of course", common sense, "sand is more permeable" water goes through sand a whole lot easier than it goes through concrete, right. "In your calculation, which of these did you say is more permeable?" Concrete -- whoops – now, Dr. Olvera is a very recognized doctor but she made a mistake. She made a mistake, probably just like Grace and Beatrice made a mistake. They didn't mean to, but she did. And for that, for that mistake, her testimony cannot be reliable.

And speaking of mistakes, Dr. Daniels gets to the stand and says "oops, made a typo." Forgot what year I got my degree, or he didn't actually say that. He could have forgotten what year he wrote his four books. But either way, he made a mistake. But maybe I should have asked Dr. Daniels is "did you make a mistake when you didn't see if any chemicals made it from Grace to the wells?" "Did you make a mistake when you didn't

even run the tests, you didn't even do a calculation?" You got Grace paying you $6,000.00, we're talking about, and you don't even run a test to see if they're causing the pollution. Hey, no, it wasn't Grace it was upstream. Do you have any data? No, but I can guess that it's upstream.

Dr. Daniel's want's you to outweigh the lives of five people and the health of two more with a guess. I am not going to specifically say it was Grace. Now I tried to keep a running tally but Mr. Ignatz got paid $19,000.00, Dr. Russell got paid 20, Dr. Olvera got paid 60 and Dr. Daniel's got paid 6 thousand dollars. So If I may, $105,000 has been paid to the four experts that they called to tell you what? Beatrice says hey it wasn't us it was Grace. Grace says hey it wasn't us it was upstream. Does anybody have any numbers to support that? No. And the reason why is because no matter how much you muddy the water you can't hide the truth. The truth in this case is simple and it was proven to you within an hour of when you sat down. The truth in this case is that Grace and Beatrice dumped toxic materials on their sites. The truth in this case is that those toxic materials flowed into the public wells. Flowed there in a century? No. Flowed there in five years from Grace and a month from Beatrice.

The truth in this case is that by 1965 those wells were contaminated with cancer causing agents and over the course of the next 15 years people drank the water and died because of it. That, members of the jury, is all you need to hear. You don't need to hear finger pointing, this, that and the other. This person, that person. Our testimony is un-refuted. Our testimony is the truth. In deliberating, I ask you to keep these things in mind because you will be asked to find – we proved our case by preponderance of the evidence,

and that's a word that the defense counsel through at you on opening statement and I bet you know what it means about as well as potentiometric. When you put all of the evidence on a scale -- here's our evidence, here's the defense evidence (indicating). To prove a case by a preponderance of the evidence the scales have to tip. All that you have to find is that we are a hair more right than they are. Ladies and gentlemen, members of the jury, the scales of justice broke. The scales of justice broke. We're not a hair more right, we're the only side that's right. We didn't just barely win our case, ladies and gentlemen, we proved that the defendant's killed five people. I ask that you find for the plaintiff's in this case. Thank you.

CLOSING STATEMENT

BY MS. SULLIVAN

Your Honor, counsel, members of the jury; Before I give my closing argument, let me take a moment to offer my sincere thanks and I am sure everyone here does. Thank you for taking a perfectly good day and spending it inside this courtroom here with us. We are honored with your presence. You have the privilege of maintaining one of the tried, true and veritably sacred facets of the American judicial system and that's the jury trial, the sacra sanctuary effect and we just applaud your presence here today.

Members of the jury, you have heard the plaintiff's telling you of the tragedy that has struck the lives of many citizens of Woburn. For years they have lived with undrinkable water. They have complained to city officials. They had no idea that the simple act of drinking water or bathing in it could have such drastic ramifications on themselves or their families and they were very justified in feeling vindicated. Beatrice Foods, we own the Riley Tannery or did at the time, grieves with the families and we suffer with them and we feel for their loss. I urge you to remember that the employees of the Riley Tannery are citizens of Woburn. They live there and they drank the water too.

You have heard lots of complicated testimony about ground water movement, gradients, chemical concentrations, but I assure you that this small portion of the trial is absolutely essential and the outcome of the entire case ends here. Though you may feel compelled, based on compassion or pity to go with a sense of - - to determine this case based on emotion. I urge you and I am actually put in a very difficult position of having to urge you to place whatever emotion you have about the case, put those feelings aside and

determine this case on the facts as they were presented to you.

Woburn, remember, has a long history of industrial development mostly concentrated in the area of the Aberjona River, the watershed, the industrial complex upstream from the two wells. For decades no one had a reason to believe that the water was contaminated long before wells G and H were even in operation. Beatrice, owner of the Riley Tannery, is only one of several companies that may have contributed to the degradation of the water supply. Here, however you need to remember what I am sure the Honorable Judge asked you before sitting on this jury. Are you going to be able to follow the law as it is given to you? You will be asked to hold the plaintiff's to a burden of proof by the preponderance of the evidence. That means that they have to show to you that we as individual defendants were 51% more likely than not to have contributed the contribution to the contamination of the wells. And I am really going to try not to bore you. I'm tired. You're tired. But I need to walk you through the facts, not so much of what the defendant's put on but as to what the plaintiff's put on.

You have heard testimony and we do concede that there were concentrations of TCE, DCE and PCE on mostly the 15 acre property owned by Beatrice. You heard plaintiff's expert, Dr. Thomas Gray, testify that in his opinion these two sucking cones of depression formed around the wells when they were pumping. You heard the plaintiff's chemical expert testify that the travel times of the chemicals from the 15 acres, owned by Beatrice, to the wells was three months – maybe it's a month, we'll see. But in order - - I know you're tired, I know I'm tired but I think in the very beginning of this case plaintiffs counsel stood up here and said that in order to prove their case they had to say that "you must find that the

chemicals reached those wells before 1979." In order for the chemical concentrations found on the 15 acres they must have traveled under the river, gotten caught in the cones of depression between – in the case of Beatrice – between 1968 and 1979. Let me tell you what the plaintiffs didn't tell you. You may not remember, but my co-counsel asked the plaintiffs chemical expert if she got her chemical concentrations from a USGS Survey, she corrected my co-counsel and said "no" she had gotten them from EPA test, and said okay the EPA testing that was conducted for every chemical concentration that has been determined is from 1979 to 1993.

95%, we'll say the majority of the percent of all the chemical concentrations implicating Beatrice Foods were taken from 1984. That's six years after the last possible day that all these chemicals had to have gotten into the wells and distributed among the town of East Woburn. This is important because, as a matter of fact, there is no chemical proof that any of the - - the plaintiffs have not put out any chemical proof prior to 1979 about their contamination of the property.

They have offered no eyewitness proof, no former employee proof. The only shred of evidence that the plaintiffs have is one photograph, which they did not offer into evidence, showing some 55-gallon barrels taken in 1956. They have no evidence of anything leaking. What if anything from the barrels, from the property and naturally the barrels are no longer there. All we have is this elusive photograph which hasn't been presented.

Now, when you go to law school you learn in law lingo that's called missing an essential element on the point of causation. They failed to meet their burden of proof. They stood up here and said "in order for you to find for us we have to prove their chemicals got to our wells before 1979". They used no data from any time before 1979. So next, of course, and I assure you it wasn't just to confuse you, we put on our own experts. And we, Mr. Ignatz who is one of our experts, and we tried to inform you of some other factors that may have led to the contamination of the wells, such as flood frequency, heavily polluted industrial complex north of the watershed and both Mr. Ignatz and Dr. Russell have obviously very different opinions from the plaintiffs about the effects of the two continuously pumping wells that were on the Riley property. But the simple fact is, we didn't have to put on any of that evidence, the plaintiffs failed to meet their burden of proof.

I only have this one chance to speak to you, my co-defendant's are going to speak next then the plaintiff is going to get a chance to rebut this argument. But my co-counsel and I have tried - - we've tried to show you that even if there were contamination of the Riley Tannery during the years of 1968 and 1979, it wouldn't have gotten to the wells anyway. The ground water flows in a lot of fluid. It had to come across the river and fight the pull of the two wells on its side of the river.

Furthermore, we have attempted to point out to you that they cannot offer you any conclusive evidence that even suggest that there were contaminants on the Riley property during the time for which time the health would be imposed. Without this credible evidence their argument must fail. We simply ask that you do as the evidence demands and find that Beatrice is not liable. Thank you.

CLOSING STATEMENT

BY MS. PARTIN

Well, here we are at the end of the trial. What's it about? It's about this ugly rock and it's about a chemical called TCE that you can by for $2.95 at your local hardware store. I would also like to thank you each and every one of you. I know that this was just horrible. The complicated subject matter was probably very frustrating for many of you as it was for us. But what I want to focus on is why we are here today and what your job as jurors is. You have a very, very, important role. As jurors the decision you render today does not only affect everyone in this courtroom but it affects the lives of everyone outside. How does it do that? Let me explain how it does that. In our legal system the plaintiff's, again I will use the words preponderance of the evidence, they have got to prove by a preponderance of the evidence that the contamination at the Grace site was able to flow down to the wells in question. They failed to do so. He was proud of testifying in one hour. Five children's lives, the import of their lives depleted to one hour's testimony. He failed to satisfy that burden.

Members of the jury, I also am a mother. I have three small children. Our hearts go out to the parents of these children. But, by accusing the wrong party the guilty parties remain free and look at what they have learned. They have learned, by hiding their wrongs they were able to kill and beat the legal system. Members of the jury, do not allow them to

beat the legal system. Do not allow them to beat you. It is up to you to send the right message. Grace is but a needle in a haystack. We have put on expert witnesses that have testified of the pollution in the water, of all the other industries that were also responsible for the pollution. We're not hiding anything. We took a cup of this, a quart of this and we tossed it out the door. When this one cup was unable to go through, this, this is the level at the Grace site. Now there was some confusion and I apologize that because of our legal system I was unable to address it, this is not on our expert witnesses. This is no fault of hers this was a fault of mine because I was unable to understand. There is a difference between permeability and porosity, they are opposites and if she had the chance she would have explained to you. But what she said remains true, this (indicating) is the surface layer at the Grace site. There is no way, members of the jury, that a chemical can travel beneath this surface and down to the wells. It is impossible.

Dr. Olvera has spent a majority of her life protecting victims such as those, protecting their lives in a wellhead protection fund. Remember her evidence. Remember her opinion. She said 30 years. There is no way that chemical that was at the Grace site, that was dumped could possibly have traveled, it's impossible. Even if you're confused about the complexity of the evidence which most of us are and feel that a portion of this chemical was able to travel. It is insufficient a quantity to be the cause, which is what the plaintiff's have to prove. They must prove beyond a preponderance of a doubt. They think they did that in one hour as complex as this is, no way. No way. They failed. They're guessing. They're saying "well we think this is what happened based on numbers that were given to us." How often have any of you forgot to write down a check or forgot to send a

bill here and there. We're suppose to take statistics that were given to them way back several years ago by government officials. Well we have all – we all know how government operates, very inefficient, it's very slow.

The plaintiff's want to blame Grace for all of its wrongdoing. The plaintiff's have failed to prove beyond a preponderance of a doubt. Dr. Daniels testified and because as he was typing he hit the wrong number we're suppose to eliminate his testimony? Oh give me a break. We all type, how often do we all make mistakes? All the time, right. But we're humans. How can we take away his credentials because of one wrong number. He testified that there were other industries that were polluting the area in question. He testified that there were pollutants coming from the water. In sum what do we have? We have this mucky area full of industry, full of pollution. And we have a needle in a haystack, Grace. We are but a needle.

If you wrongly accuse Grace, what happens to the rest of the haystack? And what message do you sent out? That's all I have. Thank you.

RE-CLOSE

BY MR. HARTER

This is a municipal well in Woburn, Massachusetts, midsize. I'm a resident of Woburn, Massachusetts. I'm not going to look for a minute and one person from Grace is going to run up and dump some TCE in there. And then Beatrice is going to run up and pour some TCE in there. In approximately a year I am going to die of leukemia unless I'm lucky and I get to live and battle leukemia. So I'm in the majority, I'm going to die. I'm going to let Janine and Julie bring my case for me and what are they going to say? They're going to say it's Grace and Beatrice. What's Grace going to say? "Maybe we did it but a lot of other people did too, we're just a needle in a haystack", to use their words. "We're a part of the problem."

What's Beatrice going to say? "We know some TCE got dumped in there but it wasn't our TCE, we borrowed it from somebody." Is it okay for them to pour TCE in here (indicating)? Absolutely not. Does it matter that says "it's not ours, it's just on our land? Absolutely not. Should you fix part of the problem or should you say, "hey we can't get everybody that poisoned the drink so we are not going to get anybody at all."

I'm not going to stand up here and rant and I'm not going to read you something I got paid to write two hours ago. I'm going to talk to you from my heart and from my mind. My mind tells me common sense dictates. My heart tells me that you must find for the plaintiff's.

Members of the jury, I submit to you again the scales have tipped and the tipped some more and then broken. Our case was proven. The defendant's killed four children.

one father, and made two other children sick. Something they will have to battle for the rest of their lives. You must, based not on emotion. Not on whatever else is going on outside. Based on the facts, you must find for the plaintiff's.

Thank you for your time and I look forward, on behalf of the plaintiff's families, to your returning a verdict in favor of the plaintiff's and against the defendant's. Thank you.

THE STATE OF OHIO)

COUNTY OF FRANKLIN)

CERTIFICATE

I, MASSIE L. PAGE, Certified Court Reporter in and for the County of Franklin, State of Ohio, do hereby certify that the foregoing statements consisting of _____ pages were reported by me in machine shorthand and transcribed by me under my personal direction and supervision and are a true and correct transcript, to the best of my ability and understanding.

I hereby certify that I am not of counsel, not related to counsel or the parties hereto, and am in no way interested in the outcome of this matter.

MASSIE PAGE
Certified Court Reporter