

MISSOURI DEPARTMENT OF NATURAL RESOURCES  
LAND RECLAMATION COMMISSION

In the Matter of:

MAGRUDER LIMESTONE CO., )  
INC., Osage Beach )  
Quarry, Miller County, )  
Missouri, )

Applicant. )  
LINDA WEEKS, et al., )  
Petitioners, )

vs. )  
LARRY P. COEN, Staff )  
Director, Land )  
Reclamation Program, )  
Division of )  
Environmental Quality, )  
Respondent. )

Proceeding Under The  
Land Reclamation Act,  
Sections  
444.760-444.789

ADMINISTRATIVE HEARING

MAY 23, 2008

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Director, Land )

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Division of )

Environmental Quality, )

Respondent. )

This matter came on for hearing on May 23, 2008, before Administrative Hearing Officer W.B. Tichenor between the hours of 9:00 o'clock in the forenoon and 5:40 o'clock in the evening of that day, at the Missouri Department of Natural Resources, 1730 Elm Street, Jefferson City, Missouri 65101, before Judy K. Moore, a Certified Court Reporter within and for the State of Missouri, in a certain cause now pending before the Land Reclamation Commission, State of Missouri, between MAGRUDER LIMESTONE CO., INC., Applicant; LINDA WEEKS, et al., Petitioners; and Larry P. Coen, Respondent.

A P P E A R A N C E S

Appearing on behalf of Petitioners City of Osage Beach and City of Lake Ozark were MR. STEVEN E. MAUER and MR. JOHN T. POLHEMUS of Bryan Cave, L.L.P., 1200 Main Street, Suite 3500, Kansas City, Missouri 64105-2100. (816) 374-3244. Semaaur@bryancave.com.

Appearing on behalf of the Individual Petitioners were MS. BRIAN E. McGOVERN and MS. ASHLEY N. SCHUETTE of McCarthy, Leonard, Kaemmerer, Owen, McGovern, Striler & Menghini, L.C., 400 South Woods Mill Road, Suite 250, Chesterfield, Missouri 63107. (314) 392-5200.

Appearing on behalf of the applicant were MR. RICHARD S. BROWNLEE, III, and MR. ADAM R. TROUTWINE of Hendren & Andrea, L.L.C., 221 Bolivar Street, Suite 300, Jefferson City, Missouri 65102. (573) 636-8135. Richardb@hendrenandreae.com.

Appearing on behalf of the Respondent was MR. TIMOTHY P. DUGGAN, Assistant Attorney General, 221 West High, 8th floor, Jefferson City, Missouri 65101. (573) 751-9802.

THE COURT: Let's come to order. The Missouri Department of Natural Resources Land Reclamation Commission is convened in a formal public hearing in the matter of Magruder Limestone Company, Inc., Osage Beach Quarry, Miller County, Missouri, Applicant, proceeding under the Land Reclamation Act, Sections 444.760 through 444.789, Revised Statutes of Missouri, expansion of Permit No. 0086, Lake Ozark/Osage Beach Joint Sewer Board, et al., the Petitioners, versus Larry P. Coen, Staff Director, Land Reclamation Program, Division of Environmental Quality, Respondent.

This formal public hearing is being convened at 9:00 a.m. on Friday, May the 23rd, 2008, at the Bennett Springs Room of the Department of Natural Resources building at 1730 Elm Street, Jefferson City, Missouri. This formal public hearing is a continuation of the hearing which was held on April the 30th and adjourned to this date. W.B. Tichenor, Hearing Officer assigned by the Land Reclamation Commission, presiding. If all individuals will please turn off their cell phones and pagers at this time and leave them off until this hearing is adjourned.

Applicant appears by counsel Adam

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1 Troutwine and Richard S. Brownlee, III; Hendren  
 2 Andrae, L.L.C., Jefferson City. Petitioner Joint  
 3 Sewer Board appears by counsel Steven Mauer; Bryan  
 4 Cave, L.L.P., Kansas City. Individual Petitioners  
 5 appear by counsel Brian E. McGovern and Ashley N.  
 6 Schuette; McCarthy, Leonard, et al., L.C.,  
 7 Chesterfield, Missouri. Respondent appears by  
 8 counsel Timothy Duggan, Assistant Attorney General.  
 9 Mr. McGovern has filed a joint motion to  
 10 dismiss or in the alternative relieve to add parties  
 11 and has requested the opportunity to speak in support  
 12 of that motion this morning. Mr. McGovern, you are  
 13 so recognized.  
 14 MR. MCGOVERN: Thank you, Mr.  
 15 Tichenor. The motion is, as the Hearing Officer is  
 16 well-aware, a re-filing of a motion that had been  
 17 previously filed by the parties with respect to the  
 18 question of whether or not the application filed by  
 19 the Applicant was, in fact, complete. The Hearing  
 20 Officer had entered an order requesting that more  
 21 information or evidence be provided before any ruling  
 22 was made.  
 23 At this point we've now completed the  
 24 evidence, I believe, with respect to that issue, and  
 25 it's our intent to then re-raise the issue now.

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1 Attached to the motion, included within the motion,  
 2 are the excerpts from the hearing. I don't see a  
 3 need to go through all of those. I think we went  
 4 through that in great detail at the hearing and we're  
 5 all familiar with the testimony and the evidence that  
 6 was introduced as to whether or not this application  
 7 was, in fact, complete.  
 8 What I would want to point out again is  
 9 just the requirements of the statute and the  
 10 regulations which I believe demonstrate that the  
 11 application has to be complete at least prior to the  
 12 time that you go to publication and the time expires  
 13 relative to potential petitioners' ability to file a  
 14 request for formal hearing. I would point the  
 15 Hearing Officer to first 10 CSR 40-10.020, Section 1,  
 16 which provides the general information that the  
 17 Commission shall prescribe the form and content of  
 18 the application to be submitted to the Commission in  
 19 order for an operator to obtain a mining permit.  
 20 Well, we know that. We know the form, we've seen the  
 21 form.  
 22 Then, of course, the regulations then go  
 23 on in Section 2 to describe what that application  
 24 needs to entail. Now, one of the points that we are  
 25 certainly addressing with respect to the motion is

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1 found down in Section 2(e)2(a), and this has to do  
 2 with the maps. I don't think there is any dispute  
 3 that the requirement is that two different maps  
 4 sufficient for the following purposes must be  
 5 included, one of which, according to at least our  
 6 position, is that the utilities, these easements,  
 7 need to be included within the map itself.  
 8 We know also from the statute, if you look  
 9 at 444.772, that there is similar information with  
 10 respect to what this application must include. In  
 11 fact, the statute specifically says the application  
 12 for a permit shall be accompanied by a map in a scale  
 13 and form specified by the Commission by regulation.  
 14 We know the regulations. What happens once the  
 15 Department deems the application to be complete or  
 16 not complete is what I believe is significant with  
 17 respect to the motion.  
 18 I would direct the Hearing Officer to  
 19 444.773, which of course is the statute upon which we  
 20 are appearing in the hearing, and there are two  
 21 things that can happen, one of which is denial of the  
 22 permit, and the second is if the recommendation of  
 23 the Director is for issuance of the permit, the  
 24 Director shall issue the permit without public  
 25 meeting. Now, we know based upon the regulations and

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1 the statute that the Director cannot deem the  
 2 application to be complete until such time that all  
 3 of the essential elements which are set forth in the  
 4 regulation and statute have been met.  
 5 Once that occurs, and we think that is the  
 6 critical time, once the Director makes that  
 7 determination, there's then a series of dates which  
 8 then come. We know there is so much time during  
 9 which an informal hearing can take place. The  
 10 meeting, I think, is actually the correct term for  
 11 that, and in this case that didn't happen. If it  
 12 doesn't happen, we know publication has to occur  
 13 within a certain window. We know that petitioners or  
 14 potential petitioners have then a limited period of  
 15 time in which to file their application for review.  
 16 In this case, although the Department believed the  
 17 application to be complete at those critical  
 18 milestones, we know -- and I don't think there's any  
 19 dispute -- that the application is amended in  
 20 February of 2008, and according to all the testimony  
 21 from the representatives of the DNR, the application  
 22 was not complete at the time that the time for filing  
 23 of a petition for review had expired.  
 24 The testimony we have laid out in support  
 25 of the motion we've included within the motion, and I

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1 think the most really enlightening of all of that is  
 2 the questions that were asked relative to the process  
 3 itself. And this is the very argument we're making.  
 4 I had asked, "I understand, and that's a time frame,  
 5 and at the point that they can do that based on all  
 6 those earlier provisions we just went through" -- and  
 7 that was talking about all the statutory provisions  
 8 that I've just discussed now -- "the application  
 9 should be complete at that point so a petitioner can  
 10 make an educated decision as to whether or not, in  
 11 fact, he wants to request such a hearing, correct?"  
 12 The answer, "Correct." "In fact, that's only fair,  
 13 isn't it?" The answer, "Yes."  
 14 The problem that we have and the basis of  
 15 this motion is not that the Department can't amend an  
 16 application, we know that, we encourage that, but at  
 17 some point that process has to cease because now once  
 18 I go to publication, the public has an opportunity to  
 19 review this application, review the project and make  
 20 their own decision on whether or not they want to be  
 21 a petitioner in this case. In this instance they  
 22 were not afforded that opportunity. Magruder can  
 23 certainly come back and re-file, do it with completed  
 24 application and then move forward. The problem is  
 25 that it's simply not fair to those petitioners out

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1 there, not just the ones requesting meetings thinking  
 2 they would get a hearing but others out there who may  
 3 have wanted to file.  
 4 The second problem with respect to the  
 5 application itself is that it's just incorrect. We  
 6 went through in some detail at the last hearing the  
 7 problems with respect to whether there's a lease or  
 8 not a lease. As the Hearing Officer recalls, there  
 9 are two sections within the application itself. In  
 10 one instance it identifies a written contract,  
 11 provides a date. The testimony is there is no such  
 12 document. The provision right below that then  
 13 references a verbal agreement and provides an  
 14 entirely different date. Again, the application is  
 15 just not correct.  
 16 So again we're renewing the motion, doing  
 17 it based upon the testimony that was elicited at the  
 18 last hearing and just requesting the Hearing Officer  
 19 to consider the motion based upon that new evidence.  
 20 HEARING OFFICER: Mr. Mauer, do you  
 21 wish to be heard on the motion?  
 22 MR. MAUER: The only thing I would  
 23 further add, your Honor, is that just the procedural  
 24 history of how we got here today was that when we  
 25 first filed the motion, the opposition was that, no,

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1 the Land Rec Department determined that the  
 2 application was complete, and upon that you rejected  
 3 the motion. We responded with reconsideration  
 4 saying, wait a minute, that's not what we understood  
 5 the Land Rec Department's position to be, and that's  
 6 when you said, okay, I'm going to wait and hear the  
 7 evidence and see what that position is. And I think  
 8 as Mr. McGovern has identified very clearly, the  
 9 position of the Land Rec Program witnesses was that  
 10 based on the information that was subsequently  
 11 received, the application was not complete until  
 12 February.  
 13 And I also believe the testimony was very  
 14 clear that according to the Land Rec Program  
 15 witnesses there is no provision in the statute that  
 16 allows for the application to be amended after the  
 17 publication notice went out. Because the statute  
 18 very clearly says that after the application is  
 19 deemed complete, then notice can be given to allow  
 20 publication. So I think the position of Land Rec  
 21 Program now has proven out to be very clear that it  
 22 was not complete until February. Thank you.  
 23 HEARING OFFICER: For the information  
 24 of the Applicant and Respondent, you will be given  
 25 until June the 13th to file any response to the

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1 appending motion. Mr. Brownlee, do you wish to be  
 2 heard at this time?  
 3 MR. BROWNLEE: Yeah, very briefly.  
 4 And, again, I didn't -- Brian called and said they  
 5 were filing this. I didn't see this until this  
 6 morning. But first of all, the issue of whether the  
 7 application was complete deals with whether the map  
 8 was required to have the easement. We've been back  
 9 and forth on this. There's no statutory requirement  
 10 for it, so you have to look to the rule, which is  
 11 10 CSR 40-20(E) which we interpret and I think the  
 12 Department originally interrupted is you had to  
 13 own -- and I'm not going to go through it, we've been  
 14 through this, but you had to have ownership in the  
 15 land and the utility. This didn't meet that  
 16 requirement, therefore we didn't include it.  
 17 Regarding the fact that there's no law  
 18 that prevents -- that deals with amendment of an  
 19 application, I point out the opposite of that,  
 20 there's no law that doesn't prevent the amendment of  
 21 an application. And, in fact -- and as I think Brian  
 22 had stated, I have never seen an application in the  
 23 time I've been doing this work where it was ever  
 24 complete at first. They almost always require  
 25 additional materials and additional information,

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1 which was done here.  
 2 I'd also like to point out regarding this  
 3 notice and the people claimed they didn't have any  
 4 knowledge of the easements and everything. Well,  
 5 it's obvious they did. There's letters that they  
 6 attached to this where the head of the Joint Sewer  
 7 Board recognizes there's an easement.  
 8 Secondly, under the statutory provisions  
 9 dealing with notice, if there would have been 40  
 10 easements across that property, the notice that the  
 11 law requires us to publish does not give notice to  
 12 anyone of the existence of these easements. It's  
 13 just not required. The notice that's required says  
 14 there's a quarry and where it's located. And for  
 15 them to come in and say they weren't aware of that  
 16 today because there weren't easements included on  
 17 maps is specious.  
 18 Further, I'd point out that they  
 19 claimed -- Brian had mentioned the application itself  
 20 was deficient in terms of it didn't have an oral  
 21 lease checked or that the post-land mine use wasn't  
 22 indicated. Well, I think if you'd review Dean's  
 23 testimony, we dealt with those issues, and we feel  
 24 and still today feel it was correct. We met the  
 25 requirements in the application format that showed

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1 what the post-land mine was going to be.  
 2 As he pointed out, whenever this project  
 3 is finished, if it's 20 years or 40 years, the best  
 4 we could do is say they were going to use it for  
 5 commercial development, which was checked. For us to  
 6 today at the very beginning put on what we might want  
 7 to use this for in 20 or 30 years I just can't  
 8 believe would be a requirement of the law, and, in  
 9 fact, the format doesn't require that. It's the form  
 10 prepared by DNR.  
 11 That really is my comment. The only other  
 12 thing I would mention, there's a little additional  
 13 twist in this motion that no one's bothered to  
 14 mention which is they've now sort of segued the City  
 15 of Osage Beach being a party, and if you'll look at  
 16 the motion, they imply that they really have been a  
 17 party all along. I think I very purposely asked  
 18 Ms. Lyons on several occasions who she was  
 19 representing and who the parties were, and it was  
 20 always her position as the Joint Sewer Board, those  
 21 are the people that have officially intervened and  
 22 the City of Osage Beach has never intervened in this  
 23 case. And I want to make that clear again. Thank  
 24 you.  
 25 HEARING OFFICER: Mr. Duggan?

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1 MR. DUGGAN: We haven't had an  
 2 opportunity to review the motion in detail, and we  
 3 appreciate having until June 13th to file a formal  
 4 written response, but I would just point out for the  
 5 Hearing Officer at this point that from the  
 6 Department Program's perspective, this hearing is  
 7 supposed to be about whether or not this permit will  
 8 unduly impair anyone's health, safety or livelihood.  
 9 That is the statutory criteria that the Commission  
 10 considered in ordering this hearing, and there is no  
 11 indication in the statute as we read it that the  
 12 purpose of this hearing includes an appeal of the  
 13 question whether the Program correctly or incorrectly  
 14 considered this a complete application. This is not  
 15 an appeal as such from that determination. This is a  
 16 separate stand-alone hearing on very limited issues  
 17 specified by the statute and ordered by the  
 18 Commission, and from our perspective we should stick  
 19 to those points. But we will file some sort of  
 20 response to this motion before June 13th.  
 21 HEARING OFFICER: All right. Mr.  
 22 McGovern, as the main maker of the motion or the  
 23 presenter of the joint motion, I will allow you a  
 24 reply argument, and then we'll conclude.  
 25 MR. MCGOVERN: Just very brief.

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1 HEARING OFFICER: Proceed.  
 2 MR. MCGOVERN: Thank you. With  
 3 respect to the question of what this hearing is  
 4 about, there is an issue about whether or not we are  
 5 appropriately before you with regard to the questions  
 6 presented in Section 444.773. The statutory and  
 7 regulatory scheme do contain, I believe, condition  
 8 precedence to the hearing. So we're not asking at  
 9 all for a review or an appeal of the decision of the  
 10 Director. I think the Director made the decision  
 11 based upon the information placed in front of them.  
 12 The motion is suggesting and arguing that those  
 13 conditions that had to be satisfied simply have not  
 14 been.  
 15 In response to Mr. Brownlee, I would point  
 16 the Hearing Officer to again 444.772, Section 3,  
 17 which I went through and the following provisions  
 18 that include those requirements necessary for  
 19 complete application. If you look at Section 10  
 20 within 444.772, it tells us, "At the time that a  
 21 permit application is deemed complete by the  
 22 Director." Well, you know that can't happen until  
 23 all of those other requirements have been satisfied.  
 24 So we start with that benchmark.  
 25 If you then look at 10 CSR 40-10.080 --

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1 and this is the provision on public meetings,  
 2 hearings and informal conferences -- it says, "If the  
 3 recommendation of the Director is for issuance of the  
 4 permit," which we know from the earlier statutory  
 5 provision can only happen upon a complete  
 6 application -- "and a petition has been filed by the  
 7 aforementioned persons," then it goes through the  
 8 process that we're now in. So I would disagree that  
 9 the statute doesn't include language that doesn't  
 10 require that all of these requirements be met and  
 11 that the application be complete. I think they're  
 12 very specific, I think they are condition precedents  
 13 to getting to this very hearing, and a motion to  
 14 dismiss in front of you is the only avenue to address  
 15 the question. Again we're not asking you to review  
 16 what the Director may or may not have done but simply  
 17 make the determination of whether those statutory  
 18 requirements have been satisfied.  
 19 HEARING OFFICER: Mr. McGovern, one  
 20 point of inquiry. Is it, then, your position that as  
 21 we sit here today, with the exception of the lease  
 22 issue, that with the additional filings that have  
 23 been made that the application is complete?  
 24 MR. MCGOVERN: With the exception of  
 25 the lease issue, I believe that the filing in

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1 February of 2008 completed the application.  
 2 HEARING OFFICER: All right. Thank  
 3 you, sir. I appreciate the argument of all parties.  
 4 We'll look forward to reading the reply briefs, and  
 5 we'll proceed accordingly once we have that. All  
 6 right. I believe at this time Petitioner Joint Sewer  
 7 Board has fact witnesses, and Mr. Mauer, you are  
 8 recognized to call your first witness.  
 9 MR. MAUER: Thank you, your Honor.  
 10 We call Mr. Al Bisogno.  
 11 HEARING OFFICER: Mr. Bisogno, will  
 12 you come forward to be sworn.  
 13 MR. MAUER: And one point of  
 14 procedure, your Honor, my understanding is that  
 15 previously at the last hearing Mr. Brownlee chose to  
 16 have non-party witnesses excluded. I don't know if  
 17 that continues today. If it is, before we start --  
 18 HEARING OFFICER: I haven't had a  
 19 request this morning.  
 20 MR. BROWNLEE: I haven't got a  
 21 chance. I was going to ask how many witnesses there  
 22 were --  
 23 MR. MAUER: Three.  
 24 MR. BROWNLEE: Yes, I would like to  
 25 have those excluded from the public hearing.

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1 HEARING OFFICER: Who are the two  
 2 other witnesses who are going to be testifying?  
 3 MR. MAUER: It would be Ms. Sallach  
 4 and Ms. Robinson.  
 5 HEARING OFFICER: If you would, have  
 6 a seat outside, and we'll call you when Mr. Mauer  
 7 wishes to present you.  
 8 MR. MCGOVERN: I assume we're  
 9 sequestering all witnesses, then, other than those  
 10 testifying --  
 11 HEARING OFFICER: I understood the  
 12 request was relative to this particular point the  
 13 Joint Sewer Board is making. My understanding is  
 14 none of these witnesses are expert witnesses  
 15 testifying relative to anything that the two experts  
 16 in the room will be testifying to. Is that correct,  
 17 Mr. Mauer?  
 18 MR. MAUER: They're not experts, no,  
 19 your Honor.  
 20 MR. MCGOVERN: So as not to waive the  
 21 argument, I will request at the time the experts are  
 22 going to testify, I assume Dr. Worsley will be going  
 23 first, I will request that Dr. Mirabelli be removed.  
 24 MR. BROWNLEE: That's fine. No  
 25 problem. They can hear this. It's not going to

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1 change anything.  
 2 ALFRED BISOGNO,  
 3 of lawful age, produced, sworn, and examined on  
 4 behalf of the Joint Sewer Board, deposes and says:  
 5 HEARING OFFICER: Have a seat.  
 6 Proceed.  
 7 EXAMINATION  
 8 QUESTIONS BY MR. MAUER:  
 9 Q. Would you please state your full name and  
 10 spell your last name for the court reporter.  
 11 A. Alfred Bisogno, B-I-S-O-G-N-O, Junior.  
 12 Q. Mr. Bisogno, where do you reside?  
 13 A. 31598 Pistol Drive, Gravois Mills, Missouri.  
 14 Q. And how old are you, sir?  
 15 A. I'm 62.  
 16 Q. Are you familiar with the quarry operated by  
 17 Magruder Limestone near Sunrise Beach, Missouri?  
 18 A. Yes, I am.  
 19 Q. Do you own property near that quarry?  
 20 A. Yes, I do.  
 21 Q. Could you describe for the Hearing Officer  
 22 where your property is and what exists on that  
 23 property and where that proximity is to the Sunrise  
 24 Beach quarry?  
 25 A. I own approximately 30 acres to the east of

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1 the quarry on the other side of Highway 5. I have a  
 2 two-story house, rental home, and I have four  
 3 businesses in a business building about 1,000 --  
 4 well, about 1,200 to 1,500 feet from the quarry.  
 5 Q. Okay. What is the elevation of your house  
 6 and property in comparison to the -- where the quarry  
 7 is operating today?  
 8 A. I would guess from the rim of the quarry, I  
 9 would say probably 50 feet higher than the rim of the  
 10 quarry.  
 11 Q. All right. And from the bottom of the  
 12 quarry, then, where would be -- what would be the  
 13 elevation change?  
 14 A. I don't know how deep that quarry is. I  
 15 would say somewhere around 200 feet, I think, but I'm  
 16 not sure. I'm guessing.  
 17 Q. And what is the distance of the house, the  
 18 two-story house, from the quarry?  
 19 A. Two-story house from the quarry is  
 20 approximately, I would say, 600 feet from the edge of  
 21 the quarry.  
 22 Q. Okay. And from where they're actively  
 23 blasting on the quarry, can you estimate the  
 24 distance?  
 25 A. I would say add another 200, 300 feet to it.

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1 Q. So we're talking 8, 900 feet away?  
 2 A. Correct.  
 3 Q. All right. Please, sir, tell me, when did  
 4 you purchase that property?  
 5 A. I purchased that property in 2003.  
 6 Q. Now, was the -- did you have the house  
 7 inspected at that time?  
 8 A. Yes, I did.  
 9 Q. Please tell the Hearing Officer the result  
 10 of that inspection.  
 11 A. Well, it passed the -- the inspection was  
 12 for electrical, plumbing, sewer system, structural,  
 13 well and so forth. It was a full inspection, and the  
 14 inspection results were that everything was fine when  
 15 I purchased it.  
 16 Q. Did you have an opportunity to personally  
 17 examine the house before you purchased it?  
 18 A. Yes, I did.  
 19 Q. Did you notice any problems with the  
 20 foundation or the above-surface structure?  
 21 A. Nothing that was unusual for a house that  
 22 old, no.  
 23 Q. Now, I want to set aside the quarry  
 24 operation for a moment. Other than the quarry  
 25 operation, are you aware of anything, any natural

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1 disaster, any earthquakes, hurricanes, anything that  
 2 would have adversely impacted the structure of your  
 3 house and the condition of your house since you  
 4 bought it in 2003?  
 5 A. The only thing I'm aware of that did have an  
 6 effect on it was a hail storm.  
 7 Q. And what effect was that?  
 8 A. The roof had to be replaced.  
 9 Q. Other than a hail storm that had the roof  
 10 replaced, are you aware of any other natural  
 11 occurring conditions that would have impacted the  
 12 structure, particularly the foundation, of that home?  
 13 A. Nothing.  
 14 Q. All right. Now, when you purchased the  
 15 property in 2003, was there a quarry actively  
 16 operating immediately across the street?  
 17 A. No.  
 18 Q. Okay. And when did that quarry open, sir?  
 19 A. He purchased that property, I believe, about  
 20 six months to a year from the time I purchased the  
 21 property. He did have a quarry that was on the same  
 22 side of the street, but he, like -- I didn't want to  
 23 buy that property if the quarry was going to be  
 24 there, because we were going to build a church on  
 25 that property, and I talked to the owner and he said,

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1 no, I'm closed down, I'm finished, I'm not quarrying  
 2 anymore, so I did buy the property, but then he  
 3 bought some recreational property across the road,  
 4 and that's where the quarry is now.  
 5 Q. And when you say he, who is he?  
 6 A. That's Mr. Harry Adrian.  
 7 Q. And is Mr. Adrian still the title owner of  
 8 the rock quarry at issue at the Sunrise Beach quarry  
 9 today?  
 10 A. He was when I last checked, and that's been  
 11 about three months ago.  
 12 Q. Now, at some point in time did that quarry  
 13 start operating after you had purchased your land?  
 14 A. Yes, it did.  
 15 Q. And can you describe for the Hearing Officer  
 16 the experiences that you've had with the operation of  
 17 that quarry and its impact on your structure?  
 18 A. Well, I had numerous situations that  
 19 occurred. The structure of the home, the two-story  
 20 home --  
 21 MR. BROWNLEE: Your Honor, I'm going  
 22 to object as, number one, this is -- involves a  
 23 quarry that's probably 20 miles from the permit  
 24 application we're dealing with here today. Further,  
 25 testimony that occurred when someone else was

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1 operating this quarry and the potential damage that  
 2 might have occurred to this man's property is totally  
 3 irrelevant from anything that has to do with this  
 4 proceeding today.  
 5 HEARING OFFICER: Mr. Mauer, do you  
 6 want to be heard on the objection?  
 7 MR. MAUER: Yes, your Honor.  
 8 HEARING OFFICER: Proceed.  
 9 MR. MAUER: It's relevant in two  
 10 fashions. First of all, the witness will describe  
 11 about the impact on his home and his structure and  
 12 his property after Magruder Limestone took over, but  
 13 also this witness is providing factual evidence about  
 14 the impact that blasting can have on property in Lake  
 15 of the Ozarks, which is very similar to and it will  
 16 be compared to the Osage Beach proposed quarry.  
 17 And, it will go to show as factual  
 18 evidence that some of the assumptions by the experts  
 19 that you're going to hear from later today are  
 20 factually incorrect because the elevations that he's  
 21 experienced and the distance that he's experienced go  
 22 to show that blasting can have an impact. And this  
 23 is factual information upon which we can utilize to  
 24 cross-examine their experts and upon which our expert  
 25 will rely and relate to, and we need to have it in

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1 the record to show so that the Hearing Officer has  
 2 full consideration on the actual impact of blasting.  
 3 HEARING OFFICER: What evidence are  
 4 you going to offer to establish the blasting that was  
 5 done either prior to the Magruder operation or after  
 6 is the same as that contained within the blast plan  
 7 developed by Dr. Worsey?  
 8 MR. MAUER: Well, in part it's done  
 9 by the same folks, Dyno, after --  
 10 HEARING OFFICER: But is it the same  
 11 blasting plan as far as the holes to be drilled, the  
 12 explosive to be put in? Are you going to be able to  
 13 tie up with that sort of evidence?  
 14 MR. MAUER: I won't tie it up in that  
 15 fashion, your Honor. What I will tie up is the  
 16 experts that you're going to hear from this afternoon  
 17 are going to say that it can't travel that far, that  
 18 if it's 900 feet away, it can't have an impact. It  
 19 doesn't matter --  
 20 HEARING OFFICER: I understand,  
 21 Mr. Mauer.  
 22 MR. MAUER: -- whether the blast plan  
 23 is followed or not. And so --  
 24 HEARING OFFICER: I understand that.  
 25 The critical -- the linchpin issue is whether or not

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1 this blasting -- how this blasting ties to the blast  
 2 plan, because as I understand from my preview of the  
 3 documents, it is tied to that blast plan. And so if  
 4 what I've got is the same blast plan at both sites,  
 5 then you certainly have -- it certainly is relevant,  
 6 but I'm not understanding that.  
 7 MR. MAUER: Well, I think what you're  
 8 going to hear this afternoon, if you don't hear it on  
 9 direct, you'll hear it on cross, is the blast plan  
 10 under Dr. Worsey's own testimony is very loose and it  
 11 is nothing more than a pre-look on what we might do  
 12 once we get there. But his deposition testimony is  
 13 very clear that until we actually get there and we  
 14 start blasting and we start operating, we don't know  
 15 how -- if we're ever going to actually have to deck.  
 16 We don't know what the level of the shelves will be.  
 17 We don't know the load of the blasts that we're  
 18 actually going to have to use or choose to use. None  
 19 of that will be decided until we actually get there.  
 20 The blast plan is really nothing more than  
 21 the team's game plan before they start, but once they  
 22 get on the field, depending upon what the other team  
 23 does, depending upon the field conditions, they don't  
 24 know what places they're going to call. And that's  
 25 the testimony that you're going to hear this

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1 afternoon, and this witness is going to rebut that it  
 2 can be done safely because I think what you're going  
 3 to hear is as long as we're 150 feet away it's safe,  
 4 nothing can happen, there won't be any impact, it  
 5 can't be felt. This witness and two others are going  
 6 to say, oh, no, you can go a whole lot farther away  
 7 than 150 feet and experience severe damage. And that  
 8 is information that our expert will rely upon, and it  
 9 absolutely coincides with his testimony that, in  
 10 fact, 150 feet is not an automatic safety margin.  
 11 MR. MCGOVERN: Mr. Tichenor, could I?  
 12 HEARING OFFICER: Mr. McGovern, do  
 13 you wish to be heard on the objection?  
 14 MR. MCGOVERN: Yes.  
 15 HEARING OFFICER: Proceed.  
 16 MR. MCGOVERN: The experts in this  
 17 case are going to provide substantial testimony  
 18 relative to testing done at other locations. There  
 19 was a test done -- in fact, I'm looking at one of the  
 20 sheets, comparisons between USB in blasting with that  
 21 blasting to be conducted at Magruder's. We've been  
 22 provided absolutely no information to suggest that  
 23 the blast pattern loads, all of the work that was  
 24 done relative to these test sites, are identical to  
 25 the blast plan which is going to be utilized by

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1 Magruder. If, in fact, this witness is not permitted  
 2 to testify to this type of information, I am going to  
 3 request that all of the testimony with respect to  
 4 these expert witnesses be excluded because it is the  
 5 very same testimony. They're making a comparison  
 6 between a test site of which we don't even have the  
 7 blast plan, as well an end to the blast plan that  
 8 Magruder intends to potentially utilize at this site.  
 9 HEARING OFFICER: At this point I'm  
 10 struggling with the relevancy, however I'm going to  
 11 overrule the objection, Mr. Mauer, and grant you  
 12 leeway and we'll see whether or not it ties up. I'll  
 13 simply have to weigh it. Essentially what we have is  
 14 lay testimony here of what this witness says occurred  
 15 relative to the operation of the Sunrise Beach  
 16 quarry, and we'll see how much weight it needs to be  
 17 given once all of the evidence is in.  
 18 MR. MAUER: Thank you, your Honor. I  
 19 understand. I appreciate that.  
 20 HEARING OFFICER: Proceed.  
 21 MR. MAUER: And I don't anticipate  
 22 that all of this testimony is going to take an hour.  
 23 HEARING OFFICER: Wait a minute.  
 24 This witness is going to take an hour?  
 25 MR. MAUER: No. No, sir. I meant

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1 all three of my witnesses. I meant all combined it  
 2 won't take an hour. My apologies.  
 3 HEARING OFFICER: Thank you, Counsel.  
 4 MR. MAUER: Can you give him the last  
 5 question, please.  
 6 (Whereupon, the requested portion of  
 7 the record was read by the reporter as follows.)  
 8 Q. (By Mr. Mauer) So please go forward and  
 9 tell Mr. Tichenor, the Hearing Officer, what  
 10 experience you have had with that home since 2003  
 11 when you bought it and it passed the inspections and  
 12 after the quarry opened up and started operating and  
 13 blasting.  
 14 A. Okay. At first my tenants called me and  
 15 said that there was dynamite blasting and that their  
 16 house was shaking, their pictures were falling off  
 17 their walls. Then they called back again I'd say,  
 18 you know, a two or three-week period and they  
 19 complained about the doors not being able to open and  
 20 close and the windows not being able to open and  
 21 close.  
 22 I went and inspected the house. I found  
 23 large cracks in the floors and foundation. I  
 24 couldn't open the doors downstairs at all. The  
 25 upstairs doors were difficult to open and close. And

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1 the house had shifted about 2 to 3 inches off its  
 2 foundation. The center post in the basement that  
 3 holds the structure in the center was now at an angle  
 4 about 3 inches off.  
 5 I contacted the other residents in the  
 6 area, and they told me that since the blasting had  
 7 started that their fireplaces had fallen apart and  
 8 foundation cracks --  
 9 MR. BROWNLEE: Your Honor, that's  
 10 hearsay as to other people.  
 11 HEARING OFFICER: Sustained. Just  
 12 confine your testimony to what you observed with your  
 13 property.  
 14 A. I contacted Mr. Harry --  
 15 Q. (By Mr. Mauer) Mr. Bisogno, please just go  
 16 ahead, but before we leave that point, tell the  
 17 Hearing Officer the condition of your basement and  
 18 the condition of the walls and the things you  
 19 personally observed after the blasting started.  
 20 A. The condition changed from, like, 3 inches,  
 21 like I said, at the beginning to gradually moving and  
 22 moving further and further where it got to be almost  
 23 at an angle of 8 to 10 degrees. The house shifted so  
 24 far that it pulled the electrical wires, popped some  
 25 of the wires. The plumbing was pulled out of the

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1 walls. To this day you can't use the master bath  
 2 because the plumbing shifted and pushed it against  
 3 the wall. You can see it buckling out. You can't  
 4 turn the faucets on and off.  
 5 The roof leaked, had to be replaced. And  
 6 the downstairs wall, which is 70 -- well, about  
 7 60 feet long had started to cave in, and I had to  
 8 have that all reinforced and restructured. My  
 9 in-ground -- I had an in-ground well system, there  
 10 was three wells for my air-conditioning system which  
 11 is a green air-conditioning system. The well  
 12 collapsed. I had two companies come out and tell me  
 13 that the walls collapsed. I had to take that  
 14 air-conditioner out and replace it.  
 15 I had complaints about the smell, the  
 16 noise, the dust. And then the people that had the  
 17 businesses, one of the businesses moved out. I  
 18 couldn't rent to another person because of the  
 19 quarry.  
 20 I filed a claim with my insurance company,  
 21 and my insurance company sent an engineer out, two  
 22 engineers, as a matter of fact, and they inspected  
 23 it, checked the area, spent quite a bit of time, and  
 24 they came back and said, you're right, the quarry did  
 25 this damage and they gave it to me in writing and

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1 they paid the claim, but they canceled my insurance  
 2 which made my property worth zero.  
 3 Q. Let me stop you there for a moment. Let me  
 4 show you what we've marked as Exhibit BP-33?  
 5 HEARING OFFICER: This is BP-33?  
 6 MR. MAUER: Yes. Sewer Board  
 7 Petitioner BP-33.  
 8 Q. (By Mr. Mauer) Mr. Bisogno, do you  
 9 recognize Exhibit BP-33?  
 10 A. Yes, I do.  
 11 Q. Would you tell the Hearing Officer what that  
 12 is?  
 13 A. This is a copy of the notice I received from  
 14 the insurance company that they were notifying my  
 15 insurance because the damage of the structure has  
 16 occurred due to the blasting of the quarry.  
 17 Q. And is this a letter that you received from  
 18 your insurance company for the home that you've just  
 19 testified about?  
 20 A. Yes, I did.  
 21 Q. And does it also show that it was  
 22 non-renewed?  
 23 A. Yes. They would not renew it. They would  
 24 not give insurance.  
 25 MR. MAUER: Your Honor, we offer

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1 BP-33.  
 2 HEARING OFFICER: Exhibit BP-33 is  
 3 offered into evidence. Any objection?  
 4 MR. BROWNEE: Again just a relevance  
 5 objection.  
 6 HEARING OFFICER: Objection is  
 7 overruled. The exhibit is admitted into evidence.  
 8 Q. (By Mr. Mauer) Mr. Bisogno, after the  
 9 blasting occurred, did you come to find out that  
 10 there was a change -- after the blasting started,  
 11 excuse me, and the quarry started operating, did you  
 12 come to find out that there was a change in the  
 13 operator of that quarry?  
 14 A. At first, no, it was the same operator,  
 15 Harry Adrian. He jumped the highway and went into  
 16 a -- like I said, a recreational -- it was zoned  
 17 recreational residential through the County. It was  
 18 in the County up here, and I filed a complaint with  
 19 the county and --  
 20 Q. Did you then come to find out that  
 21 Mr. Adrian was no longer operating it and Magruder  
 22 Limestone was going to operate it?  
 23 A. Eventually. Mr. Ditmeier came in and  
 24 operated it after Mr. Adrian, and then Mr. Magruder  
 25 came in after Mr. Ditmeier.

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1 Q. Okay. Now I want to talk to you about after  
 2 Magruder Limestone took over. Have you --  
 3 HEARING OFFICER: Excuse me.  
 4 Mr. Mauer, could we establish a time on that?  
 5 MR. MAUER: Yes, sir.  
 6 Q. (By Mr. Mauer) Do you remember  
 7 approximately when it was that Magruder Limestone  
 8 came in and began operating that quarry?  
 9 A. I think it's been about a year now.  
 10 Q. So approximately sometime in -- if we're in  
 11 May of 2008, it would have been sometime in 2007?  
 12 A. Somewhere around there. I had cancer and I  
 13 was in a bad situation for a couple of years there,  
 14 so I'm not exactly sure of the dates.  
 15 Q. Would it refresh your recollection that you  
 16 were on the radio in June of '07 with Mr. Magruder?  
 17 Would that refresh your recollection for about the  
 18 time frame that Magruder was --  
 19 A. Yes. It was about the end of June that I  
 20 was on the radio station. I contacted Mr. Magruder  
 21 before then and had him come inspect the house.  
 22 HEARING OFFICER: So, Mr. Mauer, as  
 23 the Hearing Officer understands, all of the testimony  
 24 previously that has been given by this witness  
 25 relative to this damage occurred prior to the

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1 Magruder operation?  
 2 MR. MAUER: That's what I'm going to  
 3 clarify, your Honor.  
 4 HEARING OFFICER: All right.  
 5 Proceed. Sorry for the interruption.  
 6 MR. MAUER: That's quite all right.  
 7 Q. (By Mr. Mauer) After Magruder Limestone  
 8 took over, did the house that you own 900 feet from  
 9 the quarry continue to experience damage and suffer  
 10 shifting as a result of the quarry operation?  
 11 A. Yes, it did. I had two more walls where you  
 12 could see the plumbing which started out I would say  
 13 maybe an inch buckling in the wall. If you look at  
 14 it now, it's clear. It's, like, 2 inches out where  
 15 it's been shifted some more. I had two wires that  
 16 have popped. I have trouble with the electrical.  
 17 And I had to have the plumbing repaired a couple of  
 18 times.  
 19 Q. Have you personally experienced blasts that  
 20 you could feel coming across the highway onto your  
 21 property after Magruder Limestone took over?  
 22 A. Oh, yes.  
 23 Q. Can you describe those for the Hearing  
 24 Officer?  
 25 A. Well, we in the area have for years been

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1 keeping track, our own track, of one to ten on our  
 2 calendars marking down whether it's one the least  
 3 effect of a blast, ten being the worst blast it could  
 4 be, really rocking your home, and after Magruder --  
 5 Mr. Magruder took over -- and I must say Mr. Magruder  
 6 was the best out of the three, but after he took  
 7 over, there have been numerous blasts that have  
 8 reached a seven to ten mark. I personally  
 9 experienced one that I rated as a seven, and it was  
 10 way over. And the Fire Marshal agreed with me. He  
 11 was there.

12 Q. Okay. Now, I want to talk to you about did  
 13 you have an occasion to talk with representatives  
 14 from Magruder Limestone about the quarry operation  
 15 and the impact that it was having on you and your  
 16 property and your tenants?

17 A. Yes. I had occasion to talk to Mr. Magruder  
 18 himself. And I did this under two capacities. One  
 19 was a personal because of the personal property that  
 20 I had. I showed him the problems that I had had in  
 21 the past and asked him to work with us in the future,  
 22 which he assured me he would. And the other capacity  
 23 was I'm the speaker for the Sunrise Beach Quarry  
 24 Accountability Committee, and I have talked to him on  
 25 the radio station and in person as a representative

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1 of that committee.

2 Q. Did Mr. Magruder actually -- and would that  
 3 be Mark Magruder?

4 A. Yes.

5 Q. Who's here today?

6 A. Right here today, yes, sir.

7 Q. Okay. Did Mr. Magruder actually come to  
 8 your home and view your home?

9 A. Yes, he did.

10 Q. Did you tell him that you thought the damage  
 11 was caused by the operation of the quarry, the  
 12 blasting?

13 A. Yes.

14 Q. What did Mr. Magruder tell you after you  
 15 said that to him?

16 A. Well, he assured me that he was the new guy  
 17 in town, that he was going to be a good neighbor,  
 18 that he was going to work with us and if we had any  
 19 complaints at all, let him know and he would act on  
 20 it and assured me that he would do everything  
 21 possible to work with all the neighbors in the area.

22 Q. And subsequent to that conversation, did  
 23 Mr. Magruder follow through to be a good neighbor and  
 24 work with the residents around the Sunrise Beach  
 25 quarry?

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1 A. Depending on how you would look at it. He  
 2 assured me for an example that a fence would be put  
 3 around the quarry to protect the children. Children  
 4 come out there on four-wheelers, and there's that  
 5 cliff. They come right out of the woods, there's  
 6 nothing up there to protect them from shooting off.  
 7 It is a recreational area. A lot of people come in  
 8 from out-of-state to the lake, they have their  
 9 children there, and these children are not familiar  
 10 with the area and they can go over to that quarry and  
 11 get hurt. We made him aware, Mr. Magruder, aware of  
 12 this, and he indicated to me that yes, he would act  
 13 on this and put up a fence.

14 So in answer to your question on that one,  
 15 he did put up a fence. The fence he put up is maybe  
 16 30 feet long, and that's supposed to cover the whole  
 17 quarry. So he's not -- he didn't lie, he did put up  
 18 a fence, but you can see where it was a little  
 19 misleading.

20 The other thing, he said he would work  
 21 with us on the blasting to assure us that we're not  
 22 going to have damage like that. He did that -- he  
 23 did that in a sense of when he would call the news  
 24 media in and he would call the politicians over to  
 25 his place and he would call the public over to the

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1 place, the blasts would be maybe a two or a three,  
 2 but not even a week later when nobody was there,  
 3 you'd have a seven to a ten blast go off, and then we  
 4 would have damage of broken pipes and other  
 5 structural damage. And that happened on numerous  
 6 occasions. When the public was there and  
 7 Mr. Magruder would say, I'm doing this for the public  
 8 and look at how nice a guy I am, then after they're  
 9 not there, we'd have these blasts that caused damage.  
 10 It was very misleading.

11 So yes, he did keep his word, and no, he  
 12 didn't keep his word. In reference to he promised  
 13 and even put it in the newspapers that he was going  
 14 to clean out the cove. The cove has about, they  
 15 estimate about 3 feet of silt that went into this  
 16 cove. I mean, it's disgusting down there. And he  
 17 promised myself and numerous other people and even in  
 18 the paper he and Mr. Daniels, his president, said,  
 19 we're going to clean this cove out, we're the good  
 20 guys in town, we're the good neighbors, we got the  
 21 permits and everything to do this. And I questioned  
 22 Mr. Magruder in June at the radio station. He said,  
 23 I'm waiting -- the only thing I'm waiting for right  
 24 now is for the lake to go down. Well, the lake went  
 25 down and now it's back up again. The cove still

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1 hasn't been done, and, again, it was very misleading.  
 2 Q. One last thing. Did Mr. Magruder ever make  
 3 any representations that you heard about the  
 4 operation of the asphalt plant immediately across the  
 5 street?  
 6 A. Yes, he did. He -- I talked to Mr. Magruder  
 7 and explained to him that we have children that live  
 8 within a stone's throw -- I can actually throw a  
 9 stone and hit the two asphalt plants from their  
 10 residence, from their property, and I explained to  
 11 Mr. Magruder that these children have come to Sunrise  
 12 Beach City Council, they have come to Camden County  
 13 Commission and they have cried and begged and asked  
 14 for help from DNR and from these people, please help  
 15 us, we can't play in our yard, we can't breathe.  
 16 MR. BROWNLEE: Your Honor, I'm going  
 17 to object to this again. Magruders don't own the  
 18 asphalt plant that we're getting testimony on. They  
 19 don't own it or operate it, and Mr. McDonald --  
 20 HEARING OFFICER: Is that correct,  
 21 Mr. Mauer?  
 22 MR. MAUER: That's news to me, your  
 23 Honor. With respect to Sunrise Beach --  
 24 Q. (By Mr. Mauer) All I wanted to know --  
 25 HEARING OFFICER: Wait a minute. I

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1 want to handle this objection. Do you know whether  
 2 or not Magruder owns the asphalt plant?  
 3 MR. BISOGNO: I know that  
 4 Mr. Magruder indicated to me that he did because he  
 5 said he was going to remove them, remove that asphalt  
 6 plant. He assured me, it's going to be gone within a  
 7 couple of months, and I was so happy. And he did  
 8 remove it.  
 9 HEARING OFFICER: I'll allow rebuttal  
 10 testimony on it, then. Objection is overruled at  
 11 this point.  
 12 MR. MAUER: All I was anticipating...  
 13 Q. (By Mr. Mauer) Did Mr. Magruder represent  
 14 to you that the asphalt plant would be taken out?  
 15 A. Yes.  
 16 Q. And was it taken out?  
 17 A. Yes.  
 18 Q. And then did it come back?  
 19 A. It not only came back, we have two there  
 20 now.  
 21 Q. And is it on the land that is operated and  
 22 within the quarry site right there by the quarry?  
 23 A. One is on Mr. Magruder's land where he is  
 24 leasing the land, and the other is on Mr. Adrian's  
 25 land, the old quarry that they reopened up.

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1 Q. Okay. Thank you. Sir, when was this  
 2 house -- your house that's been damaged, when was  
 3 that house constructed?  
 4 A. I believe it was in '78, I believe.  
 5 MR. MAUER: Thank you. Nothing  
 6 further.  
 7 HEARING OFFICER: Mr. McGovern, do  
 8 you wish to inquire of this witness?  
 9 MR. MCGOVERN: No, Mr. Tichenor.  
 10 HEARING OFFICER: Thank you, sir.  
 11 Mr. Brownlee, cross-examination?  
 12 EXAMINATION  
 13 QUESTIONS BY MR. BROWNLEE:  
 14 Q. Sir, I'm Richard Brownlee. I represent  
 15 Magruder. You said that you purchased this home in  
 16 2003?  
 17 A. It was around that time, yes.  
 18 Q. And when you had it inspected, you were able  
 19 to obtain insurance through Auto Owners; is that  
 20 correct?  
 21 A. I think I did have Auto Owners the whole  
 22 time, yes.  
 23 Q. And after they canceled you, as is set forth  
 24 in the exhibit you introduced, did you have -- were  
 25 you able to obtain replacement house insurance?

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1 A. Yes. I got insurance on the condition that  
 2 I could not file a claim if it was any kind of  
 3 situation that could be linked to the quarry damage.  
 4 Q. Who is that with? Who's that company?  
 5 A. That was with American Family. That was the  
 6 only way I could get insurance.  
 7 Q. And have you filed any claims with them?  
 8 A. Just one.  
 9 Q. And what was that?  
 10 A. That was that hail damage I was talking  
 11 about.  
 12 Q. Oh, the hail. Okay. And regarding any of  
 13 the damage that you alleged has occurred since  
 14 Magruder, have you asked them to refer that to their  
 15 insurance company?  
 16 A. Not at all.  
 17 Q. You haven't done that?  
 18 A. Mr. Magruder, you mean?  
 19 Q. Yes.  
 20 A. No, sir.  
 21 Q. And on this rating system that you've  
 22 testified to at one to ten, is this just a subjective  
 23 measurement that you and your wife have come up with,  
 24 or is there any scientific basis to this?  
 25 A. No, this is not my wife, but this is just

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1 all the neighbors and the businesses in this area  
 2 that were keeping their own records of their own  
 3 opinion of what they thought was a one to a ten.  
 4 Q. So you don't do this yourself?  
 5 A. No. I don't live in that area.  
 6 Q. So the one to ten testimony is just from  
 7 what someone has told you, correct?  
 8 A. From what I've seen on the calendars that  
 9 they hold, yes.  
 10 Q. So that would be the nature of hearsay.  
 11 You, yourself haven't done this test, have you?  
 12 A. No, I haven't. Well, when I was there I had  
 13 my own opinion of one to ten, but not from their  
 14 calendars.  
 15 Q. Now, the damage to the cove, the silting,  
 16 did that occur while the Magruders have operated this  
 17 quarry since May of 2007?  
 18 A. It's been acquiring ever since it's opened  
 19 up. How much Magruder had to add to it, I'm not  
 20 sure.  
 21 Q. But it was obviously existing prior to them  
 22 taking it over?  
 23 A. Oh, yes.  
 24 Q. And when you talked to Mr. Magruder, did he  
 25 not tell you that they would try to get it cleaned

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1 up, but obviously since then we've had an awful lot  
 2 of rain and water, haven't we?  
 3 A. No, sir. He told me he definitely would get  
 4 it cleaned up, and that was back at the end of June.  
 5 He said as soon as the water level went down. That  
 6 was before we had all the storms and stuff. He had  
 7 the whole season where they had the water level down  
 8 to get that cleaned out.  
 9 Q. Regarding this asphalt plant, do you know  
 10 for a fact as you sit here today if Magruders have  
 11 any ownership interest in that asphalt plant?  
 12 A. No. I don't know who owns that.  
 13 Q. And as spokesperson of the Sunrise Beach  
 14 Quarry Accountability Committee, have you talked to  
 15 the owner of the asphalt plant?  
 16 A. Well, I talked to Mr. Harry Adrian. I don't  
 17 know if he owns it. I don't know who owns it.  
 18 Q. Well, as spokesperson for this civic-minded  
 19 group, have you undertaken any effort to find out  
 20 actually who owned that property?  
 21 A. I was told Mr. Mondale owned the asphalt  
 22 plant, Mr. Magruder owned the property or leased the  
 23 property and has control of the property. And I'm  
 24 going by what Mr. Magruder told me, which he  
 25 indicated that he had control of this asphalt plant

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1 because he was going to have it removed.  
 2 Q. Okay. It's Mantle. Does that name ring a  
 3 bell that owns the asphalt plant?  
 4 A. Yes. Donnie Mantle.  
 5 Q. Do you know he used to work for APAC? Do  
 6 you know that?  
 7 A. Yes, I do.  
 8 Q. So it's your testimony today that you  
 9 believe that Magruders have an ownership interest at  
 10 least in the land where those asphalt plants --  
 11 A. No, sir. It's my testimony that  
 12 Mr. Magruder gave me the indication that he had  
 13 control of that asphalt plant. Whether he owned it  
 14 or not, he didn't say. He gave me direct indication  
 15 that I'm going to have that thing removed.  
 16 Q. So just control is what Mr. Magruder told  
 17 you?  
 18 A. Yes. Leading me to believe that he had  
 19 control or some type of ownership or whatever. He  
 20 had the say-so. He was the man to go through. He  
 21 said, I'm the new guy in town, I'm going to take care  
 22 of you people.  
 23 Q. From a legal standpoint, you do not know  
 24 whether Mr. Magruder or any of his companies have any  
 25 ownership or control over the asphalt plant?

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1 A. Mr. Magruder himself? No.  
 2 Q. And how far do you live from the proposed  
 3 quarry site at Lake Ozark?  
 4 A. 12 miles.  
 5 Q. And do you feel that that quarry site will  
 6 have any effect on your health, welfare or  
 7 livelihood?  
 8 A. Only if I'm around it when the asphalt plant  
 9 is going or the quarry is blasting.  
 10 Q. I'm talking about the proposed site that  
 11 we're here on today.  
 12 A. Well, yes, indirectly. Like I said, I was  
 13 building a business park there which completely  
 14 stopped. Nobody wants --  
 15 Q. I'm talking about the --  
 16 A. So my welfare? Yes. I'm out a lot of  
 17 money.  
 18 Q. I'm talking about the Lake Ozark quarry,  
 19 sir, not the Sunrise Beach site.  
 20 A. Oh, the other one --  
 21 Q. Yes. The one we're here on today.  
 22 A. My welfare? Yes. If something happens to  
 23 that sewer plant and Osage Beach closes down, it's  
 24 going to devastate the whole lake, both sides of that  
 25 lake. It will be completely -- yes, it will affect

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1 me. In my own opinion, yes, it will.  
 2 Q. Do you receive service from the Joint Sewer  
 3 Board at your house?  
 4 A. No, sir, I don't.  
 5 Q. At the property near the Adrian quarry, is  
 6 that served by the Joint Sewer Board, the sewer  
 7 system?  
 8 A. No, it's not.  
 9 HEARING OFFICER: Mr. Duggan, any  
 10 cross-examination?  
 11 MR. DUGGAN: No.  
 12 HEARING OFFICER: Mr. Mauer, any  
 13 redirect?  
 14 MR. MAUER: No, sir.  
 15 HEARING OFFICER: Thank you,  
 16 Mr. Bisogno. You are excused. Mr. Mauer, call your  
 17 next witness.  
 18 MR. MAUER: I call Joyce Sallach. Is  
 19 it all right for Mr. Bisogno to stay in?  
 20 HEARING OFFICER: Yes, sir. He's  
 21 finished, so he may stay.  
 22 JOYCE SALLACH,  
 23 of lawful age, produced, sworn, and examined on  
 24 behalf of the Joint Sewer Board, deposes and says:  
 25

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1 EXAMINATION  
 2 QUESTIONS BY MR. MAUER:  
 3 Q. Good morning, Ms. Sallach.  
 4 A. Good morning.  
 5 Q. Would you please tell the Hearing Officer  
 6 your full name and spell your last name for the  
 7 convenience of your court reporter, please.  
 8 A. Sure. Joyce Eileen Sallach, and my last  
 9 name is spelled S-A-L-L-A-C-H.  
 10 Q. Where do you reside, Ms. Sallach?  
 11 A. My physical address is 123 Gold Lane Cove.  
 12 Q. And we've already heard from Mr. Bisogno  
 13 about the Sunrise Beach quarry, and I don't want to  
 14 repeat all that. Will you simply explain for the  
 15 Hearing Officer where your property is and your home  
 16 in comparison to the Sunrise Beach quarry.  
 17 A. I am 400 feet away from the west boundary.  
 18 Q. And how far is it from your property to the  
 19 actual operation where the quarry is actually  
 20 operating?  
 21 A. Probably about 6, 7, 800 feet.  
 22 Q. Okay. So your property is -- is your house,  
 23 then, approximately 7, 800 feet from where the quarry  
 24 is actually operating today?  
 25 A. Where they're operating today? Yes. It

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1 moves because they go this way, then they take more  
 2 and they go that way and then they come back. So  
 3 when they come towards the west, they're closer to my  
 4 house. When they go to the east, they're closer to  
 5 Highway 5.  
 6 Q. Okay. And we've heard a little bit of  
 7 testimony about the quarry. Is the quarry at Sunrise  
 8 Beach immediately adjacent to Highway 5 there just  
 9 south of Sunrise Beach?  
 10 A. Yes, it is.  
 11 Q. And where is your road, access road, to --  
 12 in relation to the quarry?  
 13 A. It is on the north side of the quarry. It  
 14 actually -- the quarry bounds both sides of Highway  
 15 545.  
 16 Q. And that's the name of your road, 545?  
 17 A. 545 is the main road in, then I have a  
 18 private road down to where my property is and 11  
 19 other homeowners.  
 20 Q. Just since Magruder began operating the  
 21 quarry, which we've established is sometime around  
 22 May or June of 2007, all right, I want to focus on  
 23 that time period.  
 24 A. All right.  
 25 Q. Have you experienced conditions at your

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1 house other than the quarry operation, all right, I  
 2 want to talk about things other than the quarry, any  
 3 natural disasters, tornadoes, earthquakes, anything  
 4 that you're aware of that would have caused damage to  
 5 your home?  
 6 A. No.  
 7 Q. All right. Now, since the quarry started  
 8 operating or continued to operate after May of '07,  
 9 have you personally experienced conditions at your  
 10 home which you attributed to the blasting and the  
 11 operation of the quarry?  
 12 A. Yes.  
 13 Q. Please describe those to the Hearing  
 14 Officer.  
 15 A. I had a water line in November, and I think  
 16 they blasted around the 20th of November, and the  
 17 actual physical water line from my own well to my  
 18 house broke. And it was from the earth actually  
 19 moving that made the pipe break.  
 20 Q. Have you been in your home or around your  
 21 home and personally felt the earth move and the  
 22 ground move?  
 23 A. Yes, I have.  
 24 Q. And can you describe that to the Hearing  
 25 Officer?

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1 A. It's kind of scary. I mean, you're sitting  
 2 in your house and you're sitting there and it just --  
 3 everything moves, your walls and your windows. And I  
 4 know they can say that might be from, you know, air  
 5 vibrations or something, but not when you're -- my  
 6 floor isn't by air vibrations. When I'm standing on  
 7 my floor in my house and my floor is moving, that's  
 8 not air moving my house.  
 9 Q. Can you describe for the Hearing Officer the  
 10 condition of your basement and your foundation? Have  
 11 you experienced any movement, cracks, anything on the  
 12 basement floor that you would attribute to the  
 13 blasting?  
 14 A. Yes. I do have a crack that runs all the  
 15 way across my whole entire length of my basement. It  
 16 is getting worse. And I also have breaks in my  
 17 foundation walls on the back side of my foundation.  
 18 Q. And other than the operation of the quarry  
 19 and the blasting, are you aware of anything else that  
 20 would have caused the foundation to buckle and the  
 21 cracks to occur?  
 22 A. No.  
 23 Q. All right. I'd like to show you what I'm  
 24 going to mark as Exhibit 52, BP-52. Do you recognize  
 25 Exhibit BP-52?

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1 A. Oh, yeah.  
 2 Q. What is Exhibit BP-52?  
 3 A. That's my water line.  
 4 Q. And can you describe -- do you know what  
 5 that pipe is made out of? Is it metal, plastic?  
 6 A. I have no idea.  
 7 Q. PVC? Okay. But that is -- Exhibit 52 is  
 8 the water line that was at your house?  
 9 A. Yes.  
 10 Q. And you personally know that that's the line  
 11 that broke?  
 12 A. Yes. I dug it out, and the plumber came and  
 13 fixed it.  
 14 Q. All right.  
 15 MR. MAUER: Your Honor, I'd offer  
 16 BP-52.  
 17 HEARING OFFICER: BP-52 is offered  
 18 into evidence. Is there any objection?  
 19 MR. BROWNLEE: No.  
 20 HEARING OFFICER: BP-52 is received  
 21 into evidence. It is identified as a section of  
 22 water line pipe.  
 23 MR. MAUER: I think for the record,  
 24 your Honor, I think we can all agree that it's PVC  
 25 pipe and it's not metal.

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1 HEARING OFFICER: Water line PVC  
 2 pipe.  
 3 MR. BROWNLEE: I don't -- I don't  
 4 necessarily agree to that. I mean, I don't --  
 5 MR. MAUER: It's not metal. That's  
 6 all I was trying to establish. I mean, you're  
 7 welcome to look at it. I don't think there's any  
 8 dispute.  
 9 HEARING OFFICER: I don't think we  
 10 have an expert on PVC. It looks like PVC to the  
 11 Hearing Officer, though.  
 12 Q. (By Mr. Mauer) Ms. Sallach, have you had an  
 13 opportunity to hear Mr. Mark Magruder talk about how  
 14 he was operating the quarry and how he intended to  
 15 operate the quarry?  
 16 A. Yes.  
 17 Q. Did you have occasion to hear Mr. Magruder  
 18 talk about what level depth of the quarry would be  
 19 and how -- what the depth would be in the future?  
 20 A. He said he was not going to go any deeper  
 21 than what it was when he took over. He was just  
 22 going to be taking out the sides -- the side on the  
 23 south side of the quarry, he was not going to be  
 24 drilling any deeper down into the ground.  
 25 Q. Okay. And since that representation was

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1 made, have you personally observed whether or not  
 2 there have been quarrying activities going deeper  
 3 than the original level of the floor when Magruder  
 4 Limestone took over?  
 5 A. There's a machine out there that looks like  
 6 a woodpecker, for lack of a better description, that  
 7 just kind of pecks into the ground, then he's got his  
 8 bulldozers come by and they scoop it up.  
 9 Q. So have you personally observed that the  
 10 quarry is digging deeper, even though Mr. Magruder  
 11 represented that it would not?  
 12 A. Correct.  
 13 Q. Also, have you heard Mr. Magruder make  
 14 representations about how close the quarry would  
 15 operate to the property line and what type of  
 16 boundary might be left according to that property  
 17 line?  
 18 A. There is a four-acre square between my house  
 19 and where the quarry is, and I had the opportunity to  
 20 walk with Magruder, Mark Magruder, and the people  
 21 that owned that property at one time, and we walked  
 22 that four acres, and Mark actually took us up to the  
 23 top of the hill where the quarry was and he said  
 24 there would be a 50-foot boundary there. And the  
 25 last time I was up there looking before the property

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1 turned over to someone else, there's -- might be a  
 2 twig or two left up there, but there's not any big  
 3 trees like there was before.  
 4 Q. Okay. One more representation. Did you  
 5 ever hear Mr. Magruder make any representations about  
 6 what Magruder Limestone would do with respect to the  
 7 roadway? I believe you called it R45?  
 8 A. 545, yes. He said he would be repairing  
 9 that road really soon.  
 10 Q. And are you familiar with the condition of  
 11 the road today?  
 12 A. It's worse now than it ever has been.  
 13 Q. Have any repairs been made to that road, to  
 14 your knowledge?  
 15 A. None at all. If anything, it's gotten worse  
 16 and worse.  
 17 Q. And have you seen what is the cause for the  
 18 disrepair of the road?  
 19 A. Many, many trucks coming and going on the  
 20 road. Just the way that they've done things, and  
 21 they just don't seem to care about the neighborhood  
 22 at all. They block the road with trucks. You can't  
 23 get in and out of our own neighbor sometimes because  
 24 of all the trucks.  
 25 Q. And would these be trucks coming to and from

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1 the quarry?  
 2 A. Some from the quarry and some from the  
 3 asphalt plant that's on a little section of land  
 4 there that gets all their rock from the quarry, and  
 5 the dumpster that's taking rock from the quarry,  
 6 bringing it up for the asphalt plant, he's backing  
 7 forward and backward onto 545 to leave sand and  
 8 gravel for the asphalt company.  
 9 Q. And just so we're clear, it was your  
 10 understanding by a representation from Mr. Magruder  
 11 that Magruder Limestone would actually repair the  
 12 road?  
 13 A. Yes.  
 14 Q. And that has not been done?  
 15 A. Correct.  
 16 Q. One last thing, ma'am. Would you please  
 17 describe for the Hearing Officer the elevation of  
 18 your house as compared to the quarry and where the  
 19 quarry is operating. Is your house higher than the  
 20 quarry level, lower than the quarry level, at the  
 21 same level? Can you describe that for us, please?  
 22 A. It's lower.  
 23 Q. It is what? I'm sorry.  
 24 A. Lower.  
 25 HEARING OFFICER: Wait. What is --

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1 MS. SALLACH: My house is --  
 2 HEARING OFFICER: Your house is lower  
 3 than the quarry?  
 4 MS. SALLACH: Correct.  
 5 Q. (By Mr. Mauer) So even though the quarry  
 6 operates at an elevation higher than your house, you  
 7 can still feel the vibrations coming to your  
 8 foundation in your house?  
 9 A. Correct.  
 10 MR. MAUER: Thank You.  
 11 HEARING OFFICER: Mr. McGovern, do  
 12 you wish to inquire of this witness?  
 13 MR. MCGOVERN: Very briefly.  
 14 EXAMINATION  
 15 QUESTIONS BY MR. MCGOVERN:  
 16 Q. Ms. Sallach, your basement, is it a walk-out  
 17 basement?  
 18 A. Yes.  
 19 Q. And which side of your house is the  
 20 walk-out?  
 21 A. Toward the lakeside of the home.  
 22 Q. And which side is the quarry on?  
 23 A. The east side.  
 24 Q. Is it on the same side as the walk out?  
 25 A. It's like a rectangle. It's on the east

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1 side of it.  
 2 MR. MCGOVERN: Nothing further.  
 3 HEARING OFFICER: Mr. Brownlee,  
 4 cross-examination?  
 5 EXAMINATION  
 6 QUESTIONS BY MR. BROWNLEE:  
 7 Q. Ms. Sallach, my name is Richard Brownlee. I  
 8 represent the Magruders. Are you the same person  
 9 that's been in the newspapers complaining about the  
 10 Sunrise Beach quarry on several occasions?  
 11 A. Yes.  
 12 Q. Okay. Regarding this Exhibit 52, when was  
 13 this installed? Do you know?  
 14 A. November 24th-ish is when it broke.  
 15 Q. No. No. Originally when was the pipe  
 16 installed?  
 17 A. I bought my home and it was there.  
 18 Everything was working.  
 19 Q. When did you buy the home?  
 20 A. It was January of '06.  
 21 Q. Okay. And this indicates that -- but do you  
 22 know who installed this pipe?  
 23 A. No, sir.  
 24 Q. What did this pipe service?  
 25 A. My whole entire water line to my home.

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1 Q. And it came from a well?  
 2 A. Yes.  
 3 Q. And this 1-inch pipe was your entire water  
 4 line, correct?  
 5 A. Uh-huh.  
 6 Q. Do you know the surroundings where this  
 7 pipe -- did you dig this up yourself, you said?  
 8 A. It was next to the home.  
 9 Q. Did you dig this up?  
 10 A. Uh-huh.  
 11 Q. Yourself?  
 12 A. My water was not on. There was water  
 13 running in the street. You could tell where it was  
 14 coming from. To get the well man to come out to fix  
 15 it and the plumber that I needed to get, he said he  
 16 was going to have to bring a backhoe in and a tractor  
 17 and that stuff. I dug it out myself. And it  
 18 wasn't -- it was down about 30 inches or so.  
 19 Q. And was this right close to your house or  
 20 was it out in the yard?  
 21 A. It was next to my home.  
 22 Q. How far away?  
 23 A. (Indicating.)  
 24 Q. You're indicating 2 or 3 feet?  
 25 A. Yes.

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1 Q. Did you make a claim with Magruder for this  
 2 damage?  
 3 A. Why? To hear the response "prove it"?  
 4 Q. I asked you, did you make a claim?  
 5 HEARING OFFICER: Just answer the  
 6 question, please.  
 7 A. No. No.  
 8 Q. (By Mr. Brownlee) When this water line  
 9 broke, were you home?  
 10 A. No, sir.  
 11 Q. And how long had it been broken when you  
 12 discovered it?  
 13 A. I came home one day after it broke.  
 14 Q. One day?  
 15 A. Uh-huh.  
 16 Q. And do you know whether there was blasting  
 17 the day that this pipe broke?  
 18 A. They blasted on the 20th. I came home on  
 19 the 21st.  
 20 Q. How do you know they blasted on the 20th?  
 21 A. Because of all the records that everyone in  
 22 the neighborhood keeps.  
 23 Q. But you weren't there to tie up the blasting  
 24 to this water pipe personally yourself?  
 25 A. No, but there hadn't been any earthquakes

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1 either.  
 2 Q. And you're complaining about the public  
 3 roads and the use of the roads, correct?  
 4 A. Correct.  
 5 Q. Do you know whether the Land Reclamation  
 6 Commission regulates the use of the public roads?  
 7 A. I'm not sure exactly what they do.  
 8 Q. Do you know whether Magruder's regulate the  
 9 use of the public roads in your county?  
 10 A. I know he doesn't maintain it well like he's  
 11 supposed to be.  
 12 Q. And is it a public road?  
 13 A. It is a very public road, yes.  
 14 Q. Have you talked to the County about why the  
 15 road is not being maintained properly?  
 16 A. I've talked to the County, I've also talked  
 17 to the City of Sunrise Beach.  
 18 Q. And I guess they haven't got the road fixed  
 19 either?  
 20 A. No, they haven't.  
 21 MR. BROWNLEE: Thank you. I have  
 22 nothing else.  
 23 HEARING OFFICER: Mr. Duggan?  
 24 MR. DUGGAN: No.  
 25 HEARING OFFICER: Any redirect,

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1 Mr. Mauer?  
 2 MR. MAUER: Just one thing, your  
 3 Honor.  
 4 EXAMINATION  
 5 QUESTIONS BY MR. MAUER:  
 6 Q. Related to the cross-examination about  
 7 contacting Magruder about your broken water line, do  
 8 you recognize Exhibit BP-35, which I believe has  
 9 already been admitted into evidence?  
 10 A. Yes. This is a letter I got from an  
 11 attorney stating that I was slandering Magruder and I  
 12 was supposed to give Dean McDonald a phone call.  
 13 Q. And does the letter threaten a lawsuit  
 14 against you?  
 15 A. Yes.  
 16 Q. After being threatened with a lawsuit, did  
 17 you call Mr. McDonald?  
 18 A. Something about lawsuit and calling him just  
 19 didn't quite jibe.  
 20 Q. Is that why you didn't contact Mr. McDonald?  
 21 A. Correct.  
 22 HEARING OFFICER: Any recross on that  
 23 point?  
 24  
 25

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1 EXAMINATION  
 2 QUESTIONS BY MR. BROWNLEE:  
 3 Q. What's the date of that letter?  
 4 A. January 23rd.  
 5 Q. So that would be some two months after the  
 6 water line --  
 7 A. Correct.  
 8 Q. -- broke? Had you been involved in press  
 9 announcements and talking to the press about the  
 10 problems there prior to receiving that letter?  
 11 A. I had written an article to the editor of  
 12 Sunrise Beach, the paper there, yes.  
 13 Q. And what was the tone of that letter you  
 14 wrote?  
 15 A. You've got a copy of it, don't you?  
 16 Q. I'm just asking you.  
 17 MR. MAUER: Please just answer the  
 18 question, Ms. Sallach.  
 19 A. I just stated the facts as I felt they were.  
 20 MR. BROWNLEE: Thank you.  
 21 HEARING OFFICER: Any redirect on  
 22 that point?  
 23 MR. MAUER: Nothing, your Honor.  
 24 HEARING OFFICER: Did you have  
 25 anything?

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1 MR. MCGOVERN: No.  
 2 HEARING OFFICER: The witness is  
 3 excused. Thank you. You may remain in the room now.  
 4 Call your next witness.  
 5 MR. MAUER: The next witness will be  
 6 Ms. Barb Robinson. And Mr. Polhemus -- and I don't  
 7 know that he's actually been entered into the record  
 8 or introduced to the Court officially. John Polhemus  
 9 is a first year associate with us, your Honor, and  
 10 he'll be handling this next witness.  
 11 HEARING OFFICER: Mr. Polhemus, spell  
 12 your name for myself and the court reporter, please.  
 13 MR. POLHEMUS: Sure. It's  
 14 P-O-L-H-E-M-U-S.  
 15 BARBARA JEAN ROBINSON,  
 16 of lawful age, produced, sworn, and examined on  
 17 behalf of the Joint Sewer Board, deposes and says:  
 18 HEARING OFFICER: Mr. Polhemus, you  
 19 may proceed.  
 20 EXAMINATION  
 21 QUESTIONS BY MR. POLHEMUS:  
 22 Q. Good morning, Ms. Robinson. How are you  
 23 today?  
 24 A. Good morning.  
 25 Q. Could you please state your full name for

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1 the court reporter.  
 2 A. Barbara Jean Robinson.  
 3 Q. And, Ms. Robinson, there are two topics I  
 4 want to discuss with you today, the first being your  
 5 experience with the operation of the quarry, the  
 6 Sunrise Beach quarry; and second, your direct  
 7 dealings with Magruder Limestone Company. Is that  
 8 all right with you?  
 9 A. Sure.  
 10 Q. Great. And I want to focus on the Sunrise  
 11 Beach quarry for the time period beginning in and  
 12 around May of 2007 when Magruder Limestone took over  
 13 operations of the quarry.  
 14 A. Okay.  
 15 Q. Anything prior to that isn't relevant today.  
 16 A. Okay.  
 17 Q. For our purposes. Can you please describe  
 18 for the Hearing Officer where you live in relation to  
 19 the quarry.  
 20 A. Where I live in my home?  
 21 Q. Correct.  
 22 A. Oh, probably 1,200 feet north.  
 23 Q. 1,200 feet north of the quarry?  
 24 A. Of the north edge of the quarry.  
 25 Q. Okay. Great. And is that home higher than

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1 the elevation of the quarry or lower than the  
 2 elevation of the quarry?  
 3 A. Oh, lower. We're lakefront.  
 4 Q. Excuse me?  
 5 A. We're on the lakefront.  
 6 Q. And do you also operate a business?  
 7 A. Yes.  
 8 Q. And can you explain for the Hearing Officer  
 9 how close your business is in relation to the quarry.  
 10 A. Across the street.  
 11 Q. Across the street?  
 12 A. Yeah. Across Highway 5.  
 13 Q. Do you know approximately how many feet that  
 14 is?  
 15 A. Maybe 250. I don't know. I'm not sure.  
 16 Q. And is that in relation to the edge of the  
 17 quarry or where they're actually operating and  
 18 currently blasting?  
 19 A. That would be the highway edge of the  
 20 quarry.  
 21 Q. And approximately how far are you away from  
 22 where they're blasting currently?  
 23 A. I don't know.  
 24 Q. How long have you been running your business  
 25 that's across the street from the Sunrise Beach

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1 quarry?  
 2 A. Five years.  
 3 Q. And you're aware, I think I've indicated  
 4 before, but that Magruder Limestone took over the  
 5 quarry in or around May of 2007; is that correct?  
 6 A. Yes.  
 7 Q. And since that time, since they've been  
 8 operating the quarry, has their operation of the  
 9 quarry impacted your business in any way?  
 10 A. Yes.  
 11 MR. BROWNLEE: Your Honor, I'm going  
 12 to have a continuing relevance objection as to what  
 13 effect the Sunrise Beach quarry had on her business  
 14 that's 20-some miles away from the site that we're  
 15 here for today.  
 16 HEARING OFFICER: Hearing Officer  
 17 will take it as a continuing objection, and again  
 18 we'll see how it ties up and whether or not when the  
 19 day is done whether there is any relevance or what  
 20 weight the Hearing Officer might be able to give to  
 21 it concerning the issue before the Commission.  
 22 Proceed, Mr. Polhemus.  
 23 MR. POLHEMUS: Thank you, your Honor.  
 24 Q. (By Mr. Polhemus) Can you describe for us  
 25 the impacts that your business has had.

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1 A. Dust.  
 2 Q. Can you explain for the Hearing Officer the  
 3 dust that your business has experienced.  
 4 A. We have -- we have used cars and customized  
 5 golf carts, and we have dust on them all the time.  
 6 Q. And by dust, are you talking about a thin  
 7 layer of dust?  
 8 A. It's white dust. It's not like brown dust  
 9 like I would get, you know, in my house, you know.  
 10 It's -- it won't come -- it's hard to get off. It  
 11 doesn't just wash off.  
 12 Q. Well, why don't you explain to us what you  
 13 have to do in order to wash that dust off the cars  
 14 and the golf carts that you sell, please.  
 15 A. We didn't know what to do, so I talked with  
 16 Dave Owens. He's a State investigator, and he said  
 17 to wash everything in vinegar.  
 18 Q. And do you happen to know which agency Dave  
 19 Owens works for?  
 20 A. State Department of Safety, Health and  
 21 Fire -- not firearms -- yeah, Firearms, Blasting.  
 22 Q. Is he the State Fire Marshal, State Fire  
 23 Marshal's office?  
 24 A. Yes, that's it, State of Missouri.  
 25 Q. And from your personal observation, does

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1 this dust seem to be originating from inside the  
 2 boundaries of the quarry?  
 3 A. Definitely.  
 4 Q. And at your business have you also been able  
 5 to feel blasting at the quarry?  
 6 A. I felt the quarry's blasting at my business.  
 7 Q. And can you describe that feeling for us?  
 8 A. It scares me.  
 9 Q. And is this just your windows rattling? I  
 10 mean, is that the type of experience you've had with  
 11 the blasting that's originated from the quarry, or  
 12 are there other manifestations that you've actually  
 13 personally felt?  
 14 A. The floor of our building shaking.  
 15 Q. What about the floor -- it shakes? And you  
 16 mentioned before, you live about 1,200 feet from the  
 17 quarry?  
 18 A. Yes.  
 19 Q. Have you been able to feel blasts at your  
 20 home?  
 21 A. Yes.  
 22 Q. And can you describe again just those blasts  
 23 that you've experienced 1,200 feet away?  
 24 A. It's not as intense as at my business, but  
 25 you can feel it in the floor of our home.

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1 Q. And has your home experienced any problems  
 2 from blasting?  
 3 A. Well, we have -- we totally remodeled our  
 4 home in '96 on the inside, and we have cracks.  
 5 Q. And where are those cracks?  
 6 A. In the walls.  
 7 Q. I want to go back -- I want to talk a little  
 8 bit more about this blasting. Have you contacted  
 9 Magruder about this blasting?  
 10 A. I've talked with Mark, yes.  
 11 Q. And have they done anything to ease your  
 12 concerns regarding the blasting?  
 13 A. Not to ease my concern, no.  
 14 Q. Have they taken any steps that, you know,  
 15 was their attempt to offer some type of conciliation  
 16 to you or the citizens regarding their blasting?  
 17 A. No.  
 18 Q. Do you get phone calls from Magruder  
 19 indicating when they're blasting?  
 20 A. Yes. Diane calls me.  
 21 Q. Okay. And when you talk with Diane, what do  
 22 you ask her or what -- explain those conversations  
 23 with us.  
 24 A. I just say, Diane, tell them to hold the  
 25 blasting down over there.

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1 Q. And what's typically Diane's response to  
 2 that?  
 3 A. She usually says, I'll say something to  
 4 them. And one time she said, well, it's kind of  
 5 late, but I'll say something.  
 6 Q. And when you asked Diane to have them hold  
 7 it down, is it always -- then your testimony is that  
 8 you keep a calendar and log the blast. Is it always  
 9 a relatively low blast?  
 10 A. No.  
 11 Q. So the blast can be pretty significant, even  
 12 though you asked them to keep it down?  
 13 A. It can be very significant sometimes.  
 14 Q. And is it your understanding that Magruder  
 15 sounds a horn when they're blasting?  
 16 A. Sometimes.  
 17 Q. And is it your understanding they're  
 18 supposed to sound that horn every time they blast?  
 19 A. That's my understanding.  
 20 Q. And is it your testimony here that they do  
 21 sound the horn every time they blast?  
 22 A. No, they do not sound the horn every time  
 23 they blast.  
 24 Q. Now, are you sure they're not sounding a  
 25 horn when they're blasting? Do you know that, in

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1 fact, a horn didn't sound and you just didn't hear  
 2 it?  
 3 A. I've -- I mean, I've stood on the hill when  
 4 they've blasted, and there's been times they've  
 5 blasted that there's been no horn.  
 6 Q. So you've been outside --  
 7 A. Yes.  
 8 Q. -- close to the quarry and haven't heard a  
 9 horn when a blast occurred?  
 10 A. Yes.  
 11 Q. Have you ever had the opportunity to talk  
 12 directly with Mr. Magruder regarding your concerns?  
 13 A. Yes.  
 14 Q. Can you describe for us the nature of those  
 15 conversations?  
 16 A. I just asked him to hold the blasting down.  
 17 Q. Has he made any other representations to you  
 18 about the operation or safety features regarding the  
 19 quarry?  
 20 A. I don't understand safety features.  
 21 Q. Have you ever talked with Mr. Magruder about  
 22 constructing a berm, perhaps, along the edge of the  
 23 quarry to provide a buffer?  
 24 A. We asked them to fence the quarry.  
 25 Q. And, to your knowledge, has the quarry been

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1 fenced?  
 2 A. No.  
 3 Q. Did you ever have a conversation with  
 4 Mr. Magruder regarding building a berm and planting  
 5 trees to provide a buffer for the dust and the noise  
 6 emanating from the quarry?  
 7 A. I didn't ask him to do that.  
 8 Q. Did you hear any representations --  
 9 MR. BROWNLEE: Hearsay. Objection.  
 10 Q. (By Mr. Polhemus) -- by Mr. Magruder in a  
 11 June 2007 radio program where he said he would build  
 12 a berm?  
 13 A. Yes.  
 14 HEARING OFFICER: The question was  
 15 relative to a statement by Mr. Magruder?  
 16 MR. POLHEMUS: Correct, your Honor.  
 17 HEARING OFFICER: Objection is  
 18 overruled. The Hearing Officer will allow --  
 19 Q. (By Mr. Polhemus) Can you repeat --  
 20 HEARING OFFICER: And the response  
 21 she needs to repeat.  
 22 Q. (By Mr. Polhemus) Would you repeat your  
 23 response?  
 24 A. Would you repeat the question?  
 25 Q. Sure. Have you ever heard Mr. Magruder

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1 represent that he would plant trees along the edge of  
 2 Highway 5 in front of the quarry?  
 3 A. Yes.  
 4 Q. And, to your knowledge, has that ever been  
 5 done?  
 6 A. There's a pile of dirt up along Highway 5.  
 7 That's it.  
 8 Q. Any trees?  
 9 A. No.  
 10 Q. Any type of vegetation?  
 11 A. No.  
 12 MR. POLHEMUS: Nothing further, your  
 13 Honor.  
 14 MR. MCGOVERN: Nothing, your Honor.  
 15 HEARING OFFICER: Nothing, Mr.  
 16 McGovern? Thank you. Mr. Brownlee,  
 17 cross-examination?  
 18 EXAMINATION  
 19 QUESTIONS BY MR. BROWNLEE:  
 20 Q. I'm Richard Brownlee representing Magruder's.  
 21 Regarding your business that you've testified to,  
 22 what type of business is it?  
 23 A. We have used cars and customized golf carts.  
 24 We buy -- we sell cars and golf carts.  
 25 Q. And I assume that those cars and golf carts

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1 sit on a parking lot, correct?  
 2 A. Yes, they do.  
 3 Q. And that parking lot is gravel, is it not?  
 4 A. Yes.  
 5 Q. And do you have any separation of the dust  
 6 from the quarry you've complained about versus the  
 7 dust that's created naturally from your gravel  
 8 parking lot?  
 9 A. Repeat that question.  
 10 Q. I mean, can you separate the dust that you  
 11 allege comes from the quarry from the dust naturally  
 12 generated from traffic on your own gravel parking  
 13 lot?  
 14 A. Well, usually when people pull into our  
 15 parking lot they're driving very slow because they're  
 16 looking. And you can see the dust coming, bellowing,  
 17 out of the quarry across the highway.  
 18 Q. Okay. So your gravel parking lot, then,  
 19 doesn't create any dust, but it's all coming --  
 20 A. I'm sure it may create some, but when people  
 21 are driving in, it's a small lot, when people are  
 22 driving in, they're not -- you know, like when you go  
 23 down a road in a vehicle and dust flies behind your  
 24 vehicle? It doesn't do that.  
 25 Q. Okay. And regarding the cracks in the walls

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1 that you've had since your house was remodeled, have  
 2 you brought these to the Magruders' attention, made a  
 3 claim?  
 4 A. No.  
 5 Q. The answer is no?  
 6 A. No.  
 7 Q. Have you made a claim to your own insurance  
 8 company?  
 9 A. No.  
 10 Q. Has anyone from a scientific or an expert  
 11 testimony tied the cracks in the walls to the actual  
 12 blasting?  
 13 A. Not that I know of.  
 14 Q. Regarding this rating system of yours, do  
 15 you keep track of blasting on a calendar?  
 16 A. Yes, I do.  
 17 Q. And how does that rating system work?  
 18 A. I just rate from a one to a ten.  
 19 Q. Okay. And is this a subjective rating, or  
 20 do you have special training to --  
 21 A. I do not have special training. If someone  
 22 is in the hospital and they ask you for your pain,  
 23 they say from one to ten, how is your pain. That's  
 24 kind of how I do it.  
 25 Q. And are you home every time there's blasting

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1 at the quarry?  
 2 A. At my home?  
 3 Q. Or at the business?  
 4 A. Yeah, usually.  
 5 Q. How often is there blasting at the quarry?  
 6 A. It varies.  
 7 Q. Well, let's say in the last week.  
 8 A. They blasted a week ago -- let's see. What  
 9 is today, Friday? I think they blasted Tuesday.  
 10 Q. This Tuesday?  
 11 A. Yeah. Monday or Tuesday. Yeah, Tuesday  
 12 morning.  
 13 Q. How often in terms of a month is there  
 14 blasting at that quarry?  
 15 A. Probably, like I said, it varies, but at  
 16 least a couple of times.  
 17 Q. Two times a month there's blasting?  
 18 A. Maybe through the winter it wouldn't be that  
 19 much, but as the weather gets nicer and they need  
 20 more rock, they blast more. So that would vary.  
 21 MR. BROWNLEE: I think that's all.  
 22 Thank you.  
 23 HEARING OFFICER: Mr. Duggan, any  
 24 cross-examination?  
 25 MR. DUGGAN: No questions.

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1 HEARING OFFICER: Any recross, or  
 2 redirect? Pardon me.  
 3 MR. POLHEMUS: Two questions, your  
 4 Honor.  
 5 HEARING OFFICER: Proceed.  
 6 EXAMINATION  
 7 QUESTIONS BY MR. POLHEMUS:  
 8 Q. Ms. Robinson, you indicated that you hadn't  
 9 posted any claim with your insurance company; is that  
 10 correct?  
 11 A. Correct.  
 12 Q. Can you tell us why you haven't reported any  
 13 claims to your insurance company?  
 14 A. Yes.  
 15 Q. Please do.  
 16 A. Because Al Bisogno had his insurance  
 17 canceled because of quarry blasting, so we weren't  
 18 about to even send anything to our insurance company  
 19 because we didn't want our insurance canceled because  
 20 of the quarry. And a lot of people around the area  
 21 feel that way.  
 22 Q. And one final item. Earlier we heard  
 23 testimony from Ms. Sallach that her water line was  
 24 broken on November 20th of 2007?  
 25 A. Uh-huh.

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1 Q. From your personal knowledge, do you know if  
 2 there was blasting on November 20th, 2007?  
 3 A. Yes.  
 4 Q. Is that indeed a day that you recorded on  
 5 your blast calendar?  
 6 A. Yes.  
 7 MR. POLHEMUS: No further questions,  
 8 your Honor.  
 9 HEARING OFFICER: Recross on those  
 10 points only?  
 11 MR. MCGOVERN: No.  
 12 EXAMINATION  
 13 QUESTIONS BY MR. BROWNLEE:  
 14 Q. Who's your insurance with, your homeowners  
 15 insurance?  
 16 MR. POLHEMUS: Objection, your Honor.  
 17 Relevance.  
 18 HEARING OFFICER: You opened the  
 19 door, sir. Proceed. Objection is overruled. Answer  
 20 the question.  
 21 A. Golden Rule.  
 22 Q. (By Mr. Brownlee) Golden Rule?  
 23 A. Uh-huh.  
 24 MR. BROWNLEE: Thank you.  
 25 MR. DUGGAN: Nothing.

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1 HEARING OFFICER: Any other  
 2 questions, Mr. Brownlee?  
 3 MR. BROWNLEE: No.  
 4 HEARING OFFICER: Mr. Duggan?  
 5 MR. DUGGAN: Nothing.  
 6 HEARING OFFICER: Redirect on that  
 7 point only? No further questions of the witness.  
 8 The witness is excused. Thank you. You may remain  
 9 in the room if you wish to. Does that conclude  
 10 presentation of fact witnesses on behalf of the Joint  
 11 Sewer Board?  
 12 MR. MAUER: Yes, your Honor, it does.  
 13 Did it before 10:30.  
 14 HEARING OFFICER: Thank you, sir. I  
 15 appreciate it.  
 16 MR. MAUER: The only other thing we  
 17 will have at some point, they're not quite done yet,  
 18 is some deposition designations that we'll submit --  
 19 and we'd rather not -- if it's with your pleasure,  
 20 we'd rather just submit the designations and leave it  
 21 for you to read rather than actually reading them  
 22 into the record.  
 23 HEARING OFFICER: That's exactly what  
 24 the Hearing Officer wants. I assume we will take  
 25 care of that matter after we close everything and as

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1 we're going over what exhibits are going to be --  
 2 going over our list of exhibits to confirm what has  
 3 been introduced. At this time let's take a recess  
 4 until 10:30, and then we can proceed with witnesses  
 5 for the Applicant. With that, we are recessed until  
 6 10:30. We're off the record.  
 7 (Brief recess.)  
 8 HEARING OFFICER: All right. The  
 9 hearing will be reconvened. Let's come to order. We  
 10 now move to presentation of Applicant's witnesses.  
 11 Mr. Brownlee, you are recognized to call your first  
 12 witness.  
 13 MR. BROWNLEE: Dr. Paul Worsley.  
 14 HEARING OFFICER: Dr. Worsley, would  
 15 you come forward to be sworn.  
 16 PAUL DORSEY, Ph.D.,  
 17 of lawful age, produced, sworn, and examined on  
 18 behalf of the Applicant, deposes and says:  
 19 HEARING OFFICER: Please have a seat.  
 20 Does each counsel have a copy of Exhibit 8, the  
 21 numbered copy?  
 22 MR. BROWNLEE: Yes.  
 23 HEARING OFFICER: So we can all  
 24 follow along. Proceed, Mr. Brownlee.  
 25 MR. BROWNLEE: Has Exhibit 8 been

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1 admitted?  
 2 HEARING OFFICER: Exhibit 8 actually  
 3 was -- no, it was not. The blast plan, Exhibit 7,  
 4 was admitted under the McDonald testimony, but  
 5 Exhibit 8 has not been, so if you wish to lay the  
 6 foundation for this expert and move for its  
 7 admission, we will move on.  
 8 EXAMINATION  
 9 QUESTIONS BY MR. BROWNLEE:  
 10 Q. State your name for the record.  
 11 A. Paul Worsley, W-O-R-S-E-Y.  
 12 Q. Where do you live, Dr. Worsley?  
 13 A. I currently live in Maries County, north of  
 14 Rolla. I have a Rolla postal address, 16681 Maries  
 15 Road 527, Rolla, Missouri 65401.  
 16 Q. What is your formal education beginning with  
 17 your college?  
 18 A. Okay. I have three degrees which I obtained  
 19 in the United Kingdom. The first degree was a BS in  
 20 applied geology from the University of Bristol. The  
 21 second a Master's of science in excavation -- rock --  
 22 sorry -- rock mechanics excavation and engineering at  
 23 the University of Newcastle-Upon-Tyne.  
 24 Q. What year was that?  
 25 A. That was in -- I obtained that in 1978.

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1 Q. Thank you. And the third degree?  
 2 A. The third degree is a Ph.D. at the  
 3 University of Newcastle-Upon-Tyne. That was  
 4 completed in '81. I deferred conferment, as I had  
 5 come to the United States and I wanted my parents to  
 6 be there for the degree ceremony and had it conferred  
 7 in '83.  
 8 Q. Thank you. And do you have an engineering  
 9 specialty in which you're engaged?  
 10 A. Yes. I work in blasting.  
 11 Q. And does that include rock as well as other  
 12 materials?  
 13 A. Yes. Rock blasting specifically.  
 14 Q. And by whom are you currently employed?  
 15 A. I'm currently employed by the University of  
 16 Missouri, Missouri University of Science and  
 17 Technology to be specific. It's the Rolla campus.  
 18 Q. And how long have you been employed?  
 19 A. I've been employed by that University since  
 20 1981.  
 21 Q. What general courses have you taught at the  
 22 University in Rolla?  
 23 A. I've taught a number of courses; statics,  
 24 case surveying, underground mining and surface mining  
 25 and a variety of explosives and blasting classes.

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1 Q. What are you currently teaching at the  
 2 University of Missouri dealing with blasting?  
 3 A. I currently teach explosive classes, and  
 4 those dealing with blasting include Mining 307, which  
 5 is the basic explosive engineering class; an advanced  
 6 class called Mining 351 -- sorry -- Mining 350; and  
 7 also a post-graduate class whose title is  
 8 Environmental Controls Blasting. That designation is  
 9 Mining 402.  
 10 Q. Regarding the first course, the basic  
 11 blasting, what is the format or the materials taught  
 12 in that course?  
 13 A. In the first course we go through  
 14 explosives, initiation systems and go through the  
 15 whole process of applying that to blasting, safety,  
 16 blast design, the whole works. And it culminates  
 17 with putting everything together so that the students  
 18 can design a blast in close proximity to structures.  
 19 Q. Does this include benching that we've heard  
 20 the testimony --  
 21 A. Yes. In the basic explosive engineering  
 22 class, we focus on bench blasting such as in quarry  
 23 blasting.  
 24 Q. Are you going to explain that later in your  
 25 testimony, benching?

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1 A. Yes.  
 2 Q. Now, what about the second course? What are  
 3 you teaching in advanced blasting?  
 4 A. Advanced blasting we teach the more tricky  
 5 items within blasting.  
 6 Q. Such as?  
 7 A. The more specialist ones, such as opening up  
 8 a new level, blast casting for coal mines, trenching,  
 9 underground blasting and that sort of thing,  
 10 specialist techniques.  
 11 Q. And regarding the third course, what is the  
 12 content of the environmental controls for blasting  
 13 course?  
 14 A. Environmental controls for blasting starts  
 15 off with going through some of the theory involved in  
 16 blasting and use of explosives and then follows on to  
 17 perimeter blasting, which is the control of the  
 18 excavation limits. It's basically a specialized type  
 19 of blasting. We also do blast vibrations, air blasts  
 20 and other environmental aspects.  
 21 Q. And by air blasts, explain that, please.  
 22 A. Okay. Air blast is the air pressure pulse  
 23 that one gets from a blast in rock. Not necessarily  
 24 is audible. Most of the energy involved in air  
 25 blasts is below the acoustic hearing limit.

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1 Q. It's below what?  
 2 A. It is below the level at which you can hear,  
 3 the frequency. I'll put an analogy on this. It's  
 4 kind of like if anybody's ever used a dog whistle and  
 5 you blow in the dog whistle. Well, I can't hear dog  
 6 whistles at all. Now, maybe some -- a young kid can  
 7 hear a dog whistle, but dogs can hear dog whistles.  
 8 It's the same with blasting. Houses are much larger  
 9 structures, and what affects them is a lower  
 10 frequency and there's a limit to which we can hear  
 11 that.  
 12 It's kind of like a subwoofer on a car. I  
 13 remember once being in my old house and I was sitting  
 14 there, and all of a sudden I started to get a beat on  
 15 the chest like this. And I thought I was having a  
 16 heart attack and I sat there and went, whoa, I'm  
 17 having a heart attack and I was quite worried, then  
 18 all of a sudden I heard some music. It was some  
 19 teenager had got a car with one of those big, huge  
 20 subwoofers in the trunk. And as it came across the  
 21 top road which our road T'd to, okay, as it came  
 22 closer and closer, I could hear more and more of the  
 23 music, and only when it was right to the T junction  
 24 could I hear what the actual song was, and then it  
 25 disappeared back off into something. And it's the

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1 same with blasts. A lot of that energy we can't  
 2 hear, and that's why we use blasting seismographs.  
 3 Q. Thank you. Do you hold any professional  
 4 licenses?  
 5 A. I hold -- in the United Kingdom I'm a  
 6 chartered engineer and also I'm a Group 1 European  
 7 engineer.  
 8 Q. Can you explain what a chartered in the UK and  
 9 a Group 1 is?  
 10 A. A chartered engineer, it would be the  
 11 equivalent of a professional engineer over here; and  
 12 a European engineer designation means like a practice  
 13 engineer anywhere in Europe.  
 14 Q. Do you hold any other professional  
 15 qualifications as they relate to Missouri?  
 16 A. I have an MLPA blasters license. I also  
 17 have licenses for fireworks and special effects. I'm  
 18 trying to think here. I think that's about it.  
 19 Q. Are you -- you said MLPA. What is that?  
 20 A. Missouri Limestone Producers Association.  
 21 Q. And do you hold any membership in the ISEE?  
 22 A. Yes. That's correct. I'm a member of the  
 23 International Society of Explosive Engineers. I have  
 24 served as the secretary for many years of the St.  
 25 Louis chapter.

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1 Q. And do you teach any blasting-related  
 2 courses that are not necessarily connected to  
 3 University of Missouri?  
 4 A. Yes. As pertains to teaching students at  
 5 the University, also I teach outside the University  
 6 and do extension activities both within the  
 7 University framework and outside. I do many short  
 8 courses on blasters training.  
 9 Q. Have you trained for the MODOT as well as  
 10 the new blasting license under Missouri law?  
 11 A. Yes. That's correct. I've taught many  
 12 short courses, I would expect somewhere around about  
 13 50-plus while I've been here, and a large percentage  
 14 of those have been for the MLPA certification, also  
 15 for MODOT blaster certification. And now the course  
 16 has been approved for use for the fire marshal's  
 17 office for the new State certification or licensing.  
 18 Q. Do you conduct any other industry blasting  
 19 training?  
 20 A. Yes, I do. I'm regularly invited to the  
 21 Austin Blasting Training Seminar, their refresher  
 22 seminar, which occurs once every two years and also  
 23 to other people's seminars. I have also given  
 24 training not only in Missouri but other states and  
 25 all over the world.

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1 Q. Have you received any awards for your work  
 2 with explosives and blasting?  
 3 A. Yeah. I've received the ISEE President's  
 4 Award. I also have a best paper award and numerous  
 5 teaching awards from the University.  
 6 Q. Dr. Worsey, I'm going to hand you what we've  
 7 asked the court reporter, I believe, to mark  
 8 Applicant's Exhibit 21.  
 9 MR. MCGOVERN: Has this been produced  
 10 before?  
 11 HEARING OFFICER: This is Applicant's  
 12 21. This is a list of publications by the witness;  
 13 is that correct?  
 14 MR. BROWNLEE: Correct.  
 15 DR. WORSEY: Yes, that's correct.  
 16 HEARING OFFICER: Proceed, Mr.  
 17 Brownlee.  
 18 Q. (By Mr. Brownlee) Dr. Worsey, again we've  
 19 handed you what's been marked Applicant's Exhibit 21.  
 20 I'd ask you if you could identify that?  
 21 A. Yes.  
 22 Q. And what is that?  
 23 A. It's a list of my publications. It's not a  
 24 full list, but it's a list pertaining to those  
 25 involving blasting. It's missing a lot of military

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1 explosives publications, et cetera.  
 2 Q. You said your first degree was -- what was  
 3 it in?  
 4 A. Applied geology.  
 5 Q. And did you study -- in that applied geology  
 6 degree, have you had occasion to study limestone and  
 7 sedimentary rock?  
 8 A. Yes.  
 9 Q. Any other kinds of rock or materials?  
 10 A. All the different types of rock, the major  
 11 groups.  
 12 Q. Did you study karst rock formations?  
 13 A. Yes, I did.  
 14 Q. And can you tell me your experience with  
 15 that in terms of your studies or actual hands-on  
 16 experience?  
 17 A. Yes. Not only did I obtain training in that  
 18 during my Bachelor of Science in applied geology, but  
 19 I also mapped an area in Yorkshire in the United  
 20 Kingdom which was principally karst topography. In  
 21 addition to that, I also assisted my wife before we  
 22 were married in her senior design project. She was a  
 23 geographer, a physical geographer, and that project  
 24 involved the mapping of literally hundreds of sink  
 25 holes which are pressure karst features.

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1 Q. What is karst topography from a geologist's  
 2 standpoint?  
 3 A. Well, karst is a type location. It's the  
 4 karst region of what used to be Yugoslavia. Now with  
 5 all the name changes it's a vast tract of land that  
 6 can be seen easily is satellite photographs, and it  
 7 is part of Serbia and Montenegro and, I believe, one  
 8 other province as well.  
 9 Q. Could you describe to the Judge the classic  
 10 karst features.  
 11 A. Yeah. There are some very, very classic  
 12 karst features, a whole bunch of them. One of the  
 13 principal ones is sink holes, which are large cones  
 14 in the ground basically where the ground has sunk in  
 15 due to water solution of the limestone. There's a  
 16 lot of other features as well, such as clints and  
 17 grykes.  
 18 Q. Can you spell those?  
 19 A. C-L-I-N-T. And a gryke, G-R-Y-K-E.  
 20 Q. What's a clint?  
 21 A. A clint is a pinnacle, okay, so very, very  
 22 strong pinnacles you'd normally expect to see in  
 23 karst topographies. And grykes are very, very large  
 24 solution joints. So it would be like rivets or  
 25 chasms in the limestone. There are a lot of other

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1 features, dry streambeds where there is no water  
 2 flowing where there is a valley, but -- obviously a  
 3 strong valley but no water in the bottom of it,  
 4 usually because this is sunk -- a stream has  
 5 disappeared into a hole, a swallow hole they call it.  
 6 Also caverns, collapsed caverns, natural bridges and,  
 7 of course, springs. Those are some of the most  
 8 prominent karst features.  
 9 Q. Have you had any actual personal experience  
 10 dealing with blasting in karst topography?  
 11 A. Yes, I have. There's been two that I've  
 12 been involved with personally. The first one was a  
 13 project for MODOT, a Highway H across from Crystal  
 14 Caverns north of Springfield. And the second one was  
 15 work involving the Carol Cave Conservancy. The Carol  
 16 Cave itself is a few miles north of Richland on  
 17 Highway 7, just off it on the way to the lake.  
 18 Q. Regarding the first project, I said you -- I  
 19 believe you said it was the show cave. Can you  
 20 describe what that project actually involved in terms  
 21 of blasting?  
 22 A. Yes. That project involved two portions.  
 23 The first portion was to determine what the blast  
 24 vibration levels would be in the show cave. And the  
 25 whole purpose of this was to protect the show cave

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1 and people in the show cave from damage to the  
 2 formations and having them falling on them when they  
 3 put the new realignment project through which came as  
 4 close as 600 feet.  
 5 Q. That is, the highway was aligned 600 feet  
 6 from this cave?  
 7 A. Yeah. The closest was 600 feet, that's  
 8 correct.  
 9 Q. And what was the result of that project?  
 10 A. We determined -- the first part, as I say,  
 11 was determining the vibration levels, what could be  
 12 expected and what we should do. There was not many  
 13 vibration levels at that point taken in caves, so  
 14 they wanted to ascertain what those vibration levels  
 15 were likely be.  
 16 Q. And I assume the project had blasting at  
 17 600 feet from the cave?  
 18 A. Yes. That's correct.  
 19 Q. And what was the result of your work on that  
 20 project?  
 21 A. We identified some procedures for the second  
 22 part of the project, which was the actual  
 23 installation and blasting of the highway on the  
 24 hillside across from the cave.  
 25 Q. And what was the result?

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1 A. The result of the project?  
 2 Q. Yes.  
 3 A. We... The result of the project was that  
 4 the highway was put in ahead of schedule with no  
 5 damage to the cave formations whatsoever.  
 6 Q. Now, regarding the second project, the Carol  
 7 Cave Conservative, can you explain what that  
 8 involved?  
 9 A. Carol Cave Conservative is a group dedicated  
 10 to the mapping and scientific investigation of Carol  
 11 Cave, which is thought to be the largest cave system  
 12 in the State of Missouri, and they wanted to gain a  
 13 better access to the cave. The current cave entrance  
 14 is on private property where the owner has decided  
 15 not to let people access, and they've been working on  
 16 a large sink hole dig a couple of miles from the  
 17 entrance and weren't able to break through to the  
 18 cave, so they decided they'd like to put a shaft down  
 19 to it instead. And I was involved with helping  
 20 them -- well, training them and showing them how to  
 21 blast down to the cave.  
 22 Q. And how big a shaft was this?  
 23 A. It's a very, very small diameter shaft, 30  
 24 to 36 inches in diameter, going down from about 10  
 25 foot below the surface where the soil finished, the

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1 dirt finished, there was limestone, bedrock, all the  
 2 way down to within 2 feet of the actual cave itself.  
 3 It was about -- the whole depth of the shaft is  
 4 approximately 120 feet deep.  
 5 Q. What was the result of that project?  
 6 A. The result was we managed to blast the shaft  
 7 all the way down to the bottom successfully.  
 8 Q. Were there any unique features in that show  
 9 cave that you were concerned about?  
 10 A. Yes. It's a very, very pretty show -- it's  
 11 a very pretty cave. In fact, it's not a show cave  
 12 because the public isn't allowed down there. But  
 13 there were a number of very fragile cave formations  
 14 close to where the shaft was due to breakthrough,  
 15 closer than myself and Mr. Mauer, a lot closer than  
 16 that to that.  
 17 Q. Can you compare, as you will later testify,  
 18 the vibrations involved in that blasting next to the  
 19 cave as compared to what will occur on the Magruder  
 20 site?  
 21 A. Yes. The vibration levels that were  
 22 measured at the stalactites using a seismograph were  
 23 probably higher than what we are anticipating for the  
 24 sewer plant at the proposed project site.  
 25 Q. Regarding the Magruder site involving this

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1 karst discussion that's been raised by at least one  
 2 of the other experts, have you visited the Magruder  
 3 site?  
 4 A. Could you -- sorry. Could you repeat that,  
 5 please?  
 6 Q. Yeah. Regarding the issue of the karst  
 7 topography you've testified to, have you visited the  
 8 Magruder site?  
 9 A. Yes.  
 10 Q. On how many occasions?  
 11 A. Three, I believe.  
 12 Q. Now, have you seen any sign of any karst  
 13 topography on that property?  
 14 A. No. In fact, the first two times that we  
 15 went there, I looked around. It's the sort of thing  
 16 I usually look around for anyway, having a geological  
 17 background, of course, and didn't notice anything.  
 18 And I was quite surprised when I read Mr. Dressler's  
 19 report and I thought, well, we better go back and  
 20 have a further look and have a very in-depth look to  
 21 see if I actually can find something, and I did that.  
 22 Q. Did you check any other rock faces in the  
 23 area that were exposed in terms of whether there were  
 24 any voids or any sign of any karst topography in that  
 25 area?

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1 A. Yes. I had a good look over the Magruder  
 2 site, both where we've got the 20-year plan and the  
 3 hillside across as well, a good walkthrough, and it  
 4 was -- I was able to see things pretty well because  
 5 the leaves weren't on the trees at that point, hadn't  
 6 leaved, and there wasn't that much underbrush as we  
 7 walked through the woods. I also went down to the  
 8 sewer plant and had a good look at the face there at  
 9 the sewer plant.  
 10 Q. And that's the rock face?  
 11 A. Rock face, that's correct. A quite  
 12 substantial rock face at the sewer plant there. And  
 13 I also went and had a look at any outcrops I could  
 14 see nearby. The most visible outcrops, of course,  
 15 are the road cuts on the highway, which is not too  
 16 far from it. And also took a look at the quarry  
 17 that's just on the other side of the river right next  
 18 to the main road.  
 19 Q. And did you find any sign of any karst  
 20 topography in any of those views?  
 21 A. No. I didn't find any classical karst  
 22 features whatsoever.  
 23 Q. Do you know why you didn't?  
 24 A. Well, yes. The reason is karst features  
 25 don't occur everywhere. They occur in limestone, but

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1 it depends on the type of limestone that you have.  
 2 Karst features are not typical things that you find  
 3 everywhere in Missouri where you have limestone.  
 4 And, in fact, that's the reason why certain places  
 5 like Ha Ha Tonka and the Devil's Icebox are state  
 6 parks.  
 7 Q. Because they're unusual?  
 8 A. Yes, because they're unusual, that's  
 9 correct.  
 10 Q. I'd like to turn to your personal experience  
 11 dealing with blasting. Again, what was your first  
 12 formal training in blasting?  
 13 A. My first formal training in blasting was  
 14 during the Master's of science in rock mechanics and  
 15 excavation engineering.  
 16 Q. And why did you take a Ph.D. in mining?  
 17 A. I was offered the opportunity to do a Ph.D.,  
 18 to continue it in New Castle and do a Ph.D., and it  
 19 had a very interesting topic and that was in  
 20 blasting.  
 21 Q. Now, aside from Exhibit 22, the various  
 22 publications, during your Ph.D. did you do any  
 23 specific research on blasting?  
 24 A. Yes. My Ph.D. thesis was on the application  
 25 of pre-split blasting to rock slopes.

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1 Q. And what is that pre-split blasting?  
 2 A. Pre-split blasting is a perimeter blasting  
 3 excavation technique, and it's used for providing  
 4 nice smooth final walls for rock excavation.  
 5 Q. What other experience did you receive during  
 6 your blasting in obtaining your Ph.D.?  
 7 A. Apart from my actual training originally  
 8 during my Ph.D., I also worked on site for the  
 9 Transport and Road Research Laboratory of the UK, the  
 10 Scottish branch.  
 11 Q. What's that?  
 12 A. TROL? It's a government body for  
 13 transportation and road research, and in Scotland,  
 14 the Scottish branch was working directly for the  
 15 Scottish Development Department who was funding large  
 16 road contracts at the time, and they were having  
 17 quite a lot of problems with cost overruns due to  
 18 blasting.  
 19 Q. Regarding the actual project that we're here  
 20 today on, you were retained by Magruder, correct?  
 21 A. That's correct.  
 22 Q. And what was the nature of that retention  
 23 obligation you had?  
 24 A. I was asked to put forward an excavation and  
 25 blast plan that would be reasonable and protect

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1 certain structures that other persons had concern  
 2 for.  
 3 Q. And what were those structures?  
 4 A. There's a sewage facility next to the  
 5 Magruder site, something like 700 feet away when I  
 6 looked at the map last, and two sewer lines that  
 7 actually cross the Magruder property on an easement.  
 8 Q. And did you author a blast plan in this  
 9 regard?  
 10 A. Yes, I did.  
 11 Q. And what materials did you review?  
 12 A. Well, the first thing was, I think probably  
 13 the most important, is to go actually and have a look  
 14 at the site. And as I said, I had a good look at the  
 15 site before authoring the plan. Also, maps of the  
 16 area with the Magruder property marked on it and the  
 17 location of the sewer plant and the sewer lines,  
 18 geological maps, et cetera, aerial photographs. Had  
 19 a look in Google Earth as well and checked to see  
 20 what it was like on the updated. And as I said,  
 21 actually going there and having a look at it myself.  
 22 Q. And you stated how many site visits have you  
 23 made to the site project?  
 24 A. Three, I believe.  
 25 Q. And can you summarize the blast and mine

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1 plan that you prepared for Magruder?  
 2 A. Yes. Basically it's a series of blasts, of  
 3 relatively small blasts for quarrying utilizing  
 4 4-inch holes up to a 50-foot face site, the  
 5 development of benches in the order of 50 feet and  
 6 the excavation process for the site.  
 7 Q. And what was the ultimate purpose of the  
 8 blast plan?  
 9 A. The ultimate purpose of the blast plan was  
 10 to make sure that Magruder could excavate the rock in  
 11 an economical manner yet still protect the sewage  
 12 facility and the pipelines crossing the Magruder  
 13 property.  
 14 Q. Did you, in the preparation of that, make  
 15 any recommendation regarding the distance that you  
 16 would get no closer to the pipelines in the  
 17 operation?  
 18 A. Yes.  
 19 Q. And what was that distance?  
 20 A. I recommended that they didn't go closer  
 21 than 150 feet.  
 22 Q. And what's the reasons for that  
 23 recommendation?  
 24 A. The reasons for that recommendation are  
 25 twofold. The most important reason is economics. As

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1 we progress towards the site -- and we'll be able to  
 2 see this as I give the presentation -- what happens  
 3 is you go over the top of the hill and it starts  
 4 sloping down. As you go towards the pipelines down  
 5 the valley, you get less and less rock. And you get  
 6 to the point at which the face height has dropped  
 7 such that it no longer becomes economical to mine  
 8 that rock and it really doesn't make sense to take  
 9 it. We could actually come very close to that  
 10 pipeline, but it doesn't make any sense to do it  
 11 economically.  
 12 Q. And did you also -- were there any safety  
 13 considerations involved, aside from the economy?  
 14 A. Yes. Yes. To make sure that that distance  
 15 was far more than adequate to protect pipelines.  
 16 MR. BROWNLEE: Can we just go off for  
 17 a minute? At this point do you want to make  
 18 reference to your Exhibit 8?  
 19 HEARING OFFICER: Do you wish to go  
 20 off and take a recess?  
 21 MR. BROWNLEE: Well, I could just  
 22 ask...  
 23 Q. (By Mr. Brownlee) Would it be helpful at  
 24 this time, Doctor, to go ahead and look at your  
 25 proposed --

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1 A. The presentation?  
 2 Q. Yes.  
 3 A. Yes.  
 4 Q. Okay. Why don't we go ahead and do it at  
 5 this time. I think we're at a point where he's going  
 6 to get to the point on the -- explain the economics  
 7 and the safety issues.  
 8 A. Yes. That's correct. In this presentation,  
 9 as you can see up there, I have put forward an  
 10 excavation and blasting plan. To get the rock out of  
 11 the quarry, we have to excavate it.  
 12 HEARING OFFICER: Wait just a moment.  
 13 For purposes of the record, we are now looking at  
 14 Applicant's 8 which is being shown also in a Power  
 15 Point presentation that Dr. Worsey is now going to  
 16 walk us through.  
 17 MR. BROWNLEE: Correct.  
 18 HEARING OFFICER: In a narrative  
 19 form. Counsel, I trust that you have Post-It Notes,  
 20 or you can make notes as far as your  
 21 cross-examination on the copies provided, as the  
 22 Hearing Officer will for any cross-examination that  
 23 will be done on this. With that, Mr. Brownlee, you  
 24 may proceed. Or, Dr. Worsey, you may proceed to give  
 25 us the walkthrough.

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1 A. Thank you. To get the rock out, we have to  
 2 excavate it, and at the moment the only viable  
 3 economic method is the use of blasting. Using  
 4 impactors is a very, very slow process. It costs a  
 5 lot of money, and you can't make profit doing it.  
 6 Also, it makes a lot of noise, a lot of vibration, a  
 7 lot of aggravation to people. And certainly if you  
 8 were to have an impactor pecking away for eight hours  
 9 a day or more five to seven days a week, you would  
 10 not be able to get as much material as blasting, and  
 11 that would have multiple ones. So it would be very  
 12 aggravating and expensive.  
 13 Let's move on to Slide 2.  
 14 Q. (By Mr. Brownlee) And if you want to -- if  
 15 you want to just skip through, some of this we've  
 16 covered, so you can just go ahead and scroll to where  
 17 you --  
 18 A. Okay. I'll scroll, I'll skip through each  
 19 title to Slide 3. Okay. I've been retained as  
 20 consultant by Magruder. I've worked for Magruder in  
 21 the past processing vibration complaints. I'm  
 22 performing an internal audit of blasting practices  
 23 and records. And I've been told I'm going to be  
 24 retained to continue to perform consulting services  
 25 for this project as the quarry develops to make sure

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1 that it is done properly. I will in conjunction with  
 2 Dyno be performing regular visits and/or meetings to  
 3 guide the blasting process.  
 4 Q. And, now, explain who Dyno is.  
 5 A. Dyno is the largest explosive company in the  
 6 United States. They provide not only explosives but  
 7 also shot service. Shot service is where they come  
 8 on site and actually load people's holes and do the  
 9 blasting. And this is quite advantageous because of  
 10 scale. One crew can service many quarries, use  
 11 sophisticated, expensive equipment and spread that  
 12 cost out. So it becomes very economical for smaller  
 13 quarry operators to employ shot service. The other  
 14 thing is they have trained personnel that are very  
 15 experienced, very professional, and do this every day  
 16 of their career.  
 17 Q. And is it your understanding Dyno will be  
 18 handling all of the blasting on the Magruder project?  
 19 A. Yes, that's my understanding. That's what  
 20 I've been told. Okay. Let's move to the fourth  
 21 slide. I've put this presentation not as an  
 22 engineering presentation but as a layman's  
 23 presentation, certainly because the majority of  
 24 people in this room don't have engineering training,  
 25 so I have to make it understandable to everybody, so

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1 I have to bring it down so it's fairly easy to  
 2 understand. Because of that, you're not going to see  
 3 engineering drawings; you're going to see schematics  
 4 that are representations. Okay? I'll say that  
 5 straight for the record there. I've done it so it's  
 6 more easily understood and I've done it in the  
 7 understanding that many mining concepts have to be  
 8 explained along the way. Now, I'm not here to give  
 9 you a full 20-hour training course in blasting or a  
 10 whole semester's worth in surface mining, so I'm  
 11 going to keep it simple.  
 12 The next slide, Slide 5, shows the  
 13 location of the quarry. It's in Bowlin Hollow, off  
 14 the Osage River in Miller County, Missouri. That's  
 15 the topographic map.  
 16 Slide 6 talks about the overall plant,  
 17 setting up processing facilities, crushers, screens,  
 18 stockpiles in Bowlin Hollow. And Bowlin Hollow has  
 19 been chosen because it affords good access to the  
 20 existing road system. In fact, it may be the only  
 21 hollow that makes sense to put the equipment in to  
 22 start.  
 23 The second item is mining the limestone.  
 24 Technically it's dolomite.  
 25 Q. Can you describe the quality of that type of

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1 limestone?

2 A. That type of limestone is not the best

3 quality of limestone. A lot of the limestone in

4 Missouri is not topnotch, but it's good enough for

5 aggregates and concrete, et cetera.

6 They're going to start about 6 foot above

7 the creek, and this is to stop the quarry from

8 flooding when it rains. It doesn't make sense for

9 the quarry operation to mine lower than the stream

10 because then the stream may breach into the quarry

11 and flood it, and that's a lot of expense. There's a

12 lot of rock there, and the company doesn't need to be

13 greedy about it. It's as simple as that.

14 So they're going to start down there in

15 the hollow 6 feet above the creek bed and they're

16 going to excavate the directions away from the creek

17 bottom itself. The resources that are involved there

18 include potentially over 6 million tons of limestone.

19 Of course, we're going to have to see once they start

20 excavating exactly what they're going to use that for

21 and the quality of it.

22 All of the mining will be done within the

23 gasconade dolomite. That's the upper gasconade and

24 the top of the lower gasconade formations, which is

25 limestone, specifically dolomite. These formations

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1 are overlain by the rubidoux group, and this is

2 unsuitable for mining and selling, so basically it's

3 waste material. Fortunately this particular property

4 does not have much rubidoux on it, which makes it

5 very advantageous.

6 Moving to Slide 8, this is a geological

7 map that seems to have automatically re-scaled

8 itself, but on the geological map -- and this is

9 provided by Missouri Geological Survey -- you see

10 different letters. There's an O there, and that

11 refers to the ordinary rocks. The R is the rubidoux,

12 the small R. You can't quite show it here, but the

13 small R. And this is shown in pink in the map. This

14 is the site itself, and as you can see, it's on the

15 tip there in bedrock and some over here as well, but

16 not a great deal.

17 What we're going to be looking at mining

18 is mainly the gasconade, and then U is for upper,

19 which is right below the rubidoux. And then below it

20 we have OGL. It comes up the valleys, and that's the

21 lower gasconade formation, not that much different

22 between the two from a mining and usage standpoint.

23 Let's move on to Slide No. 6. What

24 resources are available on that shaded area. Now

25 that's not the complete property, but we're looking

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1 at that shaded area and specific parts of it. The

2 part of the shaded area is from the west traveling

3 eastwards to the sewer lines, and at a production

4 rate of 300,000 tons per year, this will provide

5 20 years or more of production before the quarrying

6 operations progress to the other side of the sewer

7 line. Now, there are certain assumptions on this

8 because we don't know what the economic activity is

9 going to be, and to predict us that far into the

10 future, but certainly starting off it's expected that

11 the production rate will be far lower than that, and

12 this is the sort of production rate they are

13 expecting to get up to. But before we have to --

14 they have to move over to the other side of the

15 pipeline we're expecting there's about 20 years life.

16 That's fairly reasonable.

17 Here's a map of the proposed development.

18 This is the area controlled by Magruder. And there's

19 Bowlin Hollow. This is where they'll start off. The

20 pipeline comes down here. So what they have is this

21 hillside and the main ridge here is about 20 years of

22 production. After that, there's a ridge on the other

23 side, then there's another hollow and another ridge

24 here.

25 Looking into the development of the

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1 quarry, they've got three zones or areas, subdivided

2 areas of mining planned for the initial development,

3 and this is, of course, 20 years in the already

4 bonded area. There's two sections on the ridge

5 that's in the hillside between Bowlin Hollow and the

6 next valley over where the sewer line is located, and

7 this excavation will be stopping 150 feet from the

8 sewer lines. The third area shown as C is the

9 excavation on the hillside east towards the county

10 road.

11 Here are some approximate areas of mining.

12 Here's the C area. They will be putting a new road

13 in here for access to the quarry. At the moment I

14 don't believe they have access directly into the

15 property from the same road the sewer pipe is on, so

16 they'll have to put one in from the county road down

17 here. We've got area A, B and C. It's not

18 necessarily mined in that order, but A will certainly

19 be mined before B. There's a set-back off the power

20 lines shown here. So they're not mining directly

21 right up to the property line. It's normal for

22 people to start at 50 feet from the property line so

23 that if there is a cave-in of any ground it doesn't

24 take anybody else's property. That's standard mining

25 procedure, nothing different. It's pretty standard.

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1           Going towards the sewer line, it is  
2 anticipated at the moment it will take approximately  
3 20 years before the -- we get closest to the sewer  
4 line.  
5       Q. Your slide says ten years and you --  
6       A. Sorry. It's -- sorry. It would be  
7 approximately ten years, I apologize for that, before  
8 the sewer line -- let me start that again. It's  
9 going to be approximately ten years before the  
10 blasting gets to its furthest point closest to the  
11 sewer line in mining area A. There is a reason for  
12 this, and we'll see that in a minute.  
13       There are structures and other items of  
14 interest for protection, the three main items.  
15 There's residential structures surrounding the land  
16 not owned by Magruder. These are mainly to the west  
17 and the south. We have a sewer plant to the north  
18 between the proposed quarry site and the river, which  
19 discharges -- the sewer plant discharges into the  
20 river. And there are two sewer lines on an easement  
21 crossing the property in a north/south direction, and  
22 this is to the east of the initial mining areas. And  
23 these sewer lines feed the sewage plant.  
24       We'll go on to the next slide, which is  
25 15. What about the residential buildings and the

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1 sewer plant first? The residential buildings and  
2 sewer plant buildings are protected by the new State  
3 law, the Missouri Safety Blasting Act of 2007. Now,  
4 this law was passed last summer and provides uniform  
5 blasting standards across the State of Missouri and  
6 also provides protection for areas that have no  
7 blasting standards whatever. And this would be one  
8 of the areas.  
9       So what I'm saying here is now -- okay,  
10 before, there was no blast protection. People could  
11 do whatever they wanted. Now there are vibration  
12 limits, air blast limits that mining and construction  
13 persons have to deal with and keep to those. Now,  
14 under this act there's a number of definitions. One  
15 of those is an uncontrolled structure. Now, an  
16 uncontrolled structure is defined here, but basically  
17 it's something that isn't owned by the person who's  
18 doing the blasting or the mining company or leased,  
19 so it's somebody else's property, and it's a  
20 dwelling, that's a house, a public building, school,  
21 church, commercial building. All right? That's  
22 pretty simple. It's somebody else's building.  
23       The Act itself, I've gone to -- sorry.  
24 I've gone to Slide 16 now. The Missouri Blasting Act  
25 itself sets forth specific vibration limits for

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1 uncontrolled structures, and these limits protect  
2 these structures. Now, the vibration limits that  
3 must be maintained for the buildings at the sewer  
4 plant, because they're uncontrolled surface  
5 structures, also protect the plant in their vicinity.  
6 In fact, there is a building between the sewer pumps  
7 and other equipment and the Magruder blasting site.  
8 There is a building on the east side that is between  
9 the pumps and the Magruder property to the east of  
10 the sewer plant.  
11       Now, I want to make it plain at this point  
12 that these structures actually protect the other  
13 items that are there that may not be specified under  
14 the blasting statute because surface structures  
15 amplify the ground vibration movement. If we have a  
16 house, for instance, and we, say, have a certain  
17 level of blast vibrations in the ground, that house  
18 will sway and wobble and it will amplify that  
19 movement by a factor of two or three, whereas in  
20 ground structures, they are in the ground, they have  
21 to move with the ground, so thereby the movement is  
22 much less. Also, there are other reasons for  
23 in-ground structures being less susceptible to  
24 vibrations as well. So those surface structures  
25 there say that at that sewer plant we have to meet --

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1 Magruder, Dyno has to meet the State statute for  
2 blast vibration limits. It has to be below the  
3 maximum levels.  
4       Now, there's another point in this as  
5 well. These levels are made for houses, and houses  
6 are made of much weaker materials than equipment  
7 facilities. Specifically --  
8       MR. MAUER: I'm sorry. I just want  
9 to make sure that by giving this presentation I'm not  
10 waiving an objection that there's been no foundation  
11 that this witness has any knowledge regarding the  
12 construction of the sewage treatment plant. I  
13 realize -- I'm not trying to interrupt or anything  
14 else.  
15       HEARING OFFICER: I understand you're  
16 not waiving any objection.  
17       MR. BROWNLEE: We're going to tie  
18 that up, too.  
19       MR. MAUER: I just want to make  
20 sure -- I don't quite know how you wanted me to do  
21 that, Mr. Tichenor. I won't object again, just as  
22 long as I'm not waiving it. Thank you.  
23       HEARING OFFICER: You're going to  
24 have a full opportunity to cross-examine the witness  
25 with regard to that, and the Hearing Officer clearly

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1 understands at this point no foundation has been laid  
 2 that this witness is an expert in the construction of  
 3 the structures, both above ground and in ground at  
 4 the facility. And to the extent that it's tied up,  
 5 then it will go to what weight the Hearing Officer  
 6 can give it. Proceed, Mr. Brownlee or Dr. Worsey.  
 7 A. Thank you. The regulations are based on the  
 8 OSM regulations and U.S. Bureau of Mine Report 8507,  
 9 and they specifically use Appendix B, otherwise known  
 10 as the Siskand curve in the industry or the Z curve,  
 11 and it shows the limit that is allowable and safe  
 12 that you can go to for peak particle velocity versus  
 13 frequency. And if you stay below that line it's  
 14 safe. Above that line it's questionable.  
 15 And that line is based on the damage to  
 16 sheet rock. Sheet rock is a very weak material. So  
 17 that line there is not for major structural damages;  
 18 it's there for cosmetic damage. Okay? All right.  
 19 So what we have is we have limits based on cosmetic  
 20 damage to homes, sheet rock, and we have those that  
 21 we have to conform to at an industrial facility,  
 22 okay, because that's the way the law is written. So  
 23 this provides fairly good protection.  
 24 Let's go on from Slide 16 to Slide 17.  
 25 Buried pipelines. The Missouri Blasting Safety Act

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1 of 2007 does not cover other buried structures, such  
 2 as pipelines. However, there are studies by the U.S.  
 3 Bureau of Mines that show that such buried pipelines  
 4 are far more resilient than surface structures.  
 5 During these tests they did, they set off charges in  
 6 huge diameter holes very, very close to buried  
 7 pipelines that were specifically buried that would  
 8 absolutely horrify you if it was a house that was put  
 9 there, somebody's house. We're talking about blast  
 10 holes as large as 12 inches in diameter and  
 11 2,000 pounds of explosives much, much closer than  
 12 what we're talking about here. And there's the  
 13 reference that's shown there on that slide.  
 14 Going on to 18, the U.S. Bureau of Mines  
 15 is part of the Federal Government. It was under the  
 16 Department of Interior, and at the time it was  
 17 charged with research for mining and blasting safety.  
 18 The remains of the U.S. Bureau of Mines now resides  
 19 within the MYOSH. Their research in blasting  
 20 vibrations was used by the Office of Surface Mining,  
 21 that's OSM, which is another federal organization, in  
 22 the development of federal blasting vibration  
 23 regulations.  
 24 I show up on Slide 19 an abstract from a  
 25 paper, and this says, "The mining industry

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1 occasionally blasts near pressurized transmission  
 2 pipelines and has requested guidance on safe  
 3 vibration levels and set-back distances. The Bureau  
 4 of Mines and the Indiana Department of Natural  
 5 Resources cooperated with Amax Coal Company on a  
 6 study of coal mine overburden blasting. Five buried  
 7 and pressurized 250-foot pipeline sections were  
 8 specifically installed on the Minnehaha Mine high  
 9 wall near Sullivan, Indiana, for testing to failure.  
 10 Four welded steel pipes ranging from 6 to 20 inches  
 11 in diameter and one 8-inch PVC water supply pipe were  
 12 monitored for vibration, strain and internal pressure  
 13 for a period of six months while production blasting  
 14 advanced up to the pipeline field."  
 15 MR. MCGOVERN: Mr. Petitioner, at  
 16 this point I'm going to assert the same objection  
 17 that was asserted earlier. There's no indication  
 18 that the blast plan from this particular test site,  
 19 evidence of geology, any investigation whatsoever was  
 20 done to ensure that the comparison of this blast in  
 21 this pipe is in some way relative to the blasted pipe  
 22 that's used on this particular site, so I'll simply  
 23 raise the same objection raised by Mr. Brownlee  
 24 earlier that all of this testimony related to these  
 25 test sites is irrelevant.

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1 MR. MAUER: And I join that.  
 2 HEARING OFFICER: Response, Mr.  
 3 Brownlee?  
 4 MR. BROWNLEE: Well, I think it's  
 5 background to the overall -- we will turn to the  
 6 specific pipeline and specific blasts involved in  
 7 this plan. I think this is just background as to  
 8 studies that have been made dealing with the subject  
 9 of damage to underground facilities, and at that  
 10 point I believe it is relevant.  
 11 MR. MCGOVERN: According to the power  
 12 points I've been provided, this is the basis of the  
 13 opinions that are going to be rendered. The  
 14 objection raised earlier was unless you can  
 15 demonstrate that this test site and the blast plan is  
 16 the same as this test site -- or not the test site  
 17 but the Magruder quarry and the blast plan being  
 18 utilized here, the argument was it's irrelevant, and  
 19 I would assert that objection. This is not  
 20 background.  
 21 HEARING OFFICER: The objection is  
 22 overruled. The Hearing Officer understands that we  
 23 are not dealing -- or at this point the record does  
 24 not give us the exact parameters of this. At the  
 25 same time, this is a matter clearly within the

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1 purview of this expert and I assume within the  
 2 purview of the Joint Board's expert to discuss that  
 3 testimony as well as to explore on cross-examination.  
 4 The objection goes more to what, if any, weight the  
 5 Hearing Officer may give to this or should give to  
 6 this as far as these studies and how it ties up with  
 7 the blasting at the proposed quarry site. So the  
 8 objection is overruled. Proceed.  
 9 A. Thank You. Slide 21, continuing on the  
 10 abstract, "In contrast to previous studies of small  
 11 scale blasting representing construction activities,  
 12 these tests involved overburden blasts of up to  
 13 2,100 pounds per delay in 12-and-a-quarter-inch  
 14 diameter holes. Initial analysis found low strains  
 15 and calculated stresses from even large blasts, a  
 16 result consistent with previous tests of small scale  
 17 blasting."  
 18 I'd like to add at that time when we look  
 19 at the small scale blasting, we are looking at things  
 20 more of the size that we are anticipating we're going  
 21 to be using at the Magruder site.  
 22 On to Slide 22 and continuing on their  
 23 abstract, "Ground vibrations of 5 inches per second  
 24 produced worst case circumferential strain levels,  
 25 about 25 percent of those resulting from pipeline

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1 pressurization and calculated stresses of only 10 to  
 2 18 percent of the ultimate tensile strength. No  
 3 pressurization failures occurred at the vibration  
 4 amplitudes reached over 20 inches per second."  
 5 Q. (By Mr. Brownlee) And, again, how would  
 6 that compare to the actual Magruder blast plan?  
 7 A. As anticipated, that we will be a quarter or  
 8 less of that.  
 9 These results suggest that buried  
 10 pipelines are relatively resistant to blast  
 11 vibrations. It's something that we've known in the  
 12 industry for a long time.  
 13 Going on to Slide 24, I have a comparison  
 14 between Amax and Magruder for production blasting.  
 15 First I have Amax with 12-inch holes and Magruder  
 16 with 4-inch holes. Magruder is going to be using  
 17 very, very small holes. The pounds per delay for the  
 18 Amax site was 2,000 pounds-plus per delay. That's  
 19 over a ton of explosive was put into each of those  
 20 12-inch holes.  
 21 Q. And by per delay, can you explain that,  
 22 please?  
 23 A. A delay, yes. A delay is where we actually  
 24 fire holes with a slight pause between them. It's a  
 25 time delay. In blasting, we use that to more

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1 effectively break the rock. What we do, if you can  
 2 imagine, it's like a stick of parachute that's going  
 3 out of a plane. If everybody tries to get out of the  
 4 plane at the same time, they get stuck in the door,  
 5 whereas if we go out in a stick, we go one, two,  
 6 three, four, five, six, jumping out in rapid  
 7 succession, it makes it a lot easier, more efficient  
 8 getting those people out of the plane.  
 9 Now, when we do this, the same thing with  
 10 blast holes. By putting a delay between them, doing  
 11 them in sequence, it allows us to break the rock more  
 12 effectively. It allows the rock from the first hole  
 13 to get out of the way enough before the second hole  
 14 fires, then it gives it some relief and allows us to  
 15 get much improved fragmentation. So basically  
 16 delays, the use of delays is a very advantageous  
 17 thing for mining because it gives us better rock  
 18 fragmentation. And this has been known for many  
 19 years.  
 20 I'll go on, then. We can see we've got a  
 21 ton-per-hole plus on the test site, whereas Magruder,  
 22 they're using 200 pounds -- less than 200 pounds  
 23 ANFO.  
 24 Q. And by ANFO, what do you mean?  
 25 A. ANFO is a blasting agent. It's the

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1 principal explosives that we use in the explosives  
 2 industry these days and it's a mixture of ammonium  
 3 nitrate, prill and fuel oil, generally diesel, or can  
 4 be mineral oil, a whole host of different fuels that  
 5 are available for that. And it's one of the cheapest  
 6 explosives that we have, and that's the reason why we  
 7 use it.  
 8 Or less than 300 pounds of emulsion. And  
 9 I'll explain emulsion. Emulsion is a waterproof  
 10 explosive. ANFO has no water resistance whatsoever,  
 11 so when we have wet holes, we're forced to use a  
 12 water-based emulsion. And this is also a bulk  
 13 explosive and it's brought in in trucks. The minimum  
 14 distance on Amax was well less than 100 feet.  
 15 Q. And that's the previous test you were  
 16 talking about was Amax?  
 17 A. That's it. Huge holes, huge holes really  
 18 close. Okay? Magruder, smaller holes, less  
 19 explosives, further away.  
 20 I'd like now to go on to Slide 25. And  
 21 the question that I have covered a little bit already  
 22 is why are buried objects such as pipelines far less  
 23 susceptible to damage than surface structures? And  
 24 on the slide we have a couple of pictures. The one  
 25 on the left is a pipeline project where they're using

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1 blasting putting in a large pipeline, as you can see.  
 2 We have a water or sewer line crossing that pipeline  
 3 project. On the right we have a house. The answer  
 4 to this is, as I've said, above-surface structures  
 5 amplify the ground vibrations by generally two to  
 6 three times or even more. They wobble more. Whereas  
 7 buried structures have to move with the ground, so  
 8 they move in a similar manner. Also, as we go  
 9 deeper, vibration levels decrease because larger  
 10 amplitude surface waves don't exist at depth.  
 11 Therefore, as we go down, the vibration levels  
 12 decrease.  
 13 Q. Regarding the second reason that the buried  
 14 structure like a pipeline vibrates with the  
 15 surrounding ground, can you kind of explain that as  
 16 it relates to this particular pipeline?  
 17 A. Yes. The vibration -- and we'll come onto  
 18 this probably later on vibration levels, but a  
 19 vibration is a backwards and forwards movement. You  
 20 don't generally associate an actual physical movement  
 21 that's a permanent movement with a vibration. An  
 22 example would be the windows or the blinds might  
 23 vibrate, but they'll come back to their original  
 24 position when it's finished.  
 25 Q. Thank you.

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1 A. Move on from 26 to 27. Here is a really  
 2 good example you might have heard of. It's  
 3 oftentimes earthquakes that cause severe distress to  
 4 people, and damage to surface structures go unnoticed  
 5 by underground miners. They might come up and  
 6 somebody say in the past, wow, did you feel that  
 7 earthquake, we were really worried about you, and  
 8 they many times have said, what earthquake? And  
 9 that's because surface -- the surface waves are what  
 10 cause most of the actual surface vibrations and those  
 11 surface waves are not present at cave depth.  
 12 Let's go on from 27 to 28. Here's in  
 13 addition houses and surface structures are made of  
 14 materials more susceptible to noticeable minor  
 15 damage. Sheet rock I've already said. Mortar  
 16 between bricks and concrete blocks. These are very  
 17 weak materials.  
 18 Whereas -- going on to Slide 29, whereas  
 19 pipelines are made of materials which are far  
 20 stronger in tension and therefore far more resilient,  
 21 such as steel and PVC.  
 22 Let's look now at Slide 30. We have an  
 23 overview of the mining plan. The hillside between  
 24 the two valleys is a ridge that slopes to the north.  
 25 Its height above the proposed bottom of the quarry is

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1 approximately 100 feet at the north end. That's the  
 2 end closest to the sewer plant. And that ridge dips  
 3 down towards the sewer plant. And it's approximately  
 4 140 feet high at its high end to the south.  
 5 Going on to 31, this requires benching.  
 6 The proposed blast hole -- drill hole diameter  
 7 they're going to be using is 4 inches. And this is  
 8 pretty typical for this size of operation, size of  
 9 quarrying operation. This means that we can't do it  
 10 in one pass, it doesn't make sense to, and we'd have  
 11 to bench it. The maximum bench height that we're  
 12 going to use is approximately 50 feet, and therefore  
 13 we're going to have two benches at the north end of  
 14 the quarry and three benches at the southern limit.  
 15 Q. And you will get back -- I believe on Slide  
 16 33 you have an illustration of the benching which is  
 17 going to come up in a minute?  
 18 A. Yes. That's correct. So let's go on to 32.  
 19 Have a look at some other Magruder operations.  
 20 Magruder operates up to 60-foot benches at other  
 21 quarry locations using this blast hole diameter.  
 22 Now, the reason this is really the limit is because  
 23 it's difficult to get straight holes after this.  
 24 Q. Straight holes after what?  
 25 A. After 60 feet.

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1 Q. Can you explain what you mean by --  
 2 A. Certainly. Instead of the hole coming down,  
 3 it starts to drift as it gets deeper and deeper and  
 4 deeper, and you get to a point where you can't be  
 5 certain where it is.  
 6 So if you go above that depth, you get  
 7 hole deviations, so that hole may get close to the  
 8 face and you can end up with fly rock. Also, if you  
 9 have two holes that come apart, drift apart, then  
 10 there isn't the explosive there to break that ground  
 11 in between, then it gives you toe of the bottom of  
 12 the blast when you try to excavate it out and it's  
 13 very difficult to excavate and causes all sorts of  
 14 problems.  
 15 Q. And by a toe, you mean a hump?  
 16 A. Yes, a hump.  
 17 Q. Between the two drill holes?  
 18 A. So you'll see a hump, or it might cause the  
 19 quarry hole to jump up and cause all sorts of  
 20 problems for the quarry operator. That's why we  
 21 always advise you, don't go too high on your bench  
 22 height. A maximum of 50 feet is very reasonable for  
 23 that. That would be the upper end of what I'd be  
 24 happy in doing myself.  
 25 Here's a schematic of the benching

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1 operation. Again it's a conceptual illustration,  
 2 it's not to scale, but on the one side we have Bowlin  
 3 Hollow here, and we're working it -- so we're looking  
 4 at kind of from the sewer plant. Here's Bowlin  
 5 Hollow, it goes up, and we're working in. And we  
 6 have to develop these benches by blasting into the  
 7 ground surface. Now, this relief has been highly  
 8 exaggerated, because otherwise it would look really,  
 9 really flat and would not look -- you wouldn't be  
 10 able to see it so well. And what we have is 50-foot  
 11 benches we develop, and once that bench has been  
 12 developed to the full height, then you continue at  
 13 50 feet like that. Now, obviously you can see as you  
 14 go along, in order to be able to mine this ground  
 15 here, you have to take out all the stuff above it to  
 16 get to it.  
 17 Q. Where would the pipelines be just -- I mean,  
 18 I realize this is a conceptual drawing, but --  
 19 A. The pipeline would be right here, above the  
 20 streambed on this side of the valley.  
 21 Let's go on to the next slide, which is  
 22 34. What's involved in the excavation operations?  
 23 Well, it's not just rock. The first thing we have to  
 24 do is strip the topsoil and overburden. In these  
 25 parts there's not a lot of topsoil, if you've ever

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1 been on the hillside, but there is unusable material  
 2 there with the rock, et cetera, to get out of the  
 3 way.  
 4 Then we have drilling to make the holes to  
 5 put the explosives in. We load the holes, we fire  
 6 the blasts. Once the rock is broken, we have to go  
 7 in there and dig it and load it out. Let's take it  
 8 out. Usually we use truck haulage and processing  
 9 facilities, but unfortunately diesel prices have  
 10 really gone up high, and they expect it to even  
 11 increase further, and there has been a move over the  
 12 last few years in the mining industry to actually use  
 13 the front-end loader and carry it to the crusher  
 14 which is located really, really close to the face, as  
 15 close as 200 feet away, and dump it directly into the  
 16 crusher, and that way you don't have to wait for  
 17 trucks and you don't have to have extra equipment and  
 18 have to have all the high diesel costs.  
 19 And, in fact, I've been to a number of  
 20 operations. We have one just north of Rolla, very --  
 21 within about five or ten miles of my house where  
 22 there's a quarry and they're actually doing this and  
 23 the crusher is located up to 200 -- as close as 200  
 24 foot to the face. 200 foot would be kind of to the  
 25 other side of the car parking lot over there. And in

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1 that case what you have to do is you have to blast  
 2 properly to make sure that you don't damage your  
 3 equipment.  
 4 Q. With fly rock coming off the face?  
 5 A. That's correct. Because if you damage your  
 6 equipment, you get delays, and delays are costly.  
 7 So they'll be having an in-pit primary  
 8 crusher. I have been told by them they are going to  
 9 convey that rather than use trucks to centralize the  
 10 plant. And that makes good sense, especially how  
 11 fast the price of gasoline and diesel fuel is going  
 12 up these days. Where they'll go to screens, cone  
 13 crushers and stock piles.  
 14 Go on to the next slide. Why I'm going to  
 15 concentrate on drilling and blasting. Why? Well,  
 16 equipment operating off the easement, if we have --  
 17 if it's off the easement, it's not going to affect  
 18 the pipeline. We've got a truck, we've got a drill,  
 19 we've got a -- you know, it's off the pipeline, it's  
 20 not going to affect the pipeline off the easement.  
 21 Drilling itself will not affect the pipeline. The  
 22 simple reason for that is if we've got a 150-foot  
 23 offset and we're only drilling 50 foot, there's no  
 24 way you can, even if we drill horizontally, you can  
 25 only get a third of the way towards the pipeline.

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1 It's as simple as that. However, the drill holes  
 2 themselves define where we put the explosives for  
 3 blasting, how much explosives we're going to use,  
 4 because drill holes only have a certain volume. And  
 5 the blasting times, because of the concerns of -- and  
 6 down here I was understanding it was the City. At  
 7 the time, obviously, it's the sewage treatment plant.  
 8 36, the drilling. What are we going to  
 9 do? Well, we said drill holes are important because  
 10 that's where we stick the explosive. We're going to  
 11 use a 4-inch diameter drill hole. It will be a  
 12 hydraulic drill, and the drill most likely will be  
 13 transported in to do the drilling for each blast and  
 14 shared around a number of quarries. 50-foot maximum  
 15 drill depth. That's approximate.  
 16 And we're going to -- when we start, it's  
 17 going to go up the hillside, and we'll start, because  
 18 it's increasing with a very, very small bench height,  
 19 and work up to the 50 feet. Once you get to the  
 20 50 feet, that's where you start to establish the next  
 21 bench. What we're going to do is drill to limestone  
 22 bedding planes, and these bedding planes are features  
 23 in the rock, they're seams, horizontal seams, that  
 24 define different layers in the rock. And the nice  
 25 thing about them is they afford clean breakage. And

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1 if we use these, we can get nice bench tops and we  
 2 can get a nice quarry floor, a nice even quarry  
 3 floor. And it's the most economic way to do it.  
 4 Now we must select the exact bench  
 5 positions in lithology to provide those things. At  
 6 the moment we're not sure exactly where they are, but  
 7 generally these things every foot, couple of feet,  
 8 don't expect them to be further than about 4 or  
 9 5 feet apart from that rock. There's no indication  
 10 this is huge, massive limestone with huge distances  
 11 between bedding planes.  
 12 On to 37. I've pretty much covered that,  
 13 so I'll go on to the next slide, 38. It is said in  
 14 blasting we deal with holes. When we have holes,  
 15 there is a fixed limited space in a blast hole, and  
 16 this defines the maximum amount of explosive we can  
 17 put in a hole. And we use this for design purposes.  
 18 What we do is we say, okay, this is a  
 19 4-inch hole. And we're going to use the 50-foot  
 20 example. I'm going to put a little under 200 pounds  
 21 of ANFO in it. So I know when I go to that hole I'm  
 22 going to put less than 200 pounds of ANFO into that  
 23 hole for design purposes. It's pretty simple. Now,  
 24 to increase the amount of explosives in a blast and  
 25 shoot the same amount of rock, we have to drill more

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1 holes. Because before we'd gone up to that hole we  
 2 said, well, we're going to stick less than 200 pounds  
 3 of explosive in that hole. All right? So we know  
 4 how much we're going to stick in and start with. So  
 5 if we need a finer breakage, we can't stick any more  
 6 explosives in the hole. What we have to do, because  
 7 we don't have the physical space, we have to put more  
 8 holes. And as I've said, each hole is fired on  
 9 separate delay.  
 10 The delays between the holes, it provides  
 11 the best rock breakage, it reduces fly rock, and as a  
 12 side effect it significantly reduces ground  
 13 vibrations.  
 14 Q. And why is that?  
 15 A. Okay. Because each of the holes fires in  
 16 sequence, bang, bang, bang, bang, bang, bang, like  
 17 that, instead of thump, altogether. Now, these  
 18 delays are very, very small delays, and the minimum  
 19 delay is eight milliseconds, under the regulations,  
 20 that we can say that two holes are actually firing  
 21 separately is if they are timed to be at least  
 22 eight milliseconds apart. Okay? And that's the  
 23 amount of time you need for that rock to move out of  
 24 the way just enough to give relief for the second  
 25 hole to fire.

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1 Now we're going to go on from 39 to 40,  
 2 the powder factor. Powder factor is the pounds of  
 3 explosives you need to break a fixed amount of rock.  
 4 Generally we talk either in pounds of explosive per  
 5 cubic yard or we talk about pounds of explosive per  
 6 ton of rock. I'm going to be talking about pounds of  
 7 explosive per cubic yard because it's easier to  
 8 visualize how big a yard is, a cubic yard. It's  
 9 3 feet by 3 feet by 3 feet. So there's one pound of  
 10 explosive to break that much rock. A powder factor  
 11 of one pound per cubic yard or greater will be used.  
 12 And this is the recommended powder factor for surface  
 13 quarrying of limestone in Missouri. You can use  
 14 less, you can use more. That's a good start place.  
 15 Current practice. Dyno when shooting for  
 16 Magruder currently uses a powder factor of around 1.2  
 17 pounds per cubic yard of rock. Now, increasing the  
 18 powder factor increases the rock breakage and also  
 19 decreases the ground vibrations.  
 20 Q. Why would that be the case, the latter  
 21 portion? If you were using more powder, why would it  
 22 decrease the ground vibrations?  
 23 A. Well, it's very strange. It sounds to the  
 24 lay person very strange and odd, but I think I will  
 25 be able to show this in the next slide when that

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1 comes up.  
 2 Q. Okay.  
 3 A. Let's move to 42. Okay. Yes. Increasing  
 4 powder factor decreases vibration levels. And I've  
 5 got a question mark there because that doesn't sound  
 6 right to the lay person. It's not logical at first  
 7 site, but I'm going to explain it by the fact that a  
 8 larger powder factor means that you've got more holes  
 9 for the same amount of rock. Okay? And there's  
 10 actually less rock in front of each hole, so it's a  
 11 lot easier for the explosive to break that rock. And  
 12 because it's a lot easier for it to break, it  
 13 produces a lot lower ground vibrations.  
 14 What happens is if you use a low powder  
 15 factor, then that ups the ground vibrations. And  
 16 that's the mistake a lot of people make sometimes  
 17 when they get closer to houses, they say we're going  
 18 to use a lower powder factor, so let's spread our  
 19 pattern out, and that's the wrong thing to do because  
 20 we want less shaking of the ground. Not only do we  
 21 want less shaking of the ground, but we want better  
 22 breakage, and the two go hand in hand.  
 23 And I know that's rather strange probably  
 24 to a lot of people in this room, but that's the way  
 25 it is in the blasting industry. What we want is good

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1 breakage, and usually on a blast that has higher  
 2 ground vibrations we're going to have poorer rock  
 3 breakage. Okay? We have two blasts side by side.  
 4 We're going to go on to Slide 43 now. For  
 5 this type of operation Magruder likes to do  
 6 10,000-ton blasts. That's going to consume around  
 7 about 5,000 pounds of explosives. And that may sound  
 8 a lot, but it's a small to medium blast for most  
 9 quarries, and there's a lot of quarries in Missouri.  
 10 Okay? We do a lot of quarrying in Missouri, in fact.  
 11 One of the largest crushed stone states in the  
 12 nation.  
 13 The current maximum projected production  
 14 rate of 300,000 tons per year of rock will therefore  
 15 require about 30 blasts a year. That's two or three  
 16 blasts a month. All right? So shaking is going to  
 17 occur for a few seconds two or three times a month.  
 18 It's not as if it's going to be going on day in, day  
 19 out. It is where if we had a rock impactor working  
 20 for eight hours a day producing less rock, so you'd  
 21 have to have more than one rock impactor, okay, you  
 22 can imagine that would be quite annoying.  
 23 Let's move on to the next slide, Slide 44.  
 24 Now, explosives companies prefer to do larger blasts,  
 25 and the reason is that reduces the amount of time

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1 they're traveling backwards and forwards each year  
 2 for servicing a particular quarry. Now, a typical  
 3 explosive bulk truck is capable of carrying at least  
 4 10,000 pounds of explosives or more. Some bulk  
 5 trucks have significantly larger amounts than that,  
 6 and therefore if you have a blasting crew, it would  
 7 make sense, instead of them having to travel an hour  
 8 and a half to two hours to a blast to service it and  
 9 then an hour and a half, two hours back again just in  
 10 travel, to try and shoot twice as much rock because  
 11 you don't have to go there twice, you only have to do  
 12 it in one blast.  
 13 But what we're looking at is catering more  
 14 to Magruder rather than the explosive company on  
 15 this, not that the explosive company couldn't do it.  
 16 Dyno could do this quite easily, in fact. There are  
 17 a lot of quarries I know that shoot up to 40,000 tons  
 18 of rock a shot. One in particular will do this  
 19 almost every day.  
 20 Slide 45. Having looked at a whole lot of  
 21 loading design, I have done two design scenarios, one  
 22 for dry holes and one for wet holes. The reason for  
 23 this is most companies would prefer to use ANFO  
 24 because it's cheaper; however, if you have wet holes,  
 25 you can't do it. Okay? Dry holes have no water

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1 resistance, wet holes, we're going towards emulsion  
 2 based.  
 3 Q. And wet holes, what can cause that?  
 4 A. A variety of things. One, there might be  
 5 some water seeping through the rock mass that fills  
 6 up the holes. Another one more commonly is when it  
 7 rains, what happens is you end up with water running  
 8 into the holes that have already been drilled and  
 9 this provides wet holes. So it's a problem.  
 10 Normally if wet holes are encountered for 10 percent  
 11 of the ground, then Dyno's shot service prefers using  
 12 wet whole pattern for economic reasons and ease of  
 13 use. And I won't get into that because that's fairly  
 14 complicated.  
 15 Dry holes --  
 16 MR. BROWNLEE: Excuse me a minute.  
 17 Do you want to go off the record? It's 12 noon and  
 18 it might be a --  
 19 HEARING OFFICER: I think we probably  
 20 ought to go ahead and take our break for lunch, be  
 21 back at 1:00.  
 22 MR. BROWNLEE: I mean, is this a good  
 23 stopping point?  
 24 MR. MCGOVERN: That's fine.  
 25 HEARING OFFICER: Then we will

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1 adjourn until 1:00, and with that we're off the  
 2 record.  
 3 (Luncheon recess.)  
 4 HEARING OFFICER: The hearing will  
 5 come to order. We will proceed with the testimony of  
 6 Dr. Worsley. You may proceed.  
 7 A. Thank you. We're now looking at Slide 46.  
 8 This is a pattern for dry holes, and I have  
 9 illustrated here a blast hole, and there's the face  
 10 in quarry blasting. We have our holes parallel to  
 11 free face, and this affords us the best breakage of  
 12 the rock. It's also one of the easiest types of  
 13 blasting to do and, of course, best breakage. It's  
 14 generally lower blast vibrations.  
 15 In the hole at the top here, we have to  
 16 put stemming material, and the reason we do that is  
 17 we have to cap the hole. The whole purpose of this  
 18 is to keep the explosive energy in the hole. If we  
 19 were to just leave it open, then a lot of that  
 20 valuable energy that we put into the hole, the  
 21 expensive explosives and the drilling of the hole,  
 22 would be wasted because the energy would -- a lot of  
 23 it would just pop up out of the top and we wouldn't  
 24 get the rock breakage that we required.  
 25 Q. (By Mr. Brownlee) What is the stemming

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1 material that you use?  
 2 A. Stemming material generally now used in the  
 3 industry is crushed stone. For this size hole,  
 4 usually around about a half an inch in diameter.  
 5 That can be less, can be a little bit more, but  
 6 that's generally what we use. In the old days we  
 7 used to use just the drill cuttings, but we've  
 8 changed a lot since the old days.  
 9 And that then determines how much hole we  
 10 have left to put our explosives in. So what I have  
 11 up here is burden, and the burden is 8 feet, spacing  
 12 of 12 foot. This is typical for a 4-inch hole in  
 13 limestone, stemming around 7 feet. I'm taking a hole  
 14 depth of 50 feet. This is sub-drilling. By using  
 15 bedding planes, we don't have to do this, which is  
 16 good. Out of the 50 foot of hole, we have 43 feet  
 17 left to put our explosives in.  
 18 Now, if we had a really short base up  
 19 here, we still would have to use the 7-foot stemming,  
 20 but we'd have hardly any hole to put our explosives  
 21 in. Therefore, to put the right pattern factor in  
 22 the rock, we'd have to drill many, many holes and it  
 23 would have to shrink our pattern. It's quite  
 24 expensive.  
 25 On this calculation here, it would be for

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1 the maximum height of 50 feet. We're going to have  
 2 four and a half pounds per foot, and if you do the  
 3 calculation it would come up less than 200 pounds of  
 4 explosives per hole. We have a 10,000-ton shot. We  
 5 have a little over two tons of rock for each pound of  
 6 explosives. This equates to around about 25 holes  
 7 for our shot. We'll break that up into a normal  
 8 space of two or three rows. Three rows will work out  
 9 pretty easily, so we'll do eight or nine holes per  
 10 row. So you probably ought to shoot 24 holes or we  
 11 will go for the next three up. We shoot one hole per  
 12 eight millisecond delay. Initiation system here is  
 13 an easy depth, 25/500 delay system. It's a standard,  
 14 non-electric.  
 15 Q. What's that -- what do you mean by that?  
 16 A. This here, forgive me, the first number is  
 17 the surface delay and the second number is the delay  
 18 we use down the hole. This type of system affords us  
 19 to use the same loading of each hole with identical  
 20 detonators and to set that hole off. And the  
 21 sequence is done by the actual physical hook-up hole  
 22 to hole by the surface delays here. And so the  
 23 surface delays go and fire off in sequence, and then  
 24 the holes go boom, boom, boom, boom, boom, boom  
 25 afterwards. And what we'd like to do is have all

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1 surface delays go off before -- sorry about that, I  
 2 apologize -- to get all the surface delays fired  
 3 before the in-hole delays go, and that way we're not  
 4 likely to get a cut-off.  
 5 Q. And this is -- I want to understand this.  
 6 This is what's recommended that's followed in the  
 7 Magruder blast plan?  
 8 A. Yes. That's correct. This is a pretty  
 9 standard plan. I'm following that fairly closely.  
 10 If we have wet holes, there's a couple of  
 11 things we can do. We can either decrease the  
 12 diameter of the hole, use the same amount of  
 13 explosives. Or if we use the same hole size, we're  
 14 going to use a little bit more explosive, and the  
 15 reason is the emulsions explosives are heavier than  
 16 ANFO, and so for the same hole you can get usually up  
 17 to about 50 percent more explosive into the hole.  
 18 And the reason is in the ANFO prill, there's lots of  
 19 air void space in it, whereas in the emulsion there's  
 20 hardly any void space at all.  
 21 Having more explosive in the hole, we can  
 22 go up to the higher burden of spacing, keep the same  
 23 pattern blast, a little bit more rock. So we have a  
 24 burden goes up to 10 feet, spacing to 14 feet.  
 25 Stemming, as the burden's increased a bit, I'm going

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1 to geometrically increase the stemming as well  
 2 because now it needs a little bit more to keep that  
 3 explosive energy in because it's got a little bit  
 4 more rock in front of it to push out.  
 5 The same hole depth, it drops off  
 6 explosive column height down just a fraction to  
 7 42 feet with this explosive taking that specific  
 8 gravity. And it depends on what Dyno decides to use,  
 9 whether it uses -- what type of emulsion. It may be  
 10 a slightly lower density and it could be a slightly  
 11 contracted pattern. We're looking at around about  
 12 6.8 pounds per feet, which comes out in the  
 13 calculation to around about 286 pounds of explosives.  
 14 So it's less than 300 pounds there in that hole.  
 15 Again we're looking at a 10,000-ton shot,  
 16 and because we have more explosives in each hole,  
 17 okay, we're blasting more rock per hole, we don't  
 18 need as many holes to actually shoot the shot. Now,  
 19 this reduces our drilling costs, but the emulsion  
 20 explosive is a little bit more expensive. Again, one  
 21 hole per 8 millisecond delay. Same initiation  
 22 system, 25/500 delays. When we go from row to row,  
 23 though, we take a 42-millisecond row minimum to make  
 24 sure the rock moves out pretty well and we get the  
 25 best fragmentation. This system here, it has one

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1 hole per delay. Pretty standard thing that Dyno uses  
 2 as well. Been on many shots where they've used very  
 3 similar.  
 4 Going to Slide 48, detailed excavation  
 5 sequence, one of the first items at the quarry will  
 6 be the development of an access road for the second  
 7 level. Now this is after we -- they put in --  
 8 Magruder puts in an access road to the site to the  
 9 main road at the top. That will provide access for  
 10 the drill, the explosives truck, drilling and loading  
 11 explosives on the first bench level once you got onto  
 12 the top of it. And then later it's going to provide  
 13 access for loading equipment, et cetera. Might be  
 14 dozer or whatever as we go up the benches.  
 15 I've just squiggled on some more roads to  
 16 show you where we're looking at starting. These are  
 17 the areas here, A and C. There's going to be some  
 18 sort of haul road to get to the different benches.  
 19 It may be off the main access road, it may not, it  
 20 depends on how they like to do it. And the haul road  
 21 here between A and -- the area A and the sewage  
 22 plant, which is up here.  
 23 Start of blasting. They'll have to start  
 24 by blasting strips off the hillside, going up the  
 25 hillside. Most probably this will be done parallel

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1 to the stream because it's the most easiest way to do  
 2 it and provides for the holes being roughly the same  
 3 depth. They'll establish a face by blasting the  
 4 length of the area in multiple blasts until you've  
 5 got one strip completed, and then successive strips  
 6 will be taken working backwards up the hillside.  
 7 See here, this is again conceptual, not  
 8 exactly to scale, but take one, two, three, four,  
 9 have a face, then we can come back and continue doing  
 10 it. The next one will be -- the holes will all be  
 11 roughly the same depth as you go along, then you get  
 12 to the third strip. And these strips will continue  
 13 until we get to near a 50-foot face. At that point  
 14 they'll have to establish another bench.  
 15 After they establish that bench, a two  
 16 bench system will be maintained until the second  
 17 bench approaches 50 foot in height, which is going to  
 18 occur near the crest of the ridge, and this is where  
 19 Magruder will develop a third and top bench which  
 20 will be a little bit shorter. It will be down and  
 21 have no height at the north end and looks like about  
 22 40 feet at the south end of the ridge.  
 23 So how does this benching work, the mining  
 24 process itself? The rock on the top bench has to be  
 25 removed before the rock on the bench immediately

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1 below can be blasted. Otherwise we'd have to do  
 2 underground blasting. Because of the sequence, this  
 3 means the lowest bench next to the pipeline will be  
 4 excavated last, in area A.  
 5 Well, before we can get to this material  
 6 here, we have to take material off it above. And  
 7 before we can get down to this bench one all the way  
 8 up to the closest point to the pipeline, we're going  
 9 to have to take the material off it on top. Because  
 10 of this, it's going to be a long time before they get  
 11 anywhere near the pipeline.  
 12 Q. And by a long time, are we talking years?  
 13 A. Yes. Yes. And with the blasting, what  
 14 they'll be able to do is take a lot of seismograph  
 15 readings as the excavation progresses towards the  
 16 pipeline. We have a lot of data.  
 17 The effect of blasting in each bench.  
 18 There are two factors which may potentially affect  
 19 the pipeline that I considered. The first one is  
 20 ground vibrations, and the second one is ground  
 21 shifting. Ground vibrations have already set a  
 22 transient, and these -- these are not permanent  
 23 displacements. Those can be easily managed. The  
 24 physical shifting of the pipeline is addressed  
 25 permanently. This is the possibility for an actual

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1 physical movement of the pipeline that ends up with  
 2 an actual movement that's permanent.  
 3 Said here on 56, Slide 56, ground shifting  
 4 is permanent displacement of the ground; however,  
 5 pipelines are fairly resilient to being moved. The  
 6 ground to move the rock underneath and alongside the  
 7 pipeline also has to move, okay, in this case. Now,  
 8 this could typically occur -- what we're looking  
 9 here, only for blasting in the same horizon.  
 10 Q. What do you mean by blasting in the same  
 11 horizon?  
 12 A. Well, we have to physically -- the rock, the  
 13 lithology, the same lithological unit -- sorry about  
 14 that -- same rock unit has to be shoved. So when we  
 15 blast, we have to physically push that rock unit.  
 16 Now, in the limestones that we have here, the bedding  
 17 is approximately horizontal and it's in these units,  
 18 these lithological units that go up, these beds.  
 19 Okay? So the way it can shift is along those bedding  
 20 planes. Otherwise what you have to do is sheer the  
 21 rock. And the rock has a very high strength in  
 22 sheerness, this typical rock here, so it's going to  
 23 have a high resistance to doing that. So the easiest  
 24 way to move it is along bedding planes. Then we  
 25 still have to overcome the weight of the rock that's

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1 being moved, plus the friction, the angle of friction  
 2 between the beds themselves. So that's rock  
 3 mechanics, and I don't want to get too deep into  
 4 that.  
 5 Let's go on to the next slide. This is  
 6 Slide 57. Blasting above the elevation of the  
 7 pipeline in a higher rock unit will not cause  
 8 shifting in the pipeline elevation. Therefore, the  
 9 top two benches will have no effect. It's  
 10 expected -- and this is again for ground shifting.  
 11 It's expected that virtually all of the length of the  
 12 pipeline on the Magruder property will be below the  
 13 quarry floor. This is from preliminary survey shot  
 14 by Magruder, went back in there to check on it. And  
 15 also we have to look at the exact geology as we  
 16 uncover it as the excavation progresses to make sure  
 17 that everything is good.  
 18 We'll progress to Slide 58. Some measures  
 19 that we can take to stop ground shifting, if it's  
 20 required, first is by putting sufficient rock in  
 21 between and distance between the blasting and the  
 22 pipeline. And what the first thing I'm looking at  
 23 there is 150-foot buffer zone between the quarry and  
 24 pipelines. And that's going to provide a sufficient  
 25 mass to resist shifting. There's a lot of tonnage of

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1 rock there to push on. Second, what we're looking at  
 2 is modifications in blasting operations. And there  
 3 are certain things we can do to change our blasting  
 4 and the effects of it.  
 5 I'm going to go on now to Slide 59. As we  
 6 progress down the other side of the ridge towards the  
 7 pipeline, Magruder will exercise the option to turn  
 8 the blasting of the bottom bench around 90 degrees to  
 9 reduce the pressure on the rock towards the pipeline.  
 10 Basically, what -- instead of -- if this desk that  
 11 I'm sitting at is the rock I'm pushing away and  
 12 breaking in the face and you imagine the rest of the  
 13 rock that's behind me towards the pipeline, what we  
 14 do, if I push this way, I'm pushing back towards the  
 15 pipeline, but if I change my position and the way the  
 16 blast pushes and I instead get at the end of the desk  
 17 and I push this way, I'm then pushing the rock not  
 18 towards the pipeline. And that's another option we  
 19 can use to be even more safe.  
 20 Q. So what you're saying is that by -- Slide 60  
 21 has an illustration of that, I believe. I'm sorry.  
 22 I got ahead of you on that.  
 23 A. Let's go to Slide 60 and see. Here we can  
 24 see the traditional way of blasting, and this is  
 25 we've got all our drill holes the same depth as we go

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1 along because we're at roughly the same elevation.  
 2 As we get close, though, what we can do is turn them  
 3 so they're this way and not...  
 4 Q. And like on block number one, which way will  
 5 the stone go when you blast?  
 6 A. The stone goes this way, away from the --  
 7 Q. Towards the top of the slide?  
 8 A. That's right. And action, reaction are  
 9 equal opposites, so the pressure is going to be  
 10 coming backwards towards the pipeline.  
 11 Q. The same question for blasting on block  
 12 four.  
 13 A. We'll have developed a slot in here, and  
 14 this would be done in more of a construction blasting  
 15 manner, more carefully, and then the production  
 16 blasts this way.  
 17 Q. That's to the right of the slide?  
 18 A. That's correct. They move -- and the rock  
 19 moves parallel to the pipeline. Because of this, the  
 20 back pressure moves the opposite direction, also  
 21 parallel to the pipeline but the other way. All  
 22 right? It's fairly simple. Simple mechanics there.  
 23 Now we go to Slide 61 now, and we're going  
 24 to have a look at the detailed change. Now,  
 25 unfortunately I've changed the direction of the

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1 orientation of the slide because of the length of the  
 2 blast. This example here is not completely to scale,  
 3 and the number of holes, these will go on probably a  
 4 few more holes if they're an ANFO blast. But the  
 5 pipeline is to the right, and what I have is the face  
 6 I'm going to shoot to here, which if the pipeline is  
 7 up and down on the screen, the direction of the blast  
 8 is going to be up parallel to the pipeline. We start  
 9 here and we go bang, bang, bang, bang, bang all the  
 10 way down.  
 11 Q. And the initiation direction is the timing  
 12 or the delay of each of those shots?  
 13 A. That's correct. It's the sequence of the  
 14 surface initiation of the holes, okay, those surface  
 15 connectors. And here's an example I'm going to show.  
 16 There's the first hole that shoots. Material will go  
 17 like this to the free face. And we have a second  
 18 shot, third hole, fourth hole, fifth hole, sixth hole  
 19 sequence. It always breaks off at the corner. First  
 20 hole, second row, second, third, fourth, fifth,  
 21 sixth. Again, you can see the sequence going right  
 22 now.  
 23 Q. And that sequence you've demonstrated is  
 24 each hole per delay, and that's illustrated from  
 25 Slide 61 through 79; is that correct?

1 A. Yeah. That's correct. That's correct.  
2 Now, the delay sequencing between the rows may be  
3 slightly different, but sequencing along the rows is  
4 exactly the same as what's shown in that figure.

5 Going on to Slide 80, this blasting -- in  
6 this blasting scenario a slot is developed at one  
7 end, and then the successive blasts shot to the slot.  
8 The first hole to be pulled will be the closest to  
9 the pipeline which then creates further relief to the  
10 slot. The holes are then blasted in sequence away  
11 from the pipeline, reducing the potential for rock  
12 movement towards the pipeline. And that's that rock  
13 movement of the ground due to back pressure.

14 Let's go on to Slide 81. It shows it a  
15 little bit more clearly. In the traditional  
16 sequencing you can see that the back pressure is  
17 towards the pipeline. That's, however, quite a  
18 distance.

19 Q. And, again, which way will the stone go as  
20 you set the charge off on block one?

21 A. Okay. The stone will go forwards and out  
22 this way.

23 Q. Towards the top of the slide?

24 A. That's correct. And the back pressure will  
25 be forcing back this way a little bit along, but the

1 main back pressure will be this way. Okay. Now,  
2 what we're going to do is swing that shot around  
3 90 degrees when we get closer to the pipeline, and  
4 that will put the back pressure pushing along the  
5 hillside, which will stop anything moving towards the  
6 pipeline. That's Slide 82.

7 Let's go on to Slide 83. Now, what we're  
8 going to be doing is recording the vibration levels.  
9 The vibration levels will be recorded throughout the  
10 blasting process using multiple seismographs.  
11 They'll be located at residential structures, the  
12 sewage plant and along the pipeline. Now, it's  
13 intended the monitoring is going to be done by a  
14 reputable blasting seismology company. There's a  
15 number of reasons for this.

16 Let's go to Slide 84, the next one. We're  
17 anticipating that we put in semi-permanent monitoring  
18 locations, installed at the sewage plant, the  
19 pipeline and closest residential structure.  
20 Monitoring units will communicate via land line or  
21 radio link back to the company, and blast records  
22 will be automatically generated. So what we're  
23 looking at is using the best technology in  
24 seismatics.

25 Now, I've got some comments on this. It's

1 important that we use a third-party -- reputable  
2 third-party monitoring company because this provides  
3 advantages to all parties. First, we have the  
4 professional installation and set-up of the seismic  
5 monitoring equipment; and second, it's an unbiased  
6 analysis of seismic data. Third, it doesn't require  
7 any specialist training of Magruder personnel and  
8 saves valuable time for mine personnel because they  
9 don't have to deal with this. It's better to use the  
10 experts.

11 Slide 86. In addition to the use of  
12 semi-permanent monitoring locations -- oh, sorry. In  
13 addition, the use of semi-permanent monitoring  
14 locations negates the need for the seismograph units  
15 to be set up for each blast and therefore saves  
16 considerable manpower and expense.

17 Q. What does a seismograph actually measure?

18 A. The seismograph measures peak particle  
19 velocity. It measures the ground vibration movements  
20 through use of a geophone and also measures the air  
21 blast using a microphone.

22 Q. And we're going to turn to peak particle  
23 velocity reluctantly in a minute, so we'll explain  
24 that.

25 A. Peak particle velocity is a very confusing

1 thing.

2 Let's go on to Slide 87. Now, all of the  
3 previous listed excavation and blasting practices are  
4 nothing out of the normal. What I've done is I've  
5 taken some innovative use, looking at the site and  
6 saying, hey, it behooves us to turn around our  
7 blasting direction when we get close to the pipeline,  
8 and this will give added protection. These  
9 techniques and variations of them are practiced every  
10 day in the U.S. and throughout the world.

11 Q. Dr. Worsey, if you have to rate the  
12 technical difficulty of this project in relation to  
13 let's say a scale of one to 100 or -- can you relate  
14 this in terms of day-to-day blasting that goes on in  
15 the United States?

16 A. For me, this is technically very simple. We  
17 close -- we blast close to houses... We blast close  
18 to all sorts of things. The blasting industry blasts  
19 inside factories, in fact, next to equipment to put  
20 in foundations, et cetera. There's all sorts of  
21 cases and examples of blasting. We use six billion  
22 pounds of explosives in the United States alone every  
23 year. That's three mega tons of explosives. That's  
24 a lot. There's a lot of blasting goes on. And we  
25 have a particularly safe industry.

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1 Let's go on to Slide 88. Measures taken  
 2 to protect the pipeline. Semi-permanent seismic  
 3 monitoring stations will be set up on the pipeline  
 4 easement to measure the ground vibration levels as  
 5 blasting progresses towards the pipeline. That way  
 6 we'll know how the vibration levels -- at what rate  
 7 they're increasing as we go towards the pipeline. We  
 8 know that as the blasting progresses towards the  
 9 pipeline the ground vibrations will slowly increase.  
 10 These records and long history of records can be used  
 11 to predict the point at which our blasting will  
 12 require modification, if at all.

13 It also would be prudent to uncover a  
 14 section of the pipeline and install some  
 15 circumferential measuring strain gauges to determine  
 16 the actual stresses placed on the pipelines in a  
 17 similar manner to the USBM study. This would give a  
 18 direct measurement of the strain caused by the  
 19 blasting. Ground vibrations themselves do not  
 20 directly cause damage. It's the strains developed  
 21 due to the ground vibrations. And this is an  
 22 engineering thing, concept. It's not necessarily  
 23 stress; it's the amount of strain. It's how much you  
 24 bend or pull or compress something that causes it to  
 25 fail. And this would actually be a direct

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1 measurement of that.

2 We have some optional blast modifications.  
 3 There are some pretty simple ones that we do quite  
 4 often in the blasting industry when we're shooting  
 5 close to buildings, for instance. The first one is  
 6 reducing the pounds per delay that we use. Now, one  
 7 of the things we can do on this is reduce the column  
 8 loading. Pretty simple. We use less explosives.  
 9 There's two ways to do that. Less explosives per  
 10 punch. The easiest way to do that is either reduce  
 11 the blast hole diameter, which means we use less  
 12 explosives, we can't stick as much in each hole. And  
 13 we could also use a lower density explosive. That  
 14 means we put a few less pounds into the hole.

15 But another way that we can do it is we  
 16 can use decks. And instead of taking one single hole  
 17 and shooting it all at the same time, what we can do  
 18 is we can put another layer in between -- in the  
 19 explosives so that we have two decks of explosives.  
 20 Now, the term decking is used the same as decks on a  
 21 ship. I think everybody can get a concept of decks  
 22 on a cruise ship, called the lines or something like  
 23 that. And we turn one complete hole length into a  
 24 series of decks, and those decks are shot not at  
 25 exactly the same time but with a slight delay between

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1 them.

2 Q. So for, like, a 50-foot hole, instead of  
 3 just having one column of explosive, there might be  
 4 10 feet and then an inert layer and then another  
 5 10 feet and then another inert layer?

6 A. That's correct. We could split that single  
 7 column up into two separate columns of explosives or  
 8 three separate columns. In some of the blasting I've  
 9 been involved with, in coal mines we went as far as  
 10 five or six decks, splitting the holes to five or six  
 11 decks.

12 Q. Does that have any effect on the vibration?  
 13 A. Yes. It increases the pounds per delay of  
 14 the shot, so we get a series of small thumps instead  
 15 of one big one per hole.

16 Another thing we can do is increase the  
 17 powder factor. That means tightening in the blast  
 18 pattern. As you tighten the blast pattern, as I  
 19 said, what that does, it puts less rock in front of  
 20 the hole. It's easier to break that rock, and it  
 21 produces less ground vibrations. Also, doing that,  
 22 if you've got less rock in front of you to push, you  
 23 get less push backwards at the same time from the  
 24 hole.

25 In an extreme case, we can use electronic

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1 blasting caps, precisely controlled blasting, if  
 2 necessary, when blasting very close to the pipelines.  
 3 We've used these underground when we've blasted  
 4 underneath water tanks and things like that down in  
 5 Springfield. These are a little bit more expensive  
 6 at the moment, but in the future I foresee the cost  
 7 of these coming down. They're going to be used more  
 8 and more in the blasting industry. At the moment  
 9 there's no need to use these, but if we deem it  
 10 necessary and the vibration levels start popping up a  
 11 little bit higher than we anticipate, we can go over  
 12 and potentially use these as well to reduce the blast  
 13 vibrations.

14 Let's go on to 91. Why Magruder uses Dyno  
 15 for the majority of its production shots in six  
 16 quarry operations. There's less hassle involved with  
 17 shot service, is the first thing. You don't have to  
 18 have trained blasting personnel at each quarry. This  
 19 is very important. And there's no need for extensive  
 20 explosives storage. This is one thing that really  
 21 upsets people is they've got explosive magazines next  
 22 to them that are sitting there all the time. And if  
 23 you have shot service, you don't have to worry about  
 24 this. The explosive companies come in on site and  
 25 they have bulk trucks which have blasting agents

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1 which are explosives that are extremely insensitive  
 2 and easy to store the explosives. And they transport  
 3 these around on the road quite nicely.  
 4 Shot service is now the norm in the  
 5 industry. It didn't used to be. It's quite funny.  
 6 St. Louis, for instance, back in the '80s did have  
 7 quite a lot of shot service, whereas Kansas City had  
 8 hardly any whatsoever. And it's something that's  
 9 really taken off in the industry pretty well, and  
 10 even Kansas City now is having shot service. It  
 11 gives more highly proficient specialists because  
 12 these guys are doing it every day. It's not like  
 13 they're operating a front-end loader most of the time  
 14 or they're doing maintenance and then one day a week  
 15 their job's the blaster. And Magruder have been  
 16 using shot service for ten years, they're very happy  
 17 with the professionalism of Dyno and the results that  
 18 they obtain. And the bottom dollar is, they want the  
 19 best broke rock that's going to make them the most  
 20 money, and that's what they're going to get.  
 21 Qualifications of the blasting company.  
 22 Dyno's the largest U.S. explosives company, as I  
 23 said. It's provided shot service in Missouri for  
 24 over 20 years. When I first came here in '81, it was  
 25 Ireco and they were providing shot service back then.

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1 They are very professional with a high degree of  
 2 training and qualifications. That includes I  
 3 actually trained the majority of their blasters.  
 4 Now, they also have their own training programs, so  
 5 they do very, very in-depth there. The Hermann  
 6 office up on the river where we anticipate the shot  
 7 service coming from have exceptional blasting crews.  
 8 I've seen a lot of their work and been there on site  
 9 to witness their blasts over the years, a lot of  
 10 them.  
 11 Okay. Let's follow on to 93 and my  
 12 opinions. It's my opinion that the project site is  
 13 an ideal candidate for the development of a quarry.  
 14 The surrounding structures are located sufficiently  
 15 far away from the proposed blasting as not to be  
 16 affected in a detrimental manner.  
 17 Let's come on to 94. The State of  
 18 Missouri now has a law which prescribes blasting  
 19 procedure, vibration measurements and vibration  
 20 limits for the protection of structures not under the  
 21 control of the blasting or mining company. This was  
 22 not the case a year ago. This is fairly new law. It  
 23 gives people coverage throughout Missouri. This area  
 24 I'm taken to believe had no coverage regulations  
 25 whatsoever before last summer.

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1 Let's go to the next slide, 95. Buried  
 2 pipelines are very resilient and affected less by  
 3 vibrations than surface structures. This has been  
 4 shown by an agency of the Federal Government, and it  
 5 is accepted in the blasting industry. We don't talk  
 6 about problems with pipelines; we talk about other  
 7 problems. Pipelines are not a problem for us. I go  
 8 to conference after conference after conference, and  
 9 there's very, very little issue whatsoever about  
 10 pipelines. Everybody's talking about the other  
 11 problems they have. Okay? It's not what is a  
 12 problem in our industry.  
 13 Let's go to 96, some more... Blasting for  
 14 the development of the proposed quarry is compatible  
 15 with the buried pipelines on the easement crossing  
 16 the Magruder property. Let's go to the next one.  
 17 The presence of the pipelines may, however, require  
 18 the modification of blasting procedures when the  
 19 quarry extends close to the pipelines so that they  
 20 remain unaffected.  
 21 Turn to Slide 97. Monitoring of blast  
 22 vibrations and strain on the pipeline will further  
 23 ensure that the pipeline is not compromised. And  
 24 that's the end of my slide presentation.  
 25 MR. BROWNLEE: I've got some other

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1 areas I want to go back to, and this will be more in  
 2 the Q and A format.  
 3 HEARING OFFICER: Proceed.  
 4 Q. (By Mr. Brownlee) Dr. Worsey, you have  
 5 recommended there would be no blasting within  
 6 150 feet of the pipeline, correct?  
 7 A. Yes. That's correct.  
 8 Q. And have you done any research, scientific  
 9 research, to also reinforce that conclusion or that  
 10 recommendation you make?  
 11 A. Yes. I did work on the depth of blast  
 12 damage and blast disturbance in rock blasting back in  
 13 the late '70s and '80s, early '80s, that's correct.  
 14 Q. Now, have you done it for both surface as  
 15 well as depth blasting?  
 16 A. I've done work in surface in the UK and  
 17 underground in the U.S. When I was working for the  
 18 Transport and Road Research Laboratory on  
 19 pre-splitting and troubleshooting contracts in the  
 20 highlands of Scotland that involved blasting, one of  
 21 my colleagues that was working on his Ph.D. at the  
 22 time, and he helped me and I helped him because, you  
 23 know, manpower available in the field at the time.  
 24 His area of his Ph.D. was looking at the degree of  
 25 blast damage and disturbance from bench blasting.

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1 And these were mainly in road cuts, but they're also  
 2 in some quarries. And I helped him handle the  
 3 seismograph equipment and swung the sledgehammer  
 4 trigger for him a lot of times on it and helped him  
 5 with the processing of the data.  
 6 Q. What did that research indicate in terms of  
 7 damage at the surface?  
 8 A. Okay. The surface, we measured it back --  
 9 well, it's not exactly damage; it's disturbance.  
 10 Damage you can think of as fracturing the rock, but  
 11 the rock is made up of joints, and those joints are  
 12 normally closed. Now, if those joints are opened up  
 13 very, very slightly, that would be disturbance. And  
 14 we could measure that depth back to about 25 feet.  
 15 And that was for the same size of hole or the same  
 16 range of size of hole that Magruder is intending on  
 17 using.  
 18 Q. So if you had a 4-inch hole and at the  
 19 surface you said it would be rock damage up to  
 20 25 feet, is that an angular disturbance?  
 21 A. That's backwards from -- in the face you can  
 22 measure that as a seismic slow zone.  
 23 Q. But beyond the 25 feet, is there anything to  
 24 measure?  
 25 A. No, there's nothing to measure after that.

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1 There is no disturbance.  
 2 Q. And what about did you do anything, similar  
 3 research, for rock underneath the surface as far as  
 4 how --  
 5 A. Yes. When I came over to the United States,  
 6 I had the opportunity to do that for underground, to  
 7 get some data for underground. So we did that at the  
 8 DMR experimental mine in limestone. And we got up to  
 9 about 8, 8 1/2 feet maximum. Smaller diameter holes,  
 10 so the scale is very similar.  
 11 Q. And is that not only the similar hole to  
 12 Magruder but also the same type of charge?  
 13 A. The ones underground, an inch and  
 14 three-quarters maximum size hole, so a little less  
 15 than half, but when you geometrically scale it, you  
 16 double size the hole, you double the burden, you can  
 17 double the amount of damage disturbance.  
 18 Q. So underground if you doubled it, it would  
 19 be between let's say 16 to 20 feet?  
 20 A. That's correct, yes.  
 21 Q. Now, I believe earlier you testified as to  
 22 the economic reason why you wouldn't get within  
 23 150 feet of the pipeline.  
 24 A. That's correct, yes.  
 25 Q. And that's because of the downgrade and the

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1 fact there's just less and less rock?  
 2 A. Yeah. It just doesn't make sense to take it  
 3 all. There's no point. There's so much rock there  
 4 at the site, there's no real reason to take that  
 5 rock.  
 6 Q. In your report, and I think in Mr. Mirabelli  
 7 and also Mr. Dressler's, you mention the PPV. And  
 8 also I know it's mentioned in the Missouri Blasting  
 9 Act. Could you do your best to explain that?  
 10 A. Okay. Yes. PPV is very confusing,  
 11 especially to the public. What it is is the particle  
 12 velocity. We talk about the maximum vibration as  
 13 being the peak particle velocity, otherwise known as  
 14 PPV. We measure that in inches per second. Now, one  
 15 of the problems with using this is that when I say  
 16 1 inch per second, that sounds like a lot to the  
 17 general public and it kind of scares them. And the  
 18 reason is they hear 1 inch and, wow, my house moved  
 19 1 inch in a second. Well, that's not the case. It's  
 20 velocity, not displacement.  
 21 So it's like driving along the road in  
 22 your car -- and I like to use the analogy of a  
 23 dragster. I'm sitting there on the drag strip and  
 24 I'm waiting for the lights to come down, I'm revving  
 25 the engine, that huge engine at the front there. The

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1 lights come down, I pop the clutch and off I go  
 2 hurriedly on up the drag strip in front of the  
 3 audience. And I've got a quarter of a mile and I'm  
 4 timed over a quarter of a mile and I accelerate and  
 5 accelerate until I reach around about 200 miles an  
 6 hour as I cross the finish line. And then I dump my  
 7 parachute, okay, and after my parachute is inflated I  
 8 apply the brakes and I come to a halt and a stop.  
 9 And I might take a quarter of a mile to a half a mile  
 10 to come to a stop further on. And then if I win that  
 11 heat, I'm going to go back to the start, I'm going to  
 12 do it all over again. It's like that with blast  
 13 vibrations. Now, I got to 200 miles an hour in that  
 14 dragster, but I didn't go 200 miles. Okay? I went  
 15 half a mile to three-quarters of a mile. So I only  
 16 did a small fraction of that.  
 17 It's the same with the ground vibration.  
 18 We're vibrating up and down like this, and what we're  
 19 looking at is the velocity, not the displacement.  
 20 When we run the numbers and, say, for an inch per  
 21 second, which sounds a lot, but you've got to  
 22 understand that's the velocity, an inch per second.  
 23 If we were to do that with the quarry, I'd expect  
 24 somewhere in the order of a frequency of 30 hertz or  
 25 maybe higher, and that's 30 little cycles per second.

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1 That's a buzz that the ground is moving. And if I  
 2 put those into the equation -- I could do that quite  
 3 merrily on the board for everybody, but it's an  
 4 equation. I put those numbers in there and I'm going  
 5 to come up with somewhere in the region of about  
 6 4,000ths of an inch.  
 7 Q. Now, this equation you're talking about, is  
 8 this based on the Magruder blast plan that you  
 9 prepared, these equations?  
 10 A. No. The equation is a general one you use  
 11 for a sign wave.  
 12 Q. Right, but the conclusions you're making.  
 13 A. The conclusions on --  
 14 Q. On the vibration or the PPV.  
 15 A. Well, we have to -- I have to explain this.  
 16 We have to keep to vibration limits, for instance,  
 17 for the sewage plant facility because of the  
 18 uncontrolled surface structure.  
 19 Q. And that's under Missouri law?  
 20 A. That's under Missouri law, that's correct.  
 21 And that's what we have to keep to. What I'm trying  
 22 to explain here is, the numbers that we actually use,  
 23 the measuring that we use sounds rather large, but  
 24 the actual displacements are very, very small, and  
 25 that's the reason why the Missouri limits look so

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1 high, because if you look at it and you say, wow, you  
 2 vibrated the ground an inch per second, and  
 3 everybody's sitting out there doesn't understand will  
 4 say, well, I know what an inch is, that's a lot and  
 5 that seems unreasonable. And I can understand that.  
 6 So unfortunately what's happening is  
 7 people are being scared by the numbers because they  
 8 don't understand what's going on. But when we turn  
 9 that to an actual displacement, because we're doing  
 10 this, we're not going (indicating), we're going like  
 11 this, the same velocity at a higher frequency, we're  
 12 not going very far because we're doing multiple  
 13 little cycles. We're going back to the start, back  
 14 to the start, backwards and forwards, backwards and  
 15 forwards. It's like the drag race. We're not going  
 16 to St. Louis; we're just staying on the same drag  
 17 strip.  
 18 Q. Can you relate that one 4,000ths of an inch  
 19 to something physical that --  
 20 A. Oh, yeah. Simple. 4,000ths of an inch is  
 21 one 250th of an inch. And I like to use to my  
 22 class the analogy of something we do in our everyday  
 23 lives is go out to the photocopier machine or our  
 24 printer and we run out of paper, so we go off and get  
 25 a ream. And a ream of paper is about this much.

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1 It's two inches. Last time I measured one, it was  
 2 two inches. And a ream of paper has 500 sheets in  
 3 it. So if you take a 500 -- if you take two inches,  
 4 so each one of those pieces of photocopy paper is a  
 5 250th of an inch. So an inch per second of  
 6 vibration, we're looking at the movement of about the  
 7 thickness of a piece of photocopy paper.  
 8 Now that's not much; however, I can sit  
 9 here and if I pass this piece of paper around, people  
 10 could feel the thickness of a piece of photocopy  
 11 paper. Human bodies are very perceptive to  
 12 vibrations and slight movements, especially at higher  
 13 frequencies. Okay? And so, yeah, it does disturb  
 14 people quite a lot oftentimes. Somebody who's used  
 15 to vibrations, for instance, trains hurtling down the  
 16 track right next to the house because the house is  
 17 built next to railway lines are less likely to be  
 18 disturbed by blasting because they're used to  
 19 vibrations all the time.  
 20 Q. So the vibration at this pipeline would be,  
 21 what, one 250th of an inch, or the displacement, I  
 22 should say?  
 23 A. Well, if it's an inch per second, it's a  
 24 piece of photocopy paper, approximately. Okay? As  
 25 we get closer and closer, that frequency is going to

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1 go up and the per inch per second is going to get  
 2 less and less. But let's say for the sake of  
 3 one inch one piece of photocopy paper, two inches two  
 4 pieces of photocopy paper, three inches three pieces  
 5 of photocopy paper, but we're certainly not getting  
 6 anywhere near 250 pieces of photocopy paper.  
 7 Q. And this displacement at the pipeline caused  
 8 by the vibration, is it permanent?  
 9 A. No. It goes back and forth. That's how far  
 10 it moves from its midpoint.  
 11 Q. So the length of the vibration is the  
 12 thickness of a piece of copy paper?  
 13 A. The displacement, that's correct. And it  
 14 goes back to where it should be.  
 15 Q. Have you had training in the construction of  
 16 pipelines and other underground facilities in terms  
 17 of settlement?  
 18 A. Not actual pipelines themselves, but when I  
 19 did my Master's of science in rock mechanics and  
 20 excavation engineering, we did something called  
 21 substance engineering, and this was for actual  
 22 underground excavations, for instance, coal mine  
 23 where you take out a volume of rock and if those  
 24 openings were to cave in, how much substance you  
 25 could expect at the surface above the workings. And

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1 part of that training was being able to differentiate  
 2 between settling and substance. And settling is  
 3 something that naturally occurs, the compaction of  
 4 materials. Also, for instance, the effect of  
 5 expansive clays, et cetera, which, you know, when the  
 6 ground dries up it cracks up and it actually goes  
 7 down, and then it rains a lot and the cracks fill  
 8 back up again, but at the same time the ground will  
 9 move up.  
 10 Q. What happens when the ground around a  
 11 substance like a pipeline settles? What effect does  
 12 it have?  
 13 A. There will be some permanent movement of  
 14 that structure downwards the pipeline, for instance.  
 15 Q. And are those pipes designed to have that  
 16 settlement factor?  
 17 MR. MAUER: I'm sorry, your Honor.  
 18 MR. MCGOVERN: Objection. Lack of  
 19 foundation.  
 20 HEARING OFFICER: Are we talking  
 21 about these actual pipelines?  
 22 MR. BROWNLEE: Well, I used those  
 23 actual ones.  
 24 Q. (By Mr. Brownlee) But when a pipeline is  
 25 constructed, is it normal for it to settle?

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1 MR. MCGOVERN: Objection. Lack of --  
 2 that's a different question, but I'll still object to  
 3 lack of foundation. There's no evidence that this  
 4 witness has any expertise relative to either the  
 5 construction of underground utilities or the  
 6 manufacture, fabrication or specifications for a  
 7 pipeline.  
 8 HEARING OFFICER: I don't think the  
 9 answer to the question requires that degree of  
 10 expertise.  
 11 MR. MCGOVERN: This was a  
 12 different -- I understand. There was now a different  
 13 question posed, which I'll still raise the lack of  
 14 foundation.  
 15 HEARING OFFICER: Overruled. Restate  
 16 the question, Mr. Brownlee.  
 17 (Whereupon, the requested portion of  
 18 the record was read by the reporter as follows.)  
 19 A. I think I can be a lot more general than  
 20 specifically for pipelines. Whenever you have fill  
 21 material and place an object on it, one can expect  
 22 that material to settle and compact over time.  
 23 Q. (By Mr. Brownlee) But in this particular  
 24 case, as you said, you don't know the actual  
 25 construction of this pipeline, correct?

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1 A. No, but if I remember rightly, there is  
 2 something in the pipeline specification on the  
 3 material put in there to, I think, 90 percent  
 4 compaction. So it's not fully compacted under the  
 5 specs, so yeah, it's going to compact over time.  
 6 Q. And settle over time?  
 7 A. That's correct.  
 8 Q. And based upon your knowledge -- if you  
 9 can't answer this -- since that was constructed, you  
 10 think that pipeline has settled as much as it's going  
 11 to?  
 12 MR. MAUER: Objection. Calls for  
 13 speculation, your Honor. There's no foundation --  
 14 HEARING OFFICER: Overruled. The  
 15 witness can answer.  
 16 A. Well, I've been told, okay, that pipeline  
 17 has been there -- that both pipelines have been there  
 18 for quite a few years. And certainly having a look  
 19 at the site it's evident they weren't put in  
 20 yesterday. And therefore, yes, there will have been  
 21 some settlement.  
 22 Q. (By Mr. Brownlee) And I'll follow up to the  
 23 objection. There's been quite a lot made of the fact  
 24 that you and, in fact, none of the other experts and  
 25 maybe no one in the room actually knows about the

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1 bedding or the side fill of this pipeline. From a  
 2 blasting standpoint, does that have any significance  
 3 in terms of that knowledge?  
 4 A. It has no impact whatsoever on --  
 5 Q. Can you explain that?  
 6 A. -- as far as blasting is concerned. Because  
 7 we don't have a problem with pipelines, as simple as  
 8 that. Pipelines are designed for a certain amount of  
 9 movement.  
 10 Q. And to determine what the bedding or the  
 11 side fill or anything else is, what would you have to  
 12 do?  
 13 A. We'd have to dig it up.  
 14 Q. And comparing the potential damage for  
 15 digging it up as opposed to just knowing about  
 16 pipelines and blasting, which is more likely to cause  
 17 harm?  
 18 A. Well, you'd have to be certainly a lot more  
 19 careful digging it up, a lot more careful.  
 20 Q. And in blasting along pipelines that are  
 21 done all the time, do any of the blasters usually  
 22 have any knowledge what the side fill or backfill is?  
 23 A. No.  
 24 Q. And why is that?  
 25 A. It's -- they don't take it into

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1 consideration. It's as simple as that.  
 2 Q. Are you familiar with the materials that  
 3 were spec'd on these two pipelines in the ground?  
 4 A. I've seen the specifications for the  
 5 pipelines. I have actually had a look at a piece of  
 6 the steel -- the ductile iron pipe itself. There's a  
 7 section lying in the stream on the property, or there  
 8 was when I last looked when I last visited the site,  
 9 and I made a point of going down to it, it's lying in  
 10 the stream, and having a look. And it's a 2 to  
 11 3 feet section of it, of the ductile iron pipe. It's  
 12 very substantial. In fact, I dropped my cell phone  
 13 when I clambered down the bank and it fell in the  
 14 stream. And I got a new one after it. It was about  
 15 time. Yeah, very, very, very good condition, very  
 16 nice material, very substantial, about three-quarters  
 17 of an inch wall thickness. I took my Leatherman out  
 18 and I measured it on the scale.  
 19 Q. What does ductile iron mean?  
 20 MR. MAUER: Your Honor, I just need  
 21 to lodge an objection. There has been no evidence  
 22 that a piece of pipe laying out near the pipeline was  
 23 actually the pipe that was in place and was  
 24 constructed years and years and years ago. If this  
 25 witness has knowledge that can tie some section of

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1 pipe laying in a stream to the pipe that was actually  
 2 constructed, I think they can establish a foundation.  
 3 Otherwise it's nothing more than a piece of pipe  
 4 laying near the easement.  
 5 DR. WORSEY: Well, I presume an eagle  
 6 could have carried it in.  
 7 HEARING OFFICER: Wait. Wait. Wait.  
 8 This was a piece of pipe or a section of pipe lying  
 9 on what was purported to you to be the easement?  
 10 DR. WORSEY: Yeah. Right next --  
 11 well, what there is is the easement's there and then  
 12 the easement -- well, where the pipes are is right  
 13 next to the stream. The stream is beneath it. And  
 14 this pipe was lying in the stream, so I would guess  
 15 10, 15, 20 tops feet away from where the pipeline is.  
 16 MR. MCGOVERN: I'll join in the  
 17 objection. I misunderstood the testimony. I thought  
 18 this was --  
 19 HEARING OFFICER: I did, too, Mr.  
 20 McGovern. I thought we were talking about a section  
 21 of pipe which wasn't fully covered and that's what we  
 22 were looking at, that it was actually connected to  
 23 it.  
 24 MR. MCGOVERN: I'll join in...  
 25 DR. WORSEY: Let me explain this.

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1 I've not had a look at any of the pipe that's  
 2 actually in the pipeline itself because that's  
 3 embedded.  
 4 HEARING OFFICER: The objection is  
 5 sustained. Just like with the rest of this pipeline,  
 6 we don't know enough about what's there in the  
 7 ground, so --  
 8 MR. BROWNLEE: Well, I can ask him  
 9 about -- let me try this:  
 10 Q. (By Mr. Brownlee) Did you measure the piece  
 11 of pipe that you saw?  
 12 MR. MAUER: Objection. Irrelevant.  
 13 HEARING OFFICER: Mr. Brownlee, I  
 14 understand what you're saying and I realize that I  
 15 could reasonably reach the conclusion that that piece  
 16 of pipe, if we had a photograph of it, but it -- and  
 17 it probably most likely is. Probably 99 and 44/100  
 18 percent chance it's a piece of pipe that the guy that  
 19 put this in left laying there, but we're not going to  
 20 go there. All right?  
 21 Q. (By Mr. Brownlee) Are you familiar with  
 22 ductile iron pipe?  
 23 A. The term ductile refers to something that  
 24 bends rather than shatters.  
 25 Q. And from examining the specifications on

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1 this, are you familiar with whether this pipe is  
 2 described in those specifications as ductile iron?  
 3 A. That's correct.  
 4 Q. And are you familiar with the use of PVC  
 5 pipe in lines?  
 6 A. Yes.  
 7 Q. And can you talk -- do you know generally  
 8 about PVC and whether it's meant to bend and to have  
 9 movement?  
 10 A. Yeah. PVC will deflect quite a lot before  
 11 it breaks. I've actually got PVC pipe, it's a  
 12 15-inch diameter, and when I built a pond at my old  
 13 house, we used this for the overflow section through  
 14 the dam. There's two or three sections of it in  
 15 there, and since we put it in, the dam has dropped  
 16 about a foot on one part of it due to normal  
 17 compaction, natural compaction, settlement, and the  
 18 pipe actually is bowed differently to what it was  
 19 when it was originally inserted. And, yeah, it's --  
 20 you can see from one end to the other and you can see  
 21 it's in perfect condition. It's actually been there  
 22 before I left the house at least 15 years, and it was  
 23 in excellent shape.  
 24 Q. Regarding the sewer plant that we've  
 25 discussed, have you personally -- are you personally

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1 familiar with the design and the construction of this  
 2 plant?  
 3 A. What I've seen is the testimony, I think by  
 4 Mr. Hutchinson.  
 5 Q. Hutchcraft?  
 6 A. Hutchcraft, that's it.  
 7 Q. Have you reviewed that completely in terms  
 8 of what he described was at the plant?  
 9 A. Yes. I looked through that.  
 10 Q. And can you explain as you understand the  
 11 construction of the plant and the tanks?  
 12 A. Yes.  
 13 Q. Go ahead. Let's start with the tanks.  
 14 A. And your question is?  
 15 Q. How are they constructed? Do you know how  
 16 deep they are?  
 17 A. According to Mr. Hutchcraft, they're at a  
 18 series of depths as deep as 20 feet, the concrete  
 19 structures.  
 20 Q. Is it significant that a tank would be  
 21 filled with liquid to be buried as much as 20 feet in  
 22 the ground in terms of potential to ward off any  
 23 damage?  
 24 A. No. Actually, with it in the ground and  
 25 having water up -- soil on one side and water on the

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1 other, it is bracing it. So it's actually a buried  
 2 structure. It's not allowed the movement that one  
 3 would expect from a surface structure, a house or  
 4 something like that.  
 5 Q. So is it more resilient to any type of  
 6 vibration?  
 7 A. Oh, yes, far more resilient to vibration  
 8 than a surface structure. And in addition, one has  
 9 to take into effect that the tanks are made out of  
 10 concrete rather than materials that we use for the  
 11 minimum criteria for damage which is cosmetic and  
 12 minor, which is things like sheet rock in a normal  
 13 house, which is where the regulations are based on  
 14 that the State uses now.  
 15 Q. Do you know what the closest blasting on the  
 16 Magruder site will be to the sewer plant, at least in  
 17 the initial bonding?  
 18 A. When I looked at the aerial photographs and  
 19 we had a look at measuring, I believe it's a little  
 20 bit maybe over 650 feet from the property line. With  
 21 a set-back of at least 50 feet, we're talking  
 22 700 feet or more.  
 23 Q. Do you have an opinion as to what effect the  
 24 Magruder blasting might ever have on the sewer plant?  
 25 A. The Magruder blasting is going to have no

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1 effect whatsoever on the sewer plant.  
 2 Q. Is the sewer plant even an issue in terms of  
 3 the blasting on that site?  
 4 A. No, it's not.  
 5 Q. Are you familiar with the use of the word  
 6 scale distance in, I think, one of the other  
 7 engineering reports?  
 8 A. Yes.  
 9 Q. And can you explain what scale distance is?  
 10 A. Yes. Scale distance is another very  
 11 confusing term, unfortunately, but we use it to  
 12 compare different blasts of different sizes and  
 13 different distances to structures. And it's all  
 14 scaled to one pound of explosive. So if you have a  
 15 scale distance of 55, it would be the vibration level  
 16 you would anticipate if you all measure -- if you  
 17 were 50 foot from one pound of explosives in the rock  
 18 that was shot.  
 19 Q. If it --  
 20 A. So basically as your scale distance  
 21 decreases, it means you're closer to that one pound  
 22 and your blast vibration levels will be higher. If  
 23 your scale distance is over 55 as it gets bigger,  
 24 it's the same as moving away from that one pound of  
 25 explosives, so therefore your blast vibrations

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1 reduce.  
 2 Q. Does the Missouri Blasting Act have  
 3 reference to scale distance?  
 4 A. Yes, it does.  
 5 Q. And can you explain that, please?  
 6 A. The scale distance that it has reference to  
 7 is 55. Now, under the statute, 55 is used at the  
 8 point at which you are required to use seismic  
 9 monitoring. It's not the point at which you are  
 10 unsafe or damage; it's the point at which you have to  
 11 by law monitor the vibrations.  
 12 Q. Is that 55 a standard number utilized in the  
 13 industry?  
 14 A. Yes, it is. For the State of Missouri it's  
 15 55. If we go to OSM regulations, there are different  
 16 numbers. There's 50, but from 0 to 300 feet. 55 for  
 17 301 feet to 5,000 feet and 65 for over 5,000 feet.  
 18 The reason they use the larger number that's more  
 19 conservative for long distances is those are for huge  
 20 surface coal mines where you shoot up to 50 and a  
 21 quarter or more inch diameter holes. I've actually  
 22 shot on those sites and loaded holes, and we used in  
 23 excess of two tons of explosives per hole in some  
 24 cases.  
 25 Q. Have you personally witnessed blasting near

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1 a sewer plant?  
 2 A. Oh, yes. That's quite -- not much strange;  
 3 amusing.  
 4 MR. MCGOVERN: I'm sorry? I didn't  
 5 understand what you said.  
 6 A. Well, something not quite strange but  
 7 amusing, a story. I was shooting, I believe it was  
 8 the Canadian Discovery Channel a series on blasting  
 9 and -- a portion of that series. It's called Big  
 10 Shots. It's been aired all over the world, actually,  
 11 now. I was down in Brazil two years ago on  
 12 sabbatical and turned on the TV, and there I was  
 13 speaking perfect Portuguese. I thought, wow, I'm  
 14 good. I also had the same voice, which is the  
 15 amusing part of it as the voiceover for Paul, Sr.,  
 16 out of American Chopper, Orange County, so it was  
 17 quite funny. They wanted to not only have a  
 18 demonstration but go out with me on a blast. I was  
 19 taking my class out for a blast and I said, okay, I  
 20 think we've got one we can find, and it just happened  
 21 they were shooting the Rolla sewage plant and they  
 22 were blasting to put in new sewage pits, tanks, out  
 23 at the sewage plant. So we took the class in and the  
 24 crew -- and if you want to see it, you can see it, I  
 25 think, on Canadian Discovery Channel, Big Shots.

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1 And, yeah, that was -- that was quite amusing.  
 2 Q. How close was that blasting to the sewer  
 3 plant?  
 4 A. Oh, somewhere 50 to 100 feet from the  
 5 nearest tank.  
 6 Q. Doctor, based upon your professional  
 7 training, your personal observation of the Magruder  
 8 site, the technical knowledge of blasting, your  
 9 review of the geological maps of the Magruder site,  
 10 your review of the plans for the sewer pipes and  
 11 sewer treatment plant, considerations performed,  
 12 reviewing the blast plan, your observation of sewer  
 13 line locations, your observation of sewer plant  
 14 locations, your knowledge of the materials utilized  
 15 in the constructive sewer lines, the physical  
 16 description of the sewer plant from Mr. Hutchcraft,  
 17 your knowledge of the blasting contractor and knowing  
 18 that blasting will occur no closer than 700 feet from  
 19 the sewer plant and 150 feet from the sewer lines, do  
 20 you have an opinion based upon a reasonable degree of  
 21 engineering certainty whether the Magruder proposed  
 22 quarry operations at the Lake Ozark site will have  
 23 any effect, any negative effect, on the sewer  
 24 pipelines or sewer treatment plant?  
 25 MR. MCGOVERN: I only object at this

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1 point as to any testimony to a reasonable degree of  
 2 engineering certainty in that I'm not familiar with  
 3 this charter engineering certificate that Dr. Worsey  
 4 has, as to whether or not that is, in fact,  
 5 recognized in the United States such that he can  
 6 provide that opinion here today.  
 7 MR. MAUER: And I would join that  
 8 objection and also object that I believe the long  
 9 litany of things that Dr. Worsey supposedly reviewed  
 10 and is basing his opinion on are including things  
 11 that I have not heard testimony about that he  
 12 actually ever received or evaluated.  
 13 MR. MCGOVERN: It could be resolved,  
 14 Mr. Tichenor, just by voir dire of the witness, but I  
 15 am not aware that this witness has the ability to  
 16 seal any documents within the United States where the  
 17 charter license is, in fact, recognized as an  
 18 engineering such that he can practice here in the  
 19 United States. If not, I would doubt that he's  
 20 qualified to render any decision with any degree of  
 21 engineering certainty.  
 22 MR. BROWNLEE: And I would merely  
 23 state that I know nothing that requires an expert  
 24 witness to give an engineering opinion that he has to  
 25 be a licensed Missouri engineer. I think Dr.

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1 Worsey's credentials and his publications and his  
 2 experience clearly speak for themselves in qualifying  
 3 him as an expert to give his opinion based upon a  
 4 reasonable degree of engineering certainty.  
 5 MR. MCGOVERN: I'm not disputing his  
 6 expertise in blasting, but now the question has added  
 7 the phrase "based upon a reasonable degree of  
 8 engineering certainty," and I do believe that one  
 9 needs to be a licensed engineer, just as one would  
 10 need to be a medical doctor to testify to a  
 11 reasonable degree of medical certainty. And so on  
 12 that basis I would object to any opinion which  
 13 includes that phrase.  
 14 MR. MAUER: In fact, your Honor, in  
 15 Pamela Jones versus United States of America, which  
 16 is recorded, it's a slip opinion from the Federal  
 17 District Court of South Carolina, a nurse was  
 18 attempting to answer a question to a reasonable  
 19 degree of medical certainty and the Court did not  
 20 allow that testimony to a reasonable degree of  
 21 medical certainty because she was not qualified as a  
 22 doctor. That's not to say that as I join the  
 23 objection that he's not an expert in blasting, but to  
 24 try and have him pontificate to a reasonable degree  
 25 of engineering certainty would be improper.

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1 MR. BROWNLEE: He's an engineer.  
 2 HEARING OFFICER: The objections are  
 3 overruled. The Hearing Officer knows of -- there's  
 4 no case law been cited that in Missouri in order for  
 5 an engineer, one qualified by background and  
 6 experience, to testify relative to a reasonable  
 7 degree of engineering certainty that they have, in  
 8 fact, have to be licensed as an engineer in this  
 9 state.  
 10 There is a parallel situation that the  
 11 Hearing Officer is aware of, persons giving testimony  
 12 before the State Tax Commission on the appraisal of  
 13 real estate must indeed be licensed real estate  
 14 appraisers. There is no similar rule or regulation  
 15 that I have found in the Land Reclamation rules and  
 16 regulations or any other State regulation which  
 17 requires that under this proceeding that this witness  
 18 who has been qualified in the opinion of the Hearing  
 19 Officer to give a response to that question that he  
 20 must possess a Missouri license as an engineer.  
 21 MR. MCGOVERN: With all due respect,  
 22 I would point the Hearing Officer to those statutes  
 23 in Missouri that deal with the licensure of  
 24 architects, engineers and land surveyors which  
 25 clearly state that to practice engineering within

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1 this state one must be a licensed engineer. If, in  
 2 fact, he is going to render such an opinion, he is,  
 3 in fact, acting as an engineer without a license.  
 4 HEARING OFFICER: The Hearing Officer  
 5 will review the statute to see if that, in fact, is  
 6 the conclusion of law. The objection -- the  
 7 objections are overruled on the grounds stated, and  
 8 the witness may answer the question.  
 9 MR. MAUER: I'm sorry, Mr. Tichenor,  
 10 I also made an objection based upon that it  
 11 assumes -- that the hypothetical is improper in that  
 12 it assumes information that has not been testified to  
 13 as being relied upon by this witness. It was a long  
 14 thing and it went very fast, but one that I know for  
 15 sure I heard, I thought, was that he had reviewed the  
 16 specifications of the sewage treatment plant, and I  
 17 am confident that this witness has not testified that  
 18 he reviewed any of the specifications regarding the  
 19 construction or installation of the sewage treatment  
 20 plant.  
 21 MR. BROWNLEE: The question was based  
 22 upon the physical description of the sewer plant from  
 23 Mr. Hutchcraft. That's the way the question was  
 24 worded.  
 25 MR. MAUER: That was later and I

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1 heard that part, but there was also about -- there  
 2 was reviewing the specifications of the sewage line  
 3 and sewage treatment plant. And I made my objection.  
 4 I realize you're going to allow the opinion.  
 5 HEARING OFFICER: To the extent --  
 6 I'll take it up in the transcript. To the extent  
 7 that I still haven't had an expert present the plans,  
 8 the objection is overruled at this point. The  
 9 witness may give his opinion. Do you need the  
 10 question restated, Dr. Worsey?  
 11 DR. WORSEY: No, I don't think so.  
 12 A. Okay. It's my opinion that the Magruder  
 13 operation as outlined in the blast plan can go  
 14 forward and excavate the rock for the quarry  
 15 operation using blasting without any undue effect on  
 16 the pipelines or sewage treatment facility.  
 17 MR. BROWNLEE: Thank you. I have  
 18 nothing further.  
 19 MR. MCGOVERN: Can we take a break,  
 20 Mr. Tichenor?  
 21 HEARING OFFICER: Yeah. We're going  
 22 to take a break. Before we do, do you wish to offer  
 23 the expert report at this time?  
 24 MR. BROWNLEE: Yeah. I'm sorry. I  
 25 do. I want to offer the --

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1 HEARING OFFICER: 8 is offered.  
 2 MR. BROWNLEE: And 21, his  
 3 publications.  
 4 HEARING OFFICER: And 21.  
 5 Objections?  
 6 MR. MCGOVERN: No.  
 7 MR. MAUER: No, your Honor.  
 8 HEARING OFFICER: No objections.  
 9 They are received into evidence. Before we take a  
 10 break, I want to draw attention to the fact that when  
 11 the mine and blast plan drafted by Dr. Worsey were  
 12 presented to the Hearing Officer, there were three  
 13 separate maps included with that, an -- pardon me --  
 14 an aerial photo which has been testified to and the  
 15 two maps, a topographical map and a bedrock  
 16 geological map. Unless there's an objection, the  
 17 Hearing Officer is going to receive those as part of  
 18 the blast plan because the blast plan has  
 19 reproductions -- or the excavation and blast plan  
 20 that we've just seen has reproductions from those  
 21 items. Is there any objection? I take it counsel --  
 22 I was informed counsel for both -- all right. Then  
 23 those three maps are part of what is Applicant's 7.  
 24 With that, let's try to be back in here within about  
 25 five or ten minutes, and Mr. Mauer, we'll proceed

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1 with cross-examination from you at that time.  
 2 (Brief recess.)  
 3 HEARING OFFICER: Mr. Mauer, you're  
 4 recognized for cross-examination.  
 5 MR. MAUER: Thank you.  
 6 EXAMINATION  
 7 QUESTIONS BY MR. MAUER:  
 8 Q. Dr. Worsley, I want to ask you just a couple  
 9 of things about -- just to make sure that you're not  
 10 here to testify... Exhibit BP-22 is a copy of the  
 11 sewer treatment plant and the sewage system for the  
 12 City of Lake Ozark and the lines that are at issue.  
 13 You're not here today to offer any testimony about  
 14 the impact on the sewer system if, in fact, the line  
 15 breaks or the sewage system -- if the sewage system  
 16 actually breaks and has to shut down, true?  
 17 A. No. That's true. I've had a good look at  
 18 the map, though, and I was quite interested to see  
 19 where that line went, and it appears to go right next  
 20 to the MODOT realignment of the highway, doesn't it?  
 21 Q. Sir, my question is, you're not here to say  
 22 that if the line breaks it's not going to pollute the  
 23 lake; is that true?  
 24 A. Well, certainly it's below the lake,  
 25 correct?

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1 Q. I'm sorry. The river.  
 2 A. Oh. I'm not here to testify to that, no.  
 3 Q. All right. And you're not here to testify  
 4 on any sort of environmental impact that might occur  
 5 if raw sewage is dumped into the lake or the river,  
 6 true?  
 7 A. That's true.  
 8 Q. All right. Also, you talked about how the  
 9 quarry might operate, and I just have a question for  
 10 you. You haven't done any calculation as to what  
 11 type of stress the pipe could take if it's driven  
 12 over by heavy equipment carrying rock. You haven't  
 13 done any crush load analysis or anything else; is  
 14 that true?  
 15 A. No, but that would be taken into  
 16 consideration by somebody who has had that type of  
 17 expertise, and the quarry would certainly hire on  
 18 somebody who has that expertise to do that sort of  
 19 thing.  
 20 Q. And that's not you?  
 21 A. I'm a blasting engineer, so I -- I do  
 22 blasting. But that's not to say that people don't do  
 23 this, don't drive over pipelines and put bridging  
 24 structures or paving over pipeline or whatever to do  
 25 it.

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1 Q. That wasn't anything that you were asked to  
 2 do, and you're not prepared to offer any opinions  
 3 about that today, correct?  
 4 A. That's correct.  
 5 Q. Thank you. Can we turn to your blast plan,  
 6 and I'd like you to just start on Page 3, if you  
 7 would, for a minute.  
 8 HEARING OFFICER: Is this Applicant's  
 9 7?  
 10 MR. MAUER: Applicant 8.  
 11 HEARING OFFICER: Okay. So we're  
 12 on -- okay.  
 13 MR. MAUER: The presentation, yes.  
 14 Thank you.  
 15 A. Page 3?  
 16 Q. (By Mr. Mauer) Yes, sir. Thank you. The  
 17 very first bullet point says that you've been  
 18 retained as a consultant by Magruder, correct?  
 19 A. That's correct.  
 20 Q. Now, isn't it true, sir, that you've not  
 21 actually been retained, have a signed agreement, to  
 22 do anything for Magruder if this rock quarry is  
 23 granted a permit and is actually opened?  
 24 A. I haven't got anything signed or any  
 25 contract to say.

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1 Q. Thank you.  
 2 A. But we have had a -- been verbally told that  
 3 I would be kept as this project goes forward to make  
 4 sure that things are okay.  
 5 Q. But you haven't got -- there's nothing in  
 6 writing, there's no commitment in writing by Magruder  
 7 to actually employ you, engage you or pay you  
 8 anything if this permit is granted, true?  
 9 A. True, but I have no reason to believe  
 10 otherwise. They've paid the checks so far.  
 11 Q. The next thing -- the next bullet point says  
 12 that you've worked for Magruder in the past assessing  
 13 a vibration complaint and performing an internal  
 14 audit on blasting practices. So in the past you're  
 15 aware that Magruder's operation has led to complaints  
 16 about the blasting activities that they've conducted,  
 17 right?  
 18 A. Yes. That's correct.  
 19 Q. On Page 7 -- and you're welcome to just use  
 20 the paper one. You don't have to keep flipping  
 21 through if you don't want to. On Page 7 it says,  
 22 "The resources potentially include over six million  
 23 tons of limestone;" is that right?  
 24 A. That's correct.  
 25 Q. Now, are you -- did I understand the six

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1 million tons, that's more than just the one hill  
 2 where Magruder says today they're going to start  
 3 their quarry operation, isn't it?  
 4 A. We looked at that, and that's the A, B and C  
 5 zones.  
 6 Q. I'm sorry?  
 7 A. That's the A, B and C zones.  
 8 Q. Just A, B and C is six million?  
 9 A. That's what we did the calculations, rough  
 10 calculations, on.  
 11 Q. And so the C zone is actually the part to  
 12 the west closer to Wood River Road, correct?  
 13 A. That's correct.  
 14 Q. And at what elevation is the -- does the six  
 15 million tons stop?  
 16 A. Where does it start?  
 17 Q. How deep do you have to go to get the 6  
 18 million tons out of zones A, B and C?  
 19 A. It starts approximately 6 feet above the  
 20 streambed.  
 21 Q. And is that the same one on C, area C?  
 22 A. I'm led to believe that that is  
 23 approximately the same.  
 24 Q. And who led you to believe that?  
 25 A. We actually went over and had a look at the

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1 site. I've had a look at the topographic maps, and  
 2 Magruder has done some interim surveying.  
 3 Q. So that's information that was given to you  
 4 by someone at Magruder?  
 5 A. Part of it. Part of it looked at the maps.  
 6 Q. Thank you. On Page 9 it talks about  
 7 resources at a production rate of 300,000 tons per  
 8 year, right? The 300,000 tons per year, that's an  
 9 estimate that was given to you by a representative of  
 10 Magruder?  
 11 A. Yes. There was an upper end of what they  
 12 estimated that they would be mining.  
 13 Q. And do you know how much -- how many tons  
 14 per year could actually be produced by this quarry  
 15 based on the equipment that Magruder plans to bring  
 16 in?  
 17 A. No. I haven't seen that equipment, so I  
 18 couldn't make that basis.  
 19 Q. And do you know how Magruder came to the  
 20 300,000 tons per year?  
 21 A. That was an estimation of what they expected  
 22 the top production to be.  
 23 Q. Have you -- you talked about testimony that  
 24 you've received or you've reviewed. Did you review  
 25 the deposition of Mark Magruder where he said that

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1 the 300,000-ton number was picked out of the air?  
 2 A. No.  
 3 Q. The resources also says it will provide  
 4 20 years or more of production before quarrying  
 5 operations will progress to the other side of the  
 6 sewer line. My question there is, in 20 years do you  
 7 expect that the sewer lines will be gone? I mean,  
 8 they're not going to move, are they?  
 9 A. Who knows if they're going to move?  
 10 Q. Do you --  
 11 A. Well, for instance, with the growth of the  
 12 city, with the extra sewage production with growth,  
 13 there's a potential for those pipes to no longer be  
 14 sufficient to carry the sewage load, then at that  
 15 point obviously they would have to be replaced.  
 16 Q. Is it part of your opinion that this mine  
 17 plan is acceptable because between the time that it  
 18 starts and the 20 years you anticipate that the pipes  
 19 will be moved? Is that part of your opinion?  
 20 A. No.  
 21 Q. All right. So you do understand that it's  
 22 part of your plan and your understanding that the  
 23 pipes are going to be there? Whenever the quarry  
 24 gets to it, the pipes are going to be there?  
 25 A. That's the plan.

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1 Q. Thank you. With respect to Page 12 of the  
 2 zones A, B and C, that is the -- that's the proposal  
 3 that Magruder is telling you they plan on operating.  
 4 Starting with A, then B, then C, right?  
 5 A. That's correct.  
 6 Q. But isn't it true that if the permit is  
 7 granted, Magruder could start quarrying anyplace they  
 8 want on any of the area that is bonded?  
 9 A. Yes, but it makes logical sense to start in  
 10 Bowlin Hollow. It doesn't make any sense to start  
 11 anywhere else. They could start on A, they could  
 12 start on C.  
 13 Q. I understand that, but the answer to my  
 14 question was, yes, they could start wherever they  
 15 want; is that correct?  
 16 A. Yes, they could start wherever they want,  
 17 but it doesn't make any economic sense to start  
 18 anywhere other than Bowlin Hollow. I'm sure you're  
 19 trying to twist it towards that they would be  
 20 starting in the other hollow that makes absolutely no  
 21 sense whatsoever.  
 22 MR. MAUER: I'm sorry, your Honor,  
 23 that's non-responsive. I simply asked a yes or no  
 24 question.  
 25 HEARING OFFICER: Objection

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1 sustained. The last comment is stricken. Please  
 2 confine your responses to the question. If there  
 3 needs to be explanation provided, then counsel will  
 4 be able to explore that on redirect. Proceed,  
 5 Mr. Mauer.  
 6 Q. (By Mr. Mauer) On Page 14 you talk about  
 7 three structures and other items of interest for  
 8 protection; is that right?  
 9 A. We talk about three main items.  
 10 Q. And isn't it true, sir, that nowhere in your  
 11 report is there any discussion of the Ameren UE power  
 12 lines that run across the property? Is that true?  
 13 A. That is correct.  
 14 Q. It's not in your report at all?  
 15 A. That's correct.  
 16 Q. Thank you. Now, I want to talk about Page  
 17 16, the Missouri Blasting Safety Act. As I  
 18 understand your testimony, you say that sewer lines  
 19 that run underground are not structures protected by  
 20 the Missouri Blasting Safety Act; is that right?  
 21 A. That's correct. They do not come under the  
 22 definition in the Act.  
 23 Q. And so does the sewer lines, then -- are  
 24 they unprotected until they actually enter into a  
 25 structure?

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1 A. The sewer lines don't come under the Act.  
 2 The actual surface structures do.  
 3 Q. So the answer to my question would be yes,  
 4 according to your interpretation of the Act whatever  
 5 lines may run underground, until they actually enter  
 6 into a structure, they are not covered by the Act?  
 7 A. That's incorrect. The structure is covered  
 8 by the Act, not the sewage lines.  
 9 Q. I understand that. Do you understand that  
 10 the sewage lines actually run into a structure in the  
 11 sewage treatment plant?  
 12 A. Okay. Yes, they run into the sewage  
 13 treatment plant.  
 14 Q. And so up until the wall of the very first  
 15 building of the sewage treatment plant, those lines  
 16 are unprotected under your interpretation of the  
 17 Missouri Blasting Safety Act?  
 18 A. They're not covered by Missouri Blasting  
 19 Safety Act.  
 20 Q. I just wanted to make sure.  
 21 A. I'm not saying they're not protected by  
 22 them.  
 23 Q. Well, they're not a covered structure as set  
 24 forth in the Act, right?  
 25 A. Yes.

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1 Q. We had testimony earlier today from  
 2 Ms. Sallach about Exhibit BP-52. By the way, can you  
 3 identify, is BP-52, is that PVC pipe, is it metal  
 4 pipe?  
 5 A. It appears to be a plastic pipe of some  
 6 sort, but I cannot tell whether it's PVC or not.  
 7 Q. Okay. Now, Ms. Sallach testified that that  
 8 pipe was approximately 2 to 3 feet outside of her  
 9 house where it ruptured. Under your interpretation  
 10 of the Missouri Blasting Safety Act, that pipe would  
 11 not be covered by the requirements of the Act; is  
 12 that right?  
 13 A. That is correct, but it is covered by the  
 14 actual location of the house itself.  
 15 Q. And before I move on, so a line that runs  
 16 underground, until it actually enters into a  
 17 structure as defined in the Act, is an uncontrolled  
 18 structure not covered by the Act; is that true?  
 19 A. That's correct.  
 20 Q. Thank you. You talked about the City's  
 21 sewage treatment plant and the testimony of  
 22 Mr. Hutchcraft. Did you have an opportunity to  
 23 review the exhibits utilized by Mr. Hutchcraft during  
 24 his testimony?  
 25 A. No. I just had a look at the testimony

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1 itself.  
 2 Q. All right. Well, I'd like to show you what  
 3 was BP-26, and I'll reference you a picture that  
 4 shows the tanks and a little slanted A frame  
 5 building. Do you see that?  
 6 A. Yes.  
 7 Q. Do you know, sir, if that building has water  
 8 below it?  
 9 A. I have not looked in the building.  
 10 Q. Okay. So if it has -- if Mr. Hutchcraft  
 11 identified that building as being a pump house which  
 12 has a big open space underground and there's no water  
 13 in there to have this resilient effect, you wouldn't  
 14 know anything about that?  
 15 A. No.  
 16 Q. Is that true?  
 17 A. That's correct.  
 18 Q. Did you see in Mr. Hutchcraft's testimony  
 19 his concern about the age of the plant and the valves  
 20 that are at the bottom of those large tanks  
 21 carrying -- containing millions of gallons of raw  
 22 sewage?  
 23 A. Yes.  
 24 Q. And have you done any analysis or testing on  
 25 the condition of those valves?

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1 A. No.

2 Q. On Page 17 you talk about a study of the

3 pressurized pipelines for production of size mine

4 blasting. Did you bring a copy of that study with

5 you?

6 A. I believe I may have.

7 Q. Okay. Well, if you can, can you tell me off

8 the top of your head, do you know what the diameter

9 of the pipes were at issue?

10 A. They're in the presentation, I believe.

11 Q. Okay. Can you tell me where it was?

12 MR. MCGOVERN: 24, maybe.

13 Q. (By Mr. Mauer) I think on Page 20 it talks

14 about steel pipes ranking from 6 to 20 in diameter.

15 A. That's it. That's correct, 6 to 20 inches

16 in diameter.

17 Q. So do you know the actual diameter of all

18 four pipes?

19 A. Not off the top of my head. I did read the

20 report, though.

21 Q. All right. And then on Page 20 it also

22 references an 8-inch PVC water supply pipeline,

23 correct?

24 A. Yes.

25 Q. Was that also a pressurized pipeline?

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1 A. Yes. That's correct.

2 Q. Do you know what pressure was in it?

3 A. I can't remember off the top of my head what

4 the pressure was.

5 Q. Do you know how that pressure compares to

6 the 18-inch PVC pipeline which crosses the Magruder

7 property and is utilized by the joint sewage

8 treatment plant?

9 A. No.

10 Q. Have you heard any information about the

11 pressure that pipeline has and is utilized every day?

12 A. No.

13 Q. Did you review the testimony of Mr. Rick

14 King?

15 A. I don't believe so.

16 Q. You talked about how the blasting may -- or

17 the pipeline may cause settlement, right? The

18 pipeline would settle; is that right?

19 A. Could you repeat that, please?

20 Q. I believe at the end of your testimony you

21 talked about how the pipeline could settle, the

22 bedding around the pipeline could settle?

23 A. Yes, but not due to blasting.

24 Q. Okay. That's just natural consequences; is

25 that right?

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1 A. That's a natural consequence, correct.

2 Q. Would you agree with me that a piece of

3 pipe, it's not going to settle completely even all

4 the way the entire length of the pipeline?

5 A. That's correct.

6 Q. So there may be parts where the pipe --

7 there's more settlement in the bedding, leaving a

8 little void, as compared to the whole length of the

9 pipeline?

10 A. There could be.

11 Q. And when a blast occurs and the effect comes

12 through and we get this vibration that you're talking

13 about, if those particles are there and they're not

14 laying right up against the pipe, will they vibrate

15 and move?

16 A. They'll vibrate, yes.

17 Q. Will they move?

18 A. The particles?

19 Q. Yes, sir. The pieces of bedding that have

20 settled and now they're just laying loose not up

21 against the pipe?

22 A. Yes, they'll vibrate.

23 Q. So they'll move?

24 A. They'll vibrate.

25 Q. Well, if there's a difference there, please

Page 209

1 explain it to me.

2 A. Okay. Vibration is where it moves backwards

3 and forwards and ends up in the same place when it's

4 finished.

5 Q. So it's your testimony that the loose

6 particles of bedding just laying underneath the pipe

7 due to settling would not actually be displaced and

8 moved in any fashion; they're just going to wiggle

9 and come back to the very same spot?

10 A. Well, they'll no longer be loose because of

11 the settlement. It's compaction of the material.

12 The material is 90 percent compact on the

13 specifications to start with under those

14 specifications, so it's not loose material to start

15 with, and with natural settling it further compacts.

16 That's how it settles.

17 Q. But we already established it doesn't settle

18 at the same pace all along the length of pipe, right?

19 A. Not necessarily.

20 Q. I'm sorry?

21 A. Not necessarily.

22 Q. Are you aware that the 18-inch PVC pipeline

23 ruptured simply because the ground around it was

24 moved such that the external pressure on the pipeline

25 was changed and the pipe itself just burst, even

Page 210

1 though it was never even touched?  
 2 A. No.  
 3 Q. Would it be important for you to know when  
 4 you are determining the safety of this pipeline that  
 5 this pipe is under pressure and it could actually  
 6 rupture simply if the ground around it is moved away  
 7 from it?  
 8 A. Not from a blasting standpoint.  
 9 Q. Because --  
 10 A. Because we know that blasting doesn't affect  
 11 pipelines. I mean, natural conditions are one thing;  
 12 blasting is something completely different.  
 13 Q. In fact, when you've investigated blasting  
 14 complaints and vibration complaints in all of your  
 15 time, you've never, ever found one situation where  
 16 blasting has caused the damage to a pipeline,  
 17 correct?  
 18 A. Correct.  
 19 Q. Do you know how the 18-inch PVC pipeline is  
 20 joined together?  
 21 A. It could be a butt fit.  
 22 Q. I'm sorry?  
 23 A. It will be a butt end fit with a seal.  
 24 Q. You mentioned the pipeline that had bowed in  
 25 your dam at your old house, right?

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1 A. That's correct.  
 2 Q. Was that just one piece of PVC pipe serving  
 3 as the outlet for the dam?  
 4 A. No. It was multiple sections, two or three  
 5 sections of PVC pipe.  
 6 Q. And it was able to move and bow even though  
 7 the pipe was joined together?  
 8 A. Yes.  
 9 Q. Do you know if the 18-inch PVC pipeline  
 10 utilized by the joint sewage treatment plant is  
 11 constructed in the same fashion as to allow for that  
 12 pipeline to shift and bow so that the joints don't  
 13 pull apart or break?  
 14 A. It's my understanding that's the way the  
 15 pipe is made, has been made for many years.  
 16 Q. I appreciate that, sir. Do you know if  
 17 that's the way it was actually joined, so that the  
 18 pipeline would do that?  
 19 A. Well, that's the way it's supposed to be  
 20 joined.  
 21 Q. Thank you, sir. Let me try my question one  
 22 more time. Do you know if that is the way the  
 23 pipeline was actually constructed?  
 24 A. I was not there during the construction.  
 25 Q. So the answer to my question is you don't

Page 212

1 know?  
 2 A. How it was put together?  
 3 Q. Yes, sir.  
 4 A. I was not there at the construction, so how  
 5 could I know?  
 6 Q. Thank you. With respect to the 18-inch PVC  
 7 pipeline, are you familiar with the situation that  
 8 occurred when because of the ground settling  
 9 underneath the pipeline and then weight being placed  
 10 on top of it the pipeline bowed and actually busted  
 11 at a joint?  
 12 A. Where was this?  
 13 Q. The 18-inch PVC pipeline. Are you familiar  
 14 with that situation?  
 15 A. No. Where did that occur?  
 16 Q. In the city of Osage Beach.  
 17 A. Nowhere near the Magruder property?  
 18 Q. It's the same pipeline, sir. My question is  
 19 simply, do you know about that situation?  
 20 A. No.  
 21 Q. Do you know if the pipeline due to the  
 22 settlement has any spots where the pipeline or a  
 23 joint is not actually supported by fill material?  
 24 Can you testify that at any point along that pipeline  
 25 there's no gaps?

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1 A. You can't see into the ground.  
 2 Q. So the question is you can't do that,  
 3 correct?  
 4 A. You can't do that.  
 5 Q. Thank you. Then are you aware of any  
 6 ability -- well, that's all right. I'll leave it at  
 7 that. On Page 24 of your report, you talk about  
 8 delays that have occurred -- when the shot occurs and  
 9 there are delays, right?  
 10 A. Yes.  
 11 Q. Are you aware, sir, of situations where the  
 12 delays didn't work as planned such that the shot went  
 13 off different than as planned?  
 14 A. Yes. But it doesn't matter.  
 15 Q. In fact, it does happen that you can have  
 16 the best designed plan for a shot and the plan  
 17 doesn't come off as expected, correct?  
 18 A. That's correct.  
 19 Q. You mentioned the testimony of -- or the  
 20 experience of Dyno's experts. Are you also willing  
 21 to testify as to the experience and level of  
 22 credibility -- I'm sorry -- level of qualifications  
 23 of the blasters actually on staff for Magruder  
 24 Limestone?  
 25 A. Depends who's doing the blasting.

1 Q. Do you know the qualifications of each and  
 2 every blaster currently on staff of Magruder  
 3 Limestone?  
 4 A. On staff at Magruder Limestone?  
 5 Q. Yes.  
 6 A. No, not at Magruder Limestone. However,  
 7 Dyno has strict standards for its blasters.  
 8 Q. Are you aware --  
 9 A. And under the State statute, when this  
 10 project goes forward, each blaster in charge of a  
 11 blast has to be a licensed blaster under the statute,  
 12 which meets minimum requirements which includes  
 13 training. It also includes experience and passing a  
 14 State exam.  
 15 Q. Are you aware that Magruder has blasters on  
 16 staff?  
 17 A. Yes. It blasts its own blasts, I believe,  
 18 at the Troy operation.  
 19 Q. Would you agree with me, sir, that if this  
 20 permit is granted, there would be nothing that would  
 21 require Magruder to utilize Dyno to do its blasting?  
 22 A. Yes, but they could do just as good a job.  
 23 Q. I understand that, sir. My question is, are  
 24 you aware that if this permit is granted, there's  
 25 nothing to require Magruder to utilize Dyno --

1 A. That's correct, but it doesn't matter  
 2 because the State statute puts forward the  
 3 qualifications of licensed blasters to meet minimum  
 4 standards.  
 5 Q. Let's talk about the State statute. I want  
 6 to make sure I understand that. The State statute,  
 7 as you understand it, places limitations on the  
 8 amount of vibrations that can be experienced by  
 9 neighboring qualified structures, right?  
 10 A. Uncontrolled structures.  
 11 Q. Is that correct?  
 12 A. Yes.  
 13 Q. And so for me to understand it, you believe  
 14 the State statute places a limitation on the amount  
 15 of vibrations that a neighboring house or building  
 16 can be impacted by a blast, right?  
 17 A. That's correct.  
 18 Q. Now, that is simply a limitation that is  
 19 supposed to be adhered to in order to not violate  
 20 State law, right?  
 21 A. That is correct.  
 22 Q. It doesn't -- having the limitation doesn't  
 23 actually guarantee that there's never going to be a  
 24 shot that impacts a building above the State statute,  
 25 true?

1 A. There shouldn't be.  
 2 Q. There's a speed limit of 70 miles per hour  
 3 on I-70, too, but that doesn't mean that everybody  
 4 driving down I-70 is not exceeding the speed limit;  
 5 isn't that correct?  
 6 A. That's correct.  
 7 Q. All right. So just so we're sure, the only  
 8 thing that will happen with the State statute is that  
 9 if there is a shot and it's bigger than what it's  
 10 supposed to be, there's now some standard that says  
 11 it was too big?  
 12 A. Correct.  
 13 Q. All right. And unlike my I-70 example, the  
 14 police aren't out monitoring and enforcing the  
 15 blasting safety statute; isn't that true?  
 16 A. Yes, they are.  
 17 Q. The Osage Beach or Miller County Sheriff's  
 18 Department --  
 19 A. No. Under the statute, you're supposed to  
 20 keep -- you have to keep your blasting records for  
 21 three years and seismograph records. You have to  
 22 determine your scale distance for each blast and  
 23 determine whether you need to use a seismograph or  
 24 not. And you have to make those available to the  
 25 State Fire Marshal's Office when requested.

1 Q. I appreciate that, sir. My question was  
 2 simply, to be clear, the sheriff's department or the  
 3 police department is not enforcing the blasting,  
 4 then?  
 5 A. No. It's the Fire Marshal's Office.  
 6 Q. And, again, if there is a blast that exceeds  
 7 the limit, that's not going to do anything to prevent  
 8 the damage from occurring; it's simply going to be a  
 9 measurement that it was too big?  
 10 A. Okay. In respect to the sewage treatment  
 11 plant, that is completely incorrect, because the  
 12 State statute with the Appendix B, the Z curve, is  
 13 designed for sheet rock. That is the start of  
 14 cosmetic damage. It is not the start of structural  
 15 damage. There is a safety zone above that in which  
 16 cosmetic damage might occur. Then you go further up  
 17 and then you come to minor damage. Then you go  
 18 further up still before you come anywhere near  
 19 structural damage. So what you're saying is  
 20 incorrect.  
 21 Q. All right. Well, let me try my question  
 22 again, because I apologize if I -- if that's the way  
 23 you understood it. All I want to confirm, sir, is  
 24 that if there is a blast and it's above the State  
 25 limitation, whatever damage may occur isn't going to

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1 be prevented by that limitation, correct? The damage  
 2 is going to occur any -- whatever's going to happen  
 3 is going to happen because the blast went off too  
 4 big, correct?  
 5 A. It's not going to do that.  
 6 Q. Do you understand my question?  
 7 A. Yeah, I understand your question, but I'm  
 8 saying it's not going to do that.  
 9 Q. I'm not asking you about the sewage  
 10 treatment plant. I'm not asking about any particular  
 11 structure.  
 12 A. And I'm also saying that just because the  
 13 limit is exceeded does not mean to say that there's  
 14 going to be damage to an uncontrolled structure. And  
 15 if we look at the sewage treatment plant, I'd like  
 16 you to tell me where the sheet rock is.  
 17 Q. You haven't been inside, have you?  
 18 A. And whether sheet rock is a problem. Simply  
 19 as that. Is fracturing sheet rock and causing sheet  
 20 rock joints to come apart, is that going to stop the  
 21 ability of the sewage treatment plant to treat  
 22 sewage?  
 23 Q. Dr. Worsey, yes or no?  
 24 A. What?  
 25 Q. Will a limitation on a blast actually

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1 prevent damage from occurring if, in fact, the  
 2 limitation is exceeded? The limitation in and of  
 3 itself in a book and a code book is not going to  
 4 prevent --  
 5 A. It depends on how much the limitation is  
 6 exceeded.  
 7 Q. Thank you.  
 8 A. All right?  
 9 Q. You talked about pipe vibrating and moving,  
 10 right? Remember that? Do you remember your  
 11 testimony about that, how the pipe would vibrate?  
 12 A. Could you put it in context, please?  
 13 Q. Well, I thought I understood as you went  
 14 through your testimony you talked about -- you gave  
 15 us various information about how the pipe might  
 16 vibrate and it might vibrate only the width of a  
 17 sheet of paper.  
 18 A. That's a one inch per second, yes.  
 19 Q. Now, do you know how long the length of the  
 20 pipes are?  
 21 A. Very long.  
 22 Q. Is it your testimony that the pipe -- the  
 23 entire length of the pipe will vibrate at exactly the  
 24 same rate?  
 25 A. No, it won't.

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1 Q. The mine plan that you designed, isn't it  
 2 true, sir, that the -- you describe the mine plan as  
 3 being loose?  
 4 A. Well, there's certainly no point in being  
 5 entirely specific about it because each blast is  
 6 going to be different, especially as they go up the  
 7 hillside, because each blast will have different  
 8 length holes as they progress up the hillside up to  
 9 50 feet.  
 10 Q. So as Magruder quarries along, the blast  
 11 plan may need to be modified or tweaked in order to  
 12 address conditions that are experienced as the  
 13 blasting occurs?  
 14 A. That's correct. If they want a different  
 15 size of rock, then they have the option to tweak the  
 16 blasting plan to provide what they would need.  
 17 Q. And just so we're clear, isn't it true, sir,  
 18 that you described the blast plan as a fairly loose  
 19 item?  
 20 A. Well, it's loose to a certain extent that it  
 21 gives the ability to go in there and change things,  
 22 especially when we're looking at ground vibration  
 23 measurement, as we go closer to the pipeline, for  
 24 instance. And it shouldn't be fixed to say no matter  
 25 what as we approach the pipeline we're going to do

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1 exactly the same thing. That's wrong. There should  
 2 be some ability there to say, okay, our vibration  
 3 levels are getting a little bit maybe higher than we  
 4 expected, okay, what are we going to do to the blast  
 5 now? Well, we're going to take these precautions, we  
 6 might deck. It's up to their option depending on  
 7 what actually happens when they get closer.  
 8 Q. I'm going to follow up on that, but just so  
 9 we don't lose this, do you remember when you were  
 10 deposed in this case?  
 11 A. Yeah.  
 12 Q. And do you remember testifying under oath  
 13 just like you are today?  
 14 A. Yes.  
 15 Q. If you'd look at your deposition, Page 31,  
 16 the very last line, 25, was your answer to the  
 17 question describing the blast plan as a fairly loose  
 18 item? Is that your testimony, sir?  
 19 A. Okay. I'm looking at the context. Okay.  
 20 Yes. And it is followed up by, "This is all  
 21 dependent on whether the ground is wet or dry." And  
 22 there was a slight mistake in the wording, and then  
 23 it says, "Also dependent on vibration monitoring."  
 24 And that is exactly what I have just said in this  
 25 court.

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1 Q. In fact, it is your expectation that as the  
 2 quarry operates, the results that you get from the  
 3 seismographs would actually cause you to fine tune or  
 4 change the blast plan based upon the information that  
 5 you get?  
 6 A. As necessary, correct.  
 7 Q. So, in effect, it's kind of a trial and  
 8 error process. You're going to start your blast,  
 9 you're going to follow the plan, but as you get more  
 10 information, as you see the results of the blasting,  
 11 you may need to modify it?  
 12 A. As a blasting engineer, I always rely on  
 13 empirical data rather than theory. And the reason  
 14 for this is empirical data gives you numbers. Theory  
 15 says what it should be, but it doesn't have to  
 16 exactly be that way. So what we do to be sound  
 17 practice is to have a look at these to measure things  
 18 and, if we need to, to modify them.  
 19 Q. And you don't have any numbers on how the  
 20 quarry operation might impact the sewer lines at this  
 21 point in time, right? You don't have any data?  
 22 A. Well, we don't have any data at this point,  
 23 but we're going to be working towards those sewer  
 24 lines, and by the time we get to them, we will have a  
 25 vast amount of data.

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1 Q. So at this point your blast plan is  
 2 developed on theory?  
 3 A. No. It's -- our blast plan is developed on  
 4 what's sensible, 150 feet there for economic reasons.  
 5 We know we can blast a lot closer based on previous  
 6 history and experience in the blasting industry.  
 7 There have been hardly any problems whatsoever that I  
 8 know about blasting next to pipelines, or sewage  
 9 treatment plants.  
 10 Q. Dr. Worsey, with respect to this blast plan,  
 11 isn't it true that this blast plan that we're talking  
 12 about here today is the only blast plan that you've  
 13 actually drafted in the last five years?  
 14 A. For a mining operation, yes. Usually what I  
 15 do is I have to go in and I assess other people's  
 16 operations.  
 17 MR. MCGOVERN: I'm sorry. You what?  
 18 THE WITNESS: Usually go in and  
 19 assess other people's operations for them. Usually  
 20 I'm brought in after the fact.  
 21 Q. (By Mr. Mauer) On Page 34 of your report,  
 22 when you prepared this report you identified the  
 23 operations that would be involved to excavate the  
 24 rock from the proposed quarry site, correct?  
 25 A. It's a schematic of the benching operation,

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1 yes.  
 2 Q. And the -- according to your report, at  
 3 least when you prepared this, the contemplation was  
 4 that there would be trucks utilized to haul the rock  
 5 inside on the quarry site, right?  
 6 A. Well, there will be trucks there. They  
 7 don't have to be there to haul the rock, but that's  
 8 what I anticipated as a very common method of using  
 9 it. Magruder, instead, have informed me that they're  
 10 going to use the more modern approach of actually  
 11 using an in-pit crusher that's going to be positioned  
 12 very close to the blasting faces.  
 13 Q. And on the next page, Page 35, you said,  
 14 "Equipment operating off the easement is not going to  
 15 affect the pipeline," right?  
 16 A. That's correct.  
 17 Q. You're not offering any opinions on  
 18 equipment that is operated on the easement, what type  
 19 of impact that might have on the pipelines, true,  
 20 because you haven't done any of that analysis?  
 21 A. I haven't done any analysis, no.  
 22 Q. On Page 36 you talked about bedding planes.  
 23 If I understood your testimony, limestone has beds  
 24 that will naturally fracture and stop so that you can  
 25 blast down to a certain level and then you get a nice

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1 level floor; is that right?  
 2 A. Could you recount which page that's on?  
 3 Q. I'm sorry. Page 36.  
 4 A. 36.  
 5 Q. My apologies.  
 6 A. Sorry. I misheard you.  
 7 Q. Page 36, the third bullet point, drill to  
 8 limestone bedding planes; is that correct?  
 9 A. That's correct.  
 10 Q. My understanding is these bedding planes are  
 11 natural structures in the rock where you could blast  
 12 above it, then the blasts would kind of stop at a  
 13 certain level and you get a nice level floor; is that  
 14 right?  
 15 A. That's correct. Bedding planes, what they  
 16 are basically is a halt in deposition when the  
 17 limestone, dolomite, whatever the material is, halts  
 18 and then a slight layer of something else is put  
 19 down, oftentimes clay, so it's a stop in the  
 20 deposition. And when it resumes, then you have a  
 21 different material in there so that it actually  
 22 causes a bedding plane. And that's a natural joint  
 23 weakness plane in the rock.  
 24 Q. And those run through the limestone so that  
 25 you can blast, and then the blast will kind of stop

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1 at that bedding plane, right?  
 2 A. Yes. We use those as natural pre-splits a  
 3 lot of time. They give very, very nice quarry  
 4 floors. Oftentimes used in the quarrying industry,  
 5 especially when we have horizontally bedded  
 6 limestone.  
 7 Q. Now, in this case have you done any studies  
 8 to know that all of the bedding planes on the  
 9 Magruder site are perfectly horizontal?  
 10 A. Some of them from place to place are not  
 11 perfectly horizontal. There's not that much  
 12 exposure; however, the main part -- the main portion  
 13 on the map shows the overall lithology to be  
 14 horizontal.  
 15 Q. But you haven't done any testing to  
 16 determine if, in fact, the bedding planes around the  
 17 easement are perfectly horizontal, correct?  
 18 A. Not all the bedding planes are perfectly  
 19 horizontal.  
 20 Q. And if the bedding planes actually run at an  
 21 angle headed towards the sewer lines, when you blast,  
 22 the blast would follow along the level of the bedding  
 23 plane; is that right?  
 24 A. It could do, depending on whether there's  
 25 material it's abutting against or not. Next, on the

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1 other side of the sewer line, on the hillside to the  
 2 east, there is one rock outcrop there where the  
 3 institute bedding planes there have a rather more  
 4 weaker limestone, actually have a dip, okay, but I  
 5 have no indication this is the case on the other  
 6 side. In fact, when you go up to the top of the hill  
 7 slope, there is a small outcrop of rock up there  
 8 which is pretty much horizontal. So it depends what  
 9 we get once we get there.  
 10 Q. And you won't know what the bedding planes  
 11 are adjacent to the sewer lines until you're actually  
 12 quarrying and you have an opportunity to actually get  
 13 there and see it, true?  
 14 A. Yeah, once we get in there, but again, the  
 15 intention is to turn the blast sideways once we get  
 16 to that point that we're closer to it.  
 17 Q. On Page 38 when you're talking about  
 18 blasting, you say that normally each hole is fired on  
 19 a separate delay. And that's the typical plan; is  
 20 that right?  
 21 A. Yes. That gives us the best breakage.  
 22 That's why we do it.  
 23 Q. But it doesn't always happen that way; isn't  
 24 that true?  
 25 A. Well, if you do your job properly it does.

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1 Q. I understand that, but isn't it true, sir,  
 2 that every job isn't done properly, accidents happen,  
 3 things quit and don't work and you get a blast that  
 4 occurs and they all go off at once?  
 5 A. Okay. Has occurred in the past.  
 6 MR. MCGOVERN: I'm sorry. When you  
 7 say okay, are you saying yes, you're agreeing with  
 8 his answer or... I'm trying to follow. When you  
 9 just responded and said okay, you mean yes to his  
 10 question?  
 11 DR. WORSEY: Well, what I'm saying is  
 12 yes, it has occurred in the past, right, but with the  
 13 type of initiation system that we will be using, it  
 14 is extremely unlikely that that will occur. Is that  
 15 clear?  
 16 MR. MCGOVERN: I'm sorry. All I was  
 17 trying to get, you had said okay and then gave an  
 18 answer, and I'm just trying to -- I want to  
 19 understand --  
 20 DR. WORSEY: Oh. The okay was not a  
 21 yes.  
 22 MR. MCGOVERN: Okay. I just wanted  
 23 to put -- the record is going to reflect --  
 24 DR. WORSEY: Yes, the record is going  
 25 to reflect. Sorry about that.

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1 MR. MCGOVERN: I'm suggesting this  
 2 for your benefit as much as mine.  
 3 DR. WORSEY: Yes.  
 4 Q. (By Mr. Mauer) As you sit here today, is  
 5 there any way to know that for the next 100 years one  
 6 of these accidents, mistakes, equipment failures  
 7 won't happen at the proposed Magruder quarry?  
 8 A. It is highly unlikely.  
 9 Q. I appreciate that. Is there any way to know  
 10 that it wouldn't happen?  
 11 A. Well, I haven't got a crystal ball in front  
 12 of me and I'm not a soothsayer, but I am held to a  
 13 certain degree of engineering certainty on this, and  
 14 with the people who are doing the blasting, with the  
 15 law in place and with the initiation system that will  
 16 be used, it's practically non-existent.  
 17 Q. You do understand that the permit is for  
 18 100 years? It's been requested for 100 years?  
 19 A. I haven't been told that, and really I don't  
 20 care because I'm not going to be here in 100 years  
 21 time. I don't know if you will either.  
 22 Q. You understand the City of Osage Beach will  
 23 be there in 100 years?  
 24 A. Well, who knows?  
 25 Q. Do you think the Lake of the Ozarks is going

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1 to be there for 100 years?  
 2 A. I don't know.  
 3 Q. Is there any degree of risk that you think  
 4 is reasonable to allow for a potential for a break in  
 5 the sewage line or a rupture in the sewage treatment  
 6 plant that might cause pollution to the Osage River  
 7 or Lake Ozark? Is there any amount of risk that you  
 8 believe is reasonable?  
 9 A. Can you repeat that, please?  
 10 Q. Yes, sir. Is there any amount of risk that  
 11 you believe is reasonable that the line might rupture  
 12 and pollute the Osage River or the sewage treatment  
 13 plant might be damaged such that the lake would be  
 14 polluted?  
 15 A. Well, I don't think I'm qualified to answer  
 16 that question.  
 17 Q. On Page 43 you talk about the maximum  
 18 projected of 30 blasts a year. Now, if I understood  
 19 it, when you say 30 blasts, is that 30 events where  
 20 someone is out there actually firing explosives?  
 21 A. That's 30 production blasts.  
 22 Q. And those blasts -- a production blast might  
 23 actually involve up to 25 or more actual holes where  
 24 the explosives are detonated?  
 25 A. That's correct.

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1 Q. So one blast is actually 25 or more  
 2 explosions?  
 3 A. In rapid succession. When measured, for  
 4 instance, as a vibration, you'll get a vibration  
 5 record at a distance.  
 6 Q. I understand, sir.  
 7 A. And they won't be distinguishable.  
 8 Q. When you say 30 blasts, then, you're  
 9 actually talking -- in a year, using 25 at a time,  
 10 you're actually talking about 750 explosions in a  
 11 year?  
 12 A. Well, if we take an explosion, for instance,  
 13 as anything that occurs within a second period, okay,  
 14 you're going to have -- or a second or two, you're  
 15 going to get -- have 30 blasts a year. But if you  
 16 want to take that down there, here's the example, for  
 17 instance, when you drive here every day in your car  
 18 and you say we drive an average of about 2,000 to  
 19 3,000 rpm's as we travel down the road, that means  
 20 2,000 to 3,000 explosions per minute. But we don't  
 21 say, I got here today via thousands of explosions.  
 22 Q. Thank you, sir. Maybe I'm just confused.  
 23 When you say a blast -- 30 blasts, for each one of  
 24 those, you're going to load 25 or more holes and each  
 25 one of those holes is going to have an explosion in

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1 them, right?  
 2 A. Yeah, but they're going to be fired in  
 3 sequence together. It's not as if they're separate,  
 4 completely separate, like today we're going to shoot  
 5 one hole and tomorrow we're going to shoot the next  
 6 hole after that blast. All of those holes will be  
 7 initiated at the same time and they will follow in  
 8 sequence.  
 9 Q. If you look at Page 56 and then 57 where  
 10 you're talking about ground shifting, I just want to  
 11 make sure I'm clear. If I have a stretch of pipe  
 12 20 feet long and it is -- the bedding has settled  
 13 unevenly so I've got a spot of, say, 5 feet, 10 feet  
 14 where the bedding has settled more than the other  
 15 ends on the ends of the pipe so there's nothing  
 16 underneath that stretch of pipe, the bedding has  
 17 settled more -- do you understand what I mean?  
 18 A. Yes.  
 19 Q. Now, when a blast -- when that pipe and all  
 20 the bedding material are vibrated because the blast  
 21 goes through, are you telling me that the material  
 22 underneath the pipe is not going to be shifted  
 23 ground?  
 24 A. There will be no major movement. If you've  
 25 got a vibration, it's going to go backwards and

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1 forwards.  
 2 Q. Because it wouldn't go sideways?  
 3 A. Well, it goes in whatever direction it goes,  
 4 okay, but what I'm saying, vibration comes back to  
 5 about the same position it started. We're looking at  
 6 shifting ground here, we're talking about permanent  
 7 ground displacements, and significant ground  
 8 displacement.  
 9 Q. On Page 57 when you talk about the elevation  
 10 of the pipe would be lower than the higher rock unit,  
 11 am I understanding your testimony that because the  
 12 rock being blasted is at an elevation higher than the  
 13 pipeline, there is no possibility of shifting the  
 14 ground around the pipeline?  
 15 A. Well, we talk here it's the upper -- the top  
 16 two benches, which it refers to. They're in higher  
 17 units and they're going to have no effect on the  
 18 pipeline as far as ground shifting is concerned.  
 19 Q. Because their elevation is higher than the  
 20 elevation of the pipeline?  
 21 A. That's correct.  
 22 Q. Again on that same page, 57, you talked  
 23 about it being expected that the pipeline will be  
 24 below the quarry floor, but the last line says the  
 25 actual geology is going to -- we're going to decide

1 that or uncover it as the excavation progresses,  
 2 right?  
 3 A. Yes.  
 4 Q. So that's something in the blast plan that  
 5 has yet to be worked out depending upon how you  
 6 actually -- what conditions you actually find when  
 7 the quarry is operating?  
 8 A. Yes. That's correct.  
 9 Q. Now, the 150-foot buffer zone, am I  
 10 understanding your testimony that 150 feet, because  
 11 you're staying 150 feet away, that means that there's  
 12 no possibility of any impact on the sewer lines?  
 13 A. Correct.  
 14 Q. So if you stay 150 feet away, then -- of the  
 15 sewer lines, you're safe. There's just no way the  
 16 blast could ever be felt and transmitted and impacted  
 17 on the sewer lines?  
 18 A. Well, as we blast up to the sewer line, we  
 19 will be monitoring ground vibrations, also assessing  
 20 the geology, to make sure there isn't a problem.  
 21 Q. Well, that's what I was curious about.  
 22 Because if the 150 feet is just an absolute guarantee  
 23 it can't go more than 150 feet, why even bother to  
 24 have the seismographs and test the pipe?  
 25 A. Because it makes sense.

1 Q. Because, in fact, the 150 feet may seem like  
 2 a good buffer, but until you actually get in and  
 3 start quarrying and start testing, you don't know  
 4 that the 150 feet is going to be an absolute safe  
 5 distance; is that true?  
 6 A. No, that's not correct. The reason we use  
 7 seismographs is to cover our heinie. The major  
 8 reason is to make sure that we are blasting within  
 9 reasonable levels. And that is the reason for doing  
 10 this. Okay? So that we can show, we can prove that  
 11 we are not doing what you might say we are doing.  
 12 That's why we use seismographs for the majority of  
 13 whenever we use them. It's proof that we are doing  
 14 the job as we are supposed to be doing it. It's as  
 15 simple as that. That's what it breaks down to. It  
 16 is proof, evidence that we are taking due care and  
 17 consideration on our jobs. And when the State Fire  
 18 Marshal comes along, we have a record that says,  
 19 yeah, we conformed to the State regulations.  
 20 Q. Okay. Well, now I'm confused. I thought  
 21 the State regulations didn't apply to the sewer  
 22 lines.  
 23 A. That's correct. But --  
 24 Q. So you're not -- wait. Let me finish. So  
 25 you're not using the seismographs in order to be sure

1 that your blast impact on the sewer lines are in  
 2 compliance with the State statute?  
 3 A. My example is for when we use seismographs  
 4 out in our industry, we put them on controlled  
 5 structures. We are putting them there to have  
 6 evidence that we are within certain limits. And it  
 7 behooves us to have seismographs there to show what  
 8 blasting vibration levels are being created. Now, we  
 9 can use that data to modify our blasting as we need  
 10 to, okay, but the majority of situations it is there  
 11 to say, well, we don't want to go over, say, 5 inches  
 12 per second of the pipeline or 6 or 7 inches,  
 13 whatever, and, okay, we'll look at it and say, there  
 14 you are, that blast was 2 inches per second, it was  
 15 3 inches per second.  
 16 Q. Let me try it this way, sir: On Page 58 you  
 17 talk about your second potential measure is to change  
 18 the blasting plan, right?  
 19 A. Yes.  
 20 Q. And that would be necessary only if you find  
 21 out that, in fact, the 150 feet isn't good enough  
 22 because it's actually causing shifting ground around  
 23 the sewage treatment line, correct?  
 24 A. Well, if it's necessary, but we may opt to  
 25 do otherwise.

1 Q. I'll move on, but I want to make sure I've  
 2 got this. Would you agree with me that simply  
 3 because you're 150 feet away even under your own plan  
 4 does not guarantee that the lines will not be  
 5 impacted? There's no magic to the 150 feet, true?  
 6 A. 150 feet, we will not be impacting the  
 7 lines.  
 8 Q. Guaranteed?  
 9 A. Yeah.  
 10 Q. So as long as you stay 150 feet away, there  
 11 is nothing that can happen to those lines?  
 12 A. Under the blast plan and due to blasting.  
 13 Q. On Page 59 -- well, okay. You say due to  
 14 blasting. Let me ask you about that. If the blast  
 15 causes the ground underneath the pipe to settle more  
 16 so the pipe settles more because there's been this  
 17 vibration and the pipe settles more and then --  
 18 A. That won't occur, because it's been in there  
 19 long enough for the settling to be finished.  
 20 Q. I understand that, but we've all agreed we  
 21 don't know what the condition of that pipe is, right?  
 22 A. But you're saying if.  
 23 Q. Well, Mr. Brownlee asked you to assume  
 24 things and asked you -- I'm asking you to assume, if  
 25 the pipe caused -- if the blasting causes the pipe to

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1 settle more and it settles unevenly and as a result  
 2 of that settlement a joint pulls apart and we have a  
 3 rupture, did the blasting cause it or is that just a  
 4 natural consequence?  
 5 A. But why are you asking? Because I've said  
 6 it's not going to do that.  
 7 Q. Humor me. Did the blasting cause it, or is  
 8 that just a natural consequence of settlement that  
 9 you described earlier?  
 10 A. That doesn't make any sense.  
 11 Q. You just can't answer that question?  
 12 A. Well, it doesn't make any sense because the  
 13 pipelines have been long enough there that they'll  
 14 have completed their settlement. If it was a new  
 15 pipeline, maybe we'd have to take that into  
 16 consideration because it was going to move, but these  
 17 things are put in and they're expected to move.  
 18 Q. When were they put in?  
 19 A. They're expected to settle.  
 20 Q. When were they put in?  
 21 A. I can't remember the exact dates now. It  
 22 was awhile ago.  
 23 Q. How long does it take for a pipeline to  
 24 settle so that it will settle no more?  
 25 A. Major settlement occurs in the first two,

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1 three years.  
 2 Q. How long does it take for a pipeline to  
 3 settle before all settlement is done?  
 4 A. It gets smaller and smaller and smaller, and  
 5 that tends to no more.  
 6 Q. And how long does that take, sir?  
 7 A. Well --  
 8 Q. Do you know?  
 9 A. -- it's as simple as this: It tends -- when  
 10 you take an asymptotic curve and if you measured it  
 11 small enough to small to small to small, you can keep  
 12 going quite a long time.  
 13 Q. Can you tell me in a number of years that  
 14 the pipe will settle no more?  
 15 A. No, but it's over a fairly short period.  
 16 Q. On Page 60 you were describing the changing  
 17 of the direction of the blasting. Do you remember  
 18 that testimony?  
 19 A. Yes.  
 20 Q. All right. Now, just to the right of shot  
 21 number four is a void, and I think you've described  
 22 that that would be done under a construction blasting  
 23 situation?  
 24 A. That's correct.  
 25 Q. And I think you described the construction

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1 blasting as being more careful?  
 2 A. That is correct.  
 3 Q. Thank you. On Page 85 you talked about  
 4 third-party monitoring. Do you see that?  
 5 A. Yes.  
 6 Q. In your second bullet point you talk about  
 7 unbiased analysis. Do you see that?  
 8 A. Correct.  
 9 Q. All right. Now, does the Land Rec Program  
 10 require this seismographic testing?  
 11 A. No, because it's for the Land Reclamation.  
 12 Q. And does the Fire Marshal mandate or pick  
 13 who is utilized for the seismographic testing?  
 14 A. No.  
 15 Q. And in this case would Magruder be the one  
 16 who pays for the seismographic testing?  
 17 A. Yes.  
 18 Q. And would Magruder be the one who gets to  
 19 pick the seismographic testing company?  
 20 A. There's only a few seismographic testing  
 21 companies available in the state of Missouri.  
 22 Q. I'm sorry, sir. Perhaps that -- my question  
 23 wasn't clear. Does Magruder get to pick who is the  
 24 seismographic company?  
 25 A. Yes.

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1 Q. On Page 87 you described this proposed  
 2 quarry excavation plan as technically simple; is that  
 3 right?  
 4 A. Yes.  
 5 Q. Have you done any analysis as to the ability  
 6 of Magruder Limestone Company and its employees to  
 7 carry out each step of this technically simple plan?  
 8 A. My answer to that is under the Missouri  
 9 blasting statute you require licensed blasters who  
 10 are trained, qualified by experience and have passed  
 11 a blasting exam set by the State, and that will  
 12 qualify people to do blasting and follow procedures.  
 13 Q. I appreciate that, sir. My question was a  
 14 little bit different. Have you done anything to  
 15 analyze the ability of the Magruder Limestone Company  
 16 and its personnel --  
 17 A. No. I don't need to.  
 18 Q. Can I finish my question, just so we have a  
 19 clean record?  
 20 A. Okay. Sorry.  
 21 Q. Have you done any analysis or attempted any  
 22 investigation as to the ability of Magruder Limestone  
 23 Company personnel to actually satisfy the  
 24 requirements of this blast plan?  
 25 A. No. I don't need to because of State

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1 statute.

2 Q. Well, would you agree with me that the blast

3 plan is not something that's going to be on file with

4 any regulatory agency? It's not going to be a public

5 record. It's not going to be out amongst the public

6 for everybody to see, correct?

7 A. It isn't already? I thought this whole

8 proceedings was public record and Sunshine Law.

9 Q. Let me try again. The Fire Marshal is not

10 going to receive a copy of this blast plan and have

11 it to be able to enforce the requirements of the

12 blast plan, true?

13 A. He doesn't need to enforce the requirements

14 of the blast plan.

15 Q. And when a blaster comes out, the way

16 they're going to find out about this blast plan is

17 somebody's going to have to tell them, right?

18 A. Why?

19 Q. It's not going to be posted at the office,

20 is it?

21 A. Why should somebody have to tell the Fire

22 Marshal the blast plan?

23 Q. I'm sorry. Not the Fire Marshal. When the

24 employees come on site to actually carry out a blast,

25 somebody's going to have to at bare minimum tell

Page 243

1 them, hey, we have a blast plan and there are sewer

2 lines over here and we need to make sure that this

3 blast complies with this plan so that those sewer

4 lines are not impacted, right?

5 A. Yes.

6 Q. And that's going to have to happen each time

7 a shot occurs so that whoever is doing the blast

8 knows, we've gotta make sure that this plan is

9 followed and those lines are protected?

10 A. Every time you have a new person. You can

11 have the same guy every time. Oh, don't forget we

12 have the sewer lines over there when they're doing

13 the same thing.

14 Q. They're only coming out 30 times a year,

15 right? They're not on -- as I understood your blast

16 plan, you're going to be bringing in somebody from

17 the outside, not a Magruder employee?

18 A. Yeah, but the holes are going to be drilled

19 by Magruder, so the blasts will be on the -- drilled

20 by their own equipment. That's their intent at the

21 moment. Dyno comes out and does the shot service.

22 Q. So not only does Dyno have to know about the

23 blast plan each time, but whoever Magruder hires and

24 is their employee to drill the holes is going to have

25 to know about the blast plan and the sewer lines?

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1 A. Not each time.

2 Q. Whenever a shot --

3 A. It's general procedure for that site.

4 Q. But you haven't done anything to know

5 whether or not Magruder has the internal controls and

6 abilities to make sure that that's done, correct?

7 A. I've been through and audited Magruder's

8 blast records and things like that, and I'm certainly

9 sure that they have that sort of thing put in place.

10 Q. On Page 93 where we start your opinions,

11 your second opinion you offer -- well, first of all,

12 let's talk about the project site is an ideal

13 candidate. Is it true, sir, that you weren't asked

14 to compare this site to another site, any other site

15 in and around the Osage Beach/Lake Ozark area?

16 A. No. Why should I?

17 Q. You weren't asked to evaluate whether this

18 site had more or less risk than some other site that

19 might be opened up for a quarry?

20 A. No. I was asked to go and have a look at

21 this individual site.

22 Q. And you were asked to, if a quarry is here,

23 help us develop a blast plan for how we're going to

24 operate?

25 A. Just to make sure -- I was asked to make

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1 sure -- to develop a blast plan to make sure the

2 concerns were addressed adequately. That doesn't

3 mean anybody else couldn't have done it. Dyno could

4 have done it quite nicely by themselves.

5 Q. Is it your understanding that there is

6 electronic equipment within the bounds of the sewage

7 treatment plant?

8 A. Yes. I've seen that in the testimony given

9 by Mr. Hutchcraft.

10 Q. Have you done anything to analyze the impact

11 of a quarry operation on that electronic equipment?

12 A. No, but electronic equipment is not a

13 problem. We shoot next to computer facilities and

14 things like that. That is not a problem. Electronic

15 equipment in mines, electrical equipment in mines.

16 That's every day. It's not a concern. Sheet rock is

17 far more susceptible to blasting vibrations.

18 Q. When you said you were hired to address the

19 concerns, whose concerns were you hired to address?

20 A. To address your concerns.

21 Q. Okay. And you understand that through the

22 testimony of Mr. Hutchcraft that he is concerned

23 about the impact of the quarry on his electronic

24 equipment?

25 A. That's correct, but it's unfounded.

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1 Q. But you haven't done anything to analyze  
 2 which electronic equipment he has, the specifications  
 3 of that equipment or how it might be impacted by the  
 4 quarry, true?  
 5 A. The ground vibrations are going to be so low  
 6 at that site that it's not going to be a problem.  
 7 This is something we deal with every day in the  
 8 industry.  
 9 Q. Have you done anything to analyze the impact  
 10 of dust potential on that electronic equipment?  
 11 A. No.  
 12 Q. You talked about the lines not being a  
 13 problem. The question I have for you, have you  
 14 actually been involved with any quarries and/or  
 15 blasting on top of, you know, or adjacent to forced  
 16 main lines?  
 17 A. Not with any quarries per se. This is very,  
 18 very common in the industry, though.  
 19 Q. But you haven't been involved with it?  
 20 A. No, I haven't. In fact, I believe there's a  
 21 MODOT job that's going to be blasting right next to  
 22 these lines further up toward the city.  
 23 Q. Now, that blasting, that would be for the  
 24 construction of the highway, right?  
 25 A. That's correct.

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1 Q. So that would be construction blasting?  
 2 A. Yes. It's not too much different, however,  
 3 from the blasting that will be put forward here in  
 4 hole diameter, and it certainly will be a lot closer,  
 5 from what I understand.  
 6 Q. Have you examined the specifications for the  
 7 construction of the highway?  
 8 A. No, I have not.  
 9 Q. Can you testify here today what the hole  
 10 diameter will be for those blasts pursuant to the  
 11 specifications?  
 12 A. No, because that's up to the contractor. I  
 13 can tell you that the specifications on it are going  
 14 to be no larger than 4 inches in diameter, but the  
 15 rest is up to the purview of the contractor that will  
 16 be doing the job.  
 17 Q. At the beginning of your testimony you  
 18 talked about karst geology and topography; is that  
 19 right?  
 20 A. Topography, yes.  
 21 Q. Now, you talked about some of the  
 22 characteristics of karst topography might be a  
 23 sinkhole, for an example; is that right?  
 24 A. That's correct.  
 25 Q. Or a cave-in; is that right?

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1 A. That's correct.  
 2 Q. And a cave-in happens when there is a cave  
 3 underneath and the land above it actually -- the roof  
 4 of the cave collapses and you have a cave-in, right?  
 5 A. Yes, but you usually see those -- that  
 6 occurs a little bit in sinkholes as the ground sinks  
 7 into the hole beneath it, a pothole we call them in  
 8 England, whereas I was referring to a cavern that  
 9 would collapse. An example of that would be of the  
 10 Ha Ha Tonka where they have a section of a very deep  
 11 gorge which is a result of a cavern collapse.  
 12 Q. And until the cavern or cave collapses, if  
 13 you're walking over top of it, can you tell that  
 14 there's actually a cavern or a cave underneath it?  
 15 A. No, but there's generally other karst  
 16 features.  
 17 Q. So, in fact, if you're walking over top of  
 18 Bridal Cave or Jacobs Cave or Carol Cave, any of  
 19 those caves in and around the Lake of the Ozarks  
 20 area, do you know -- can you stand on the ground  
 21 above those caves and tell that there's a cave down  
 22 there below?  
 23 A. In the area around those features there's  
 24 usually other karst features.  
 25 Q. Have you ever stood in the area above Bridal

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1 Cave?  
 2 A. No, I have not stood above Bridal Cave.  
 3 Q. Can you tell me if there are any karst  
 4 features above Jacobs Cave?  
 5 A. No. I have not looked above Jacobs Cave.  
 6 I've looked at a lot of other cave sites, though.  
 7 Q. I'm going to show you what has been marked  
 8 as BP-8. BP-8 is a USGS report talking about  
 9 environmental impacts of quarrying stone in karst.  
 10 Do you see that first page?  
 11 A. Yes, I see it.  
 12 Q. I just wondered, have you ever seen this  
 13 report before?  
 14 A. No, I've not seen this report before.  
 15 Q. Would you turn to the actual first page of  
 16 text?  
 17 A. Past the pictures of classic karst  
 18 topography?  
 19 Q. It's actually right after the index, Page  
 20 Number 1. Right there. You were on it.  
 21 A. "Potential Environmental Impacts For  
 22 Quarrying Stone in Karst."  
 23 Q. Right. A literature review. Do you see  
 24 that?  
 25 A. Yes.

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1 Q. According to this USGS report, under the  
 2 introduction, limestone, dolomite and marble, the  
 3 carbonate rocks, are principal karst-forming rocks;  
 4 is that right?  
 5 A. Yes, but they don't have to display karst  
 6 features in any way, shape or form.  
 7 Q. Would you agree that dolomite is a principal  
 8 karst-forming rock?  
 9 A. It can have karst features. It doesn't have  
 10 to.  
 11 Q. And the rock that's being utilized -- that  
 12 is going to be quarried if this permit is granted is  
 13 dolomite; is that right?  
 14 A. That is correct.  
 15 Q. Would you please turn to your report, Page  
 16 15.  
 17 A. My report?  
 18 Q. Yes, sir. Your presentation.  
 19 A. (Complies.)  
 20 Q. Now, if I understand your definition of an  
 21 un -- in your report, Page 15, you've identified the  
 22 definition of an uncontrolled structure from the  
 23 Missouri Blasting Safety Act, right?  
 24 A. Yes. That's correct.  
 25 Q. All right. And it's your opinion of the

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1 statute that a pipeline is not an uncontrolled  
 2 structure because it's not identified as a dwelling,  
 3 public building, school, church, commercial building,  
 4 right?  
 5 A. That's correct.  
 6 Q. Now, if I understood your testimony about  
 7 the sewage treatment plant, the big round tanks, open  
 8 air tanks that are cement tanks, you identified that  
 9 as a structure covered, right?  
 10 A. Okay. I don't identify that as an  
 11 uncontrolled structure; however, there are buildings,  
 12 surface buildings, at that treatment plant which are  
 13 covered under the statute. Okay? And thereby those  
 14 structures, their actual physical presence limits the  
 15 ground vibrations to what the statute requires, and  
 16 that means the actual physical presence will protect  
 17 the rest of the sewage treatment plant.  
 18 Q. So the tanks themselves are not protected  
 19 structures -- are not an uncontrolled structure  
 20 protected by the Act? Because it doesn't say in the  
 21 Act tanks; is that right?  
 22 A. That's correct.  
 23 Q. With respect to the blast plan, which is  
 24 Applicant's 7...  
 25 MR. MAUER: I don't know if he has it

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1 there.  
 2 DR. WORSEY: I don't have a copy with  
 3 me.  
 4 HEARING OFFICER: Just a moment. The  
 5 witness is being handed a copy of Applicant's 7.  
 6 DR. WORSEY: Thank you.  
 7 Q. (By Mr. Mauer) As I understood the prior  
 8 testimony in this case, Mr. Dean McDonald provided  
 9 assistance and input in preparation of Applicant's 7;  
 10 is that right?  
 11 A. Correct.  
 12 Q. Can you tell me by looking at Applicant's 7  
 13 which portions you wrote as compared to which  
 14 portions were done by Mr. McDonald?  
 15 A. I believe I actually wrote all of this  
 16 personally, quoting from various sources including  
 17 the Bureau of Mines. Okay. In the information  
 18 pertaining in here that I got from Mr. Dean McDonald  
 19 would be the hole diameter and some of the other  
 20 information.  
 21 Q. So the information about the actual plan for  
 22 operation of the quarry, would that have come from  
 23 Mr. McDonald?  
 24 A. As pertains to non-blasting items, these are  
 25 generalized statements. The blasting items are

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1 specific.  
 2 Q. I'm not sure I understood your answer.  
 3 Could you say it again, please? I'm sorry. I'm  
 4 confused.  
 5 A. Well, there's material in there that is  
 6 general mining operations that one finds as standard  
 7 procedure expected in quarries.  
 8 Q. So some of the information set forth in the  
 9 blast plan is just what you would expect would be  
 10 done on the proposed site because that's common in  
 11 the industry?  
 12 A. On the non-blasting items.  
 13 Q. Okay. Thank you.  
 14 A. For instance, one of the things he told me  
 15 was the location of where the road access to the site  
 16 would come in, approximately, and the reasons for  
 17 that.  
 18 Q. One last thing. This blast plan that we've  
 19 talked about, is it so specific and finalized today  
 20 that the Land Rec Program could issue a permit and  
 21 say that Magruder can only operate this quarry under  
 22 the specifics set forth in the blast plan?  
 23 A. It could, but there's no reason to do that.  
 24 Q. Because, in fact, that's not actually even  
 25 what you plan on doing. You plan on modifying it as

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1 you go along, as is necessary, right?  
 2 A. The blast plan includes modifications as  
 3 necessary. I don't plan on modifying the blast plan.  
 4 It's in there. It's stated straight up there that  
 5 we're going to modify as necessary. I'm not going to  
 6 modify the blast plan.  
 7 Q. So prior to --  
 8 A. It has modifications in it.  
 9 Q. Thank you, sir. Last question. So prior to  
 10 issuance of the permit, there's no way to say that  
 11 blasting shall only be conducted exactly in this  
 12 fashion, because you don't know what's going to be  
 13 needed in the future, right?  
 14 A. The modifications there are extra for  
 15 protection if deemed necessary.  
 16 MR. MAUER: I'm sorry, your Honor. I  
 17 have to ask another one.  
 18 A. I don't want to go through the point of  
 19 saying this is the way we're going to do it,  
 20 especially if there's a better way developed to do  
 21 it. It's as simple as that.  
 22 Q. (By Mr. Mauer) So the answer to my question  
 23 is yes?  
 24 A. Can you repeat the question?  
 25 MR. MAUER: Would you read it back,

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1 please.  
 2 (Whereupon, the requested portion of  
 3 the record was read by the reporter as follows.)  
 4 A. That's a little bit confusing.  
 5 Q. (By Mr. Mauer) Let me try again.  
 6 A. Could you restructure that, please?  
 7 Q. Yes, sir. There's been some suggestion that  
 8 perhaps the Land Rec Program could issue a permit for  
 9 this proposed site and place limitations on the  
 10 permit, and all I'm trying to make sure is that under  
 11 the blast plan that you've testified to, it  
 12 encompasses the ability to modify the plan, to change  
 13 the plan after you get on site and start quarrying  
 14 and determine what is necessary?  
 15 A. Yes, but the modifications are there for  
 16 positive reasons rather than negative.  
 17 Q. Right. So there would be no way to say  
 18 today the Land Rec Program issues a permit only if  
 19 blasting is conducted in these specific parameters  
 20 and fashions, because you don't know if that's  
 21 actually going to be the best way to do it, true?  
 22 A. Well, I can give you an example how this  
 23 would work if this was MODOT. What you would do is  
 24 put forward a blast plant, and then if you wanted a  
 25 variance from that blast plan, then you would have to

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1 go to their engineer. Well, the engineer first would  
 2 approve the blast plan. If you need to do a variance  
 3 for that blast plan, then you would present the new  
 4 blast plan to the engineer at MODOT, and then the  
 5 engineer would say, yeah, this is okay or it's not  
 6 okay. It's as simple as that. And trying to fix  
 7 somebody to something is not necessarily a good  
 8 thing.  
 9 Q. I agree with that. Last thing. The Land  
 10 Rec Program doesn't require a blast plan and they  
 11 don't have an engineer that reviews them, correct?  
 12 A. That's correct.  
 13 MR. MAUER: Thank you. I don't think  
 14 I have anything else at this time. I don't know if  
 15 you want to take a break now.  
 16 THE COURT: I think we need to take  
 17 about a five-minute break before we go to Mr.  
 18 McGovern's cross-examination. Let's try to stretch  
 19 our legs and be back in about five minutes.  
 20 (Brief recess.)  
 21 HEARING OFFICER: We are reconvened.  
 22 Mr. McGovern, you are recognized for  
 23 cross-examination of the witness.  
 24 MR. MCGOVERN: Thank you.  
 25

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1 EXAMINATION  
 2 QUESTIONS BY MR. MCGOVERN:  
 3 Q. Dr. Worsley, first I'd like to start with  
 4 Applicant's Exhibit No. 21, which is your list of  
 5 publications.  
 6 A. Yes.  
 7 Q. Looking at the list of publications, it  
 8 indicates that Dr. Worsley has authored and  
 9 co-authored over 250 publications, and it goes on to  
 10 state that defense related publications have been  
 11 removed. Do you see that?  
 12 A. Yes.  
 13 Q. So from that, can I assume that the  
 14 publications that are at least listed on Applicant's  
 15 No. 21 are those that do not relate to defense  
 16 matters?  
 17 A. That's what I believe.  
 18 Q. And defense matters, these are military type  
 19 reports that you would have prepared; is that  
 20 correct?  
 21 A. Yes. All that military stuff should have  
 22 been taken out about processing of ICBM rocket motor  
 23 propellers and all those sorts of things.  
 24 Q. Fortunately, we don't have to worry about  
 25 that.

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1 A. Hopefully there aren't any left in.  
 2 Q. Of the 123 articles, papers and  
 3 presentations that you've identified, do any of them  
 4 deal with the impact of blasting on pipelines?  
 5 A. No. And the reason for that is it's been  
 6 done already.  
 7 Q. I wasn't asking. Just have you done a paper  
 8 with respect to the impact of blasting on pipelines?  
 9 A. No.  
 10 Q. Of the 98 pages or 97 pages that we have  
 11 with respect to your Power Point presentation, is  
 12 there anything in here that would reflect any type of  
 13 test or analysis that you've done relative to the  
 14 actual pipes in the ground or the type of pipes in  
 15 the ground that service the sewer district?  
 16 A. No.  
 17 Q. I think you've said this, but your expertise  
 18 is in blasting, correct?  
 19 A. Correct.  
 20 Q. You are not suggesting that you have any  
 21 expertise with respect to the fabrication of either  
 22 ductile or PVC pipe, are you?  
 23 A. That's not my specialty.  
 24 Q. And you're not suggesting that it's your  
 25 specialty with respect to the installation of either

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1 ductile or PVC pipe; is that correct?  
 2 A. That's correct.  
 3 Q. Your opinion -- now I'm looking -- let's  
 4 sort of start at the end and work our way back. The  
 5 opinions that you've given -- and I'm looking at  
 6 those contained on Page 96 of your Power Point  
 7 PRESENTATION, Applicant's Exhibit 8. The first  
 8 bullet point indicates, "Blasting for the development  
 9 of the proposed quarry is compatible with the buried  
 10 pipelines on the easement crossing the Magruder  
 11 property," correct?  
 12 A. That's correct.  
 13 Q. To get to that conclusion, assume there are  
 14 two things that we need to know. One is blasting  
 15 information, which I think you have provided us;  
 16 isn't that correct?  
 17 A. Yes.  
 18 Q. The second would be I need to know about the  
 19 pipe that's in the ground to determine whether or not  
 20 the blasting you're proposing is compatible with the  
 21 pipe that's in the ground; isn't that correct?  
 22 A. To a certain degree.  
 23 Q. Now, relative to the blasting itself, you've  
 24 told us about seismic activity and vibration and peak  
 25 particle velocity, which I want to ask you about in a

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1 little bit, but I want to ask you, in terms of the  
 2 pipe itself, when asked about PVC pipe, I believe  
 3 that you indicated your experience relates to the  
 4 installation of a pond that you have at your home or  
 5 an older home; is that correct?  
 6 A. Yeah. That's the PVC sewer pipe, correct.  
 7 Q. And with respect to the ductile pipe, do you  
 8 have any experience with respect to installation of  
 9 ductile pipe?  
 10 A. Not to the installation itself with ductile  
 11 pipe; however, it is ductile.  
 12 Q. Now, relative to the process of pipe  
 13 installation itself, you never worked or have any  
 14 work experience in the actual installation of  
 15 underground utilities such as those that service the  
 16 sewer plant, correct?  
 17 A. That's correct.  
 18 Q. Relative to the installation of this pipe,  
 19 or any pipe for that matter, you've indicated that  
 20 your familiarity with the geology at least on this  
 21 site relates to what you physically observed on the  
 22 topography; is that correct?  
 23 A. That's correct.  
 24 Q. Do you have any information at all as to  
 25 what the actual bedding material was used in this

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1 particular project?  
 2 A. No. I saw a specification, but I don't  
 3 believe I remember what was exactly on it.  
 4 Q. Do you have any information relative to the  
 5 compaction density that was used?  
 6 A. I believe it said on the specification  
 7 90 percent.  
 8 Q. I want to ask you about that. Relative to  
 9 the installation of pipes such as that which services  
 10 the sewer plant, the process by which that is going  
 11 to happen is going to be, first, a trench is going to  
 12 have to be excavated; is that right?  
 13 A. That's correct.  
 14 Q. And that trench is going to be of a certain  
 15 width and certain depth, correct?  
 16 A. Correct.  
 17 Q. Do you have any knowledge of what either the  
 18 width or the depth of this trench is?  
 19 A. I had a look at the actual specs. I can't  
 20 remember exactly what they said at the moment, but I  
 21 was not there at the time that was excavated.  
 22 Q. And I'm not suggesting you were, and I think  
 23 we all understand that you weren't there and you  
 24 certainly didn't participate in the installation of  
 25 this pipe. I'll ask it this way: Have you seen any

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1 as-builts that will tell you the actual depth and  
 2 width of the trench that the pipe is located?  
 3 A. I don't believe any as-builts were provided.  
 4 Q. The answer would be you haven't seen any,  
 5 then, correct?  
 6 A. No, but they weren't provided.  
 7 Q. Now, with respect to the process of  
 8 installing a pipe such as those servicing the sewer  
 9 or the sewer treatment plant, the next step would be  
 10 the installation of the bedding itself; is that  
 11 correct?  
 12 A. Once you got the trench dug out, then you  
 13 put in the bedding material, then lay down the pipe.  
 14 Q. And the bedding material itself can be  
 15 pieces gravel of a specified size or it can be sand;  
 16 is that correct?  
 17 A. Yes. There's usually specifications,  
 18 depending on what the pipe is, okaying the maximum  
 19 size material that can be put in.  
 20 Q. And the reason there are specifications with  
 21 respect to the maximum size is that you don't want to  
 22 have a rock too large leaning up against that pipe;  
 23 isn't that correct?  
 24 A. That's correct.  
 25 Q. And the reason you don't want to do that is

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1 because over time a large rock, potentially a sharp  
 2 edge leaning against a pipe, can actually wear  
 3 through that pipe and cause a failure; isn't that  
 4 correct?  
 5 A. Well, the problem is actual settling. The  
 6 large rocks tend not to settle, whereas the other  
 7 material does and therefore it puts a point load on  
 8 the pipe.  
 9 Q. But isn't the concern that a large rock  
 10 leaning up against a pipe can actually cause a  
 11 failure of that pipe over time?  
 12 A. Yes.  
 13 Q. And the reason that can happen is because of  
 14 movement, different movement between the pipe and the  
 15 rock itself such that that rock is rubbing up against  
 16 the side of the pipe; isn't that correct?  
 17 A. You're trying to say that we are having an  
 18 abrasion issue here?  
 19 Q. No. I'm simply asking you in terms of the  
 20 installation of a pipe --  
 21 A. Well, it certainly wouldn't.  
 22 Q. -- that one of the concerns that you have --  
 23 A. It certainly wouldn't be rubbing.  
 24 Q. If I can finish the question.  
 25 A. Yes.

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1 Q. One of the concerns relative to installation  
 2 is that you don't want to have too large of a piece  
 3 of rock laying up against the pipe because one of the  
 4 things that can happen is the friction of that rock  
 5 rubbing back and forth across the pipe can cause a  
 6 failure, correct?  
 7 A. I would not know.  
 8 Q. You don't know?  
 9 A. I don't know.  
 10 Q. Have you ever looked at any of the Uni-Bell  
 11 specifications with respect to the installation of  
 12 PVC pipe?  
 13 A. No.  
 14 Q. Have you ever heard of Uni-Bell?  
 15 A. No.  
 16 Q. Throughout your report in multiple locations  
 17 you reference the resiliency of a PVC pipe and  
 18 ductile pipe, correct?  
 19 A. Correct.  
 20 Q. What do you mean by resiliency?  
 21 A. These pipelines are put in to last.  
 22 Q. I'm sorry?  
 23 A. These pipelines are put in to last and to  
 24 take a variety of situations.  
 25 Q. In fact, you were telling us about -- I

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1 think you used the term how your pipe actually bowed  
 2 to some extent, correct?  
 3 A. That's correct.  
 4 Q. So part of the resiliency that you're  
 5 telling us about is the ability of PVC pipe to  
 6 actually bend in some fashion, correct?  
 7 A. Yes.  
 8 Q. Have you run any type of fatigue analysis  
 9 with respect to the pipe that's actually in place on  
 10 this project?  
 11 A. No.  
 12 Q. Are you familiar with a process known as  
 13 Vincent's method for testing fatigue failure within  
 14 PVC pipe?  
 15 A. I'm not familiar with any method to measure  
 16 failure in PVC pipe.  
 17 Q. Have you ever heard of Mosier's method of  
 18 testing PVC pipe failure or fatigue?  
 19 A. No.  
 20 Q. Have you ever reviewed any of the ASTM  
 21 standards with respect to PVC pipe failure or  
 22 resiliency?  
 23 A. No.  
 24 Q. You've talked about bowing. Are you  
 25 familiar with the percentage of deflection that PVC

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1 pipe is capable of before it will experience failure?  
 2 A. No, but I've seen it deflect quite a lot.  
 3 Q. I understand that, but do you realize that  
 4 there is an industry standard as to the percentage of  
 5 acceptable deflection before you can experience  
 6 failure in that pipe?  
 7 A. That's correct.  
 8 Q. And do you know what that percentage is?  
 9 A. No, not offhand.  
 10 Q. Are you familiar with a concept known as  
 11 flexible conduit theory in PVC pipe?  
 12 A. No.  
 13 Q. There were questions asked, and I think you  
 14 provided some testimony with respect to loads on top  
 15 of the pipe. Do you recall that?  
 16 A. Yes.  
 17 Q. Have you done any calculations relative to  
 18 anticipated loads on this pipe?  
 19 A. No. I specifically said that it would be  
 20 the prerogative of getting somebody in experienced in  
 21 that matter to do the exact determination of what  
 22 needed to be done to bridge to go over such a  
 23 pipeline. And that's not within my area of  
 24 expertise.  
 25 Q. You did say that.

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1 A. Like I said, I'm a blasting guy, and that  
 2 would be for some -- for a civil engineer that  
 3 specializes in the area.  
 4 Q. I guess from what you're now testifying to  
 5 is originally I asked you about the two components of  
 6 your conclusion, one of which has to deal with the  
 7 blasting; the second, since you're talking about  
 8 compatibility of blasting to the pipe is we have to  
 9 have some understanding about the pipe that's in  
 10 place, correct?  
 11 A. To a certain degree.  
 12 Q. And your testimony is, really to determine  
 13 whether or not this pipe is compatible with the  
 14 blasting that is expected, I really should be asking  
 15 these pipe questions to a pipe expert; is that  
 16 correct?  
 17 A. Not as far as the blasting is concerned,  
 18 because the pipe expert would not have any idea of  
 19 blasting.  
 20 Q. I understand that.  
 21 A. For blasting what we work in in the  
 22 industry, people work around pipelines every day.  
 23 There's a USBM study on blasting right up to  
 24 pipelines, and they significantly show that this is  
 25 not blasting -- blasting is not a problem.

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1 Q. You've testified that you have no expertise  
 2 in these various questions I've asked you relative to  
 3 pipe, correct?  
 4 A. Yes.  
 5 Q. You've provided a conclusion blasting for  
 6 the development of the proposed quarry is compatible  
 7 with the buried pipelines on the easement crossing  
 8 the Magruder property. Now, what you've just  
 9 testified to, the fact that you are not an expert in  
 10 pipe, would suggest to me that I should ask you  
 11 questions relative to blasting and I should ask a  
 12 pipe expert those questions that I just asked you to  
 13 determine whether or not, in fact, this pipe is  
 14 compatible with blasting. Isn't that correct?  
 15 A. No, that's not correct, because a pipe  
 16 expert would not have the blasting expertise.  
 17 Q. I understand. You're providing that to us,  
 18 correct?  
 19 A. That's correct.  
 20 Q. And I need the pipe expert to provide to me  
 21 the information I need relative to the pipe and what  
 22 tolerances the pipe has, correct?  
 23 A. Okay. If you want to go to that detail.  
 24 However, we know in the blasting industry that  
 25 blasting next to pipelines is not a problem.

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1 Q. I'm not asking that. And this will go much  
 2 quicker if you simply listen to the question and  
 3 answer the one I'm asking. All I'm asking you -- and  
 4 I think we all know the answer -- you've now  
 5 indicated to me that you don't have the expertise to  
 6 answer the questions I'm asking relative to the pipe.  
 7 Are you telling me that I should be asking these  
 8 questions to a pipe expert?  
 9 A. If it's to the pipe per se, it's from a pipe  
 10 expert. If it's from blasting, then you can look at  
 11 a blasting expert. But I don't think you're going to  
 12 find anybody that's a pipe expert and a blasting  
 13 expert.  
 14 Q. Fair enough. Do you have any knowledge as  
 15 to what the width of the trench was at the time of  
 16 installation?  
 17 A. No, not exactly.  
 18 Q. Now, you were talking about 90 percent  
 19 compaction. You do understand that compaction  
 20 densities are used for the backfill and not the  
 21 bedding material, correct?  
 22 A. Under the specs? In other words, I thought  
 23 that it was for the...  
 24 Q. You do understand that compaction density,  
 25 when they're discussed within specifications, that is

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1 talking about the compaction density of the backfill  
 2 material and not the bedding material, correct?  
 3 A. I have no idea.  
 4 Q. Looking at Page 24 of the report, this is  
 5 identified as Comparison: Magruder and Amax,  
 6 correct?  
 7 A. That's correct.  
 8 Q. And Amax is a coal mine located someplace in  
 9 Indiana; is that correct?  
 10 A. That is correct. Amax is a company -- Amax  
 11 is a coal mining company. It's now changed names.  
 12 It was mergers and acquisitions. The name no longer  
 13 exists anymore.  
 14 Q. I understand, but at the time of the  
 15 analysis it was doing business under the name of  
 16 Amax?  
 17 A. Amax, yes. It had a number of mines.  
 18 Q. Have you done any comparison between the  
 19 geology located at this Amax location as compared to  
 20 the geology of the Magruder proposed site?  
 21 A. No, but it really doesn't matter about the  
 22 geology. The important thing is what the pipeline is  
 23 buried in.  
 24 Q. Did you have a copy of the blast plan that  
 25 was utilized at the Amax facility?

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1 A. I don't believe that was there, but I saw it  
 2 when it was presented at the conference. I was there  
 3 for a presentation.  
 4 Q. So you heard somebody talking about it?  
 5 A. That's right, Dave Siskand.  
 6 Q. Did you get a copy of it?  
 7 A. Yeah. I had a copy of the publication, and  
 8 later on it was published by the -- the whole thing  
 9 was published by the Bureau of Mines.  
 10 Q. Is a blast plan for the Amax coal mine the  
 11 same as the blast plan that you have prepared for  
 12 Magruder?  
 13 A. No, it isn't. The blast plan for the  
 14 Amax -- what was used in blasting at the Amax coal  
 15 mine was huge diameter holes with huge amounts of  
 16 explosives, which was actually closer than we plan to  
 17 come to the pipelines in this case.  
 18 Q. I'm only asking if they're the same.  
 19 A. Of course they're not the same.  
 20 Q. Are the blast patterns that were being  
 21 utilized with respect to the testing at Amax the same  
 22 as the --  
 23 A. No. These blast --  
 24 HEARING OFFICER: Let him finish his  
 25 question. Listen to the question he asks, let him

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1 finish and then answer the question.  
 2 Q. (By Mr. McGovern) Is the blast plan that  
 3 was utilized at Amax -- I'm sorry -- the blast  
 4 patterns utilized at Amax the same as the blast  
 5 patterns you've proposed for Magruder?  
 6 A. No. They were far in excess of what is  
 7 proposed for Magruder. It's night and day  
 8 difference. Those blast holes are huge, very, very  
 9 large amounts of explosives per hole, plus they  
 10 blasted a lot closer to the pipelines with no  
 11 problems whatsoever.  
 12 Q. Do you have any idea as to what type of  
 13 backfill was utilized for that pipe at the Amax  
 14 facility?  
 15 A. I can't remember.  
 16 Q. Any idea what bedding material was used?  
 17 A. From what I understand, it was standard  
 18 stuff that was used for putting down pipelines. And  
 19 that input was given by the pipeline industry.  
 20 Q. The standard stuff. What do you understand  
 21 to be the standard stuff used for bedding?  
 22 A. Well, all the standard stuff, shall I amend  
 23 that to say the normal procedures. Okay? That was  
 24 overseen by the pipeline industry people.  
 25 Q. Do you have any idea the age of the pipe

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1 that was used at the Amax facility?  
 2 A. I think it was new, but they might have put  
 3 some old pipe in as well. I'm not sure. I would  
 4 have to have a read back to have look at it on the  
 5 details.  
 6 Q. The pipe was actually installed for the  
 7 purpose of performing this test, correct?  
 8 A. Yes, that's correct.  
 9 Q. And are you suggesting that they went out  
 10 someplace and found old pipe and put it into the  
 11 ground?  
 12 A. I'm not sure. I can't remember at this  
 13 point.  
 14 Q. At the very least, though, we know that the  
 15 connections as you've described them would have been  
 16 done or put in place sometime just prior to the test  
 17 being performed, correct?  
 18 A. That would have been -- yes. That would  
 19 have been done in standard procedure. I think the  
 20 blasting occurred over a six-month period.  
 21 Q. You say standard -- I'm sorry. When you say  
 22 standard procedure, do you understand and know what  
 23 the standard procedure is relative to the  
 24 installation and connection of PVC or ductile pipe?  
 25 A. No. The standard procedure that would have

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1 been done at the site would have been overseeing and  
 2 making sure that it was done to industry standards,  
 3 because the pipeline people were involved in this.  
 4 Q. I was simply asking if you know -- when you  
 5 say standard procedures, do you know what they are?  
 6 A. No.  
 7 Q. Do you know what type of pipe was utilized  
 8 for Amax?  
 9 A. It says in there in the paper -- I've got it  
 10 down here somewhere.  
 11 MR. BROWNLEE: Page 20, I believe.  
 12 A. I've got it now. Welded steel pipes ranging  
 13 in diameter from 6 to 20-inch.  
 14 Q. (By Mr. McGovern) So it was welded steel  
 15 pipe, correct?  
 16 A. Yes, that's correct.  
 17 Q. Now, PVC is obviously not steel, correct?  
 18 A. No. We had one 8-inch PVC water supply  
 19 pipe.  
 20 Q. How much?  
 21 A. One 8-inch PVC water supply pipe. These  
 22 were monitored for vibration, strain and internal  
 23 pressure for a period of six months.  
 24 Q. Do you understand there to be any  
 25 distinction between steel pipe and ductile pipe?

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1 A. Yes, there is some difference.  
 2 Q. And can you tell us what that is?  
 3 A. They're slightly different materials.  
 4 Q. And do you know as to whether or not the  
 5 either fatigue capability of ductile versus steel is  
 6 any different?  
 7 A. That's not my specialty.  
 8 Q. Do you have any knowledge as to the  
 9 deflection ability of ductile versus the steel?  
 10 A. That's not my specialty.  
 11 Q. You had testified earlier that you are -- I  
 12 think you used the term a chartered engineer in the  
 13 UK; is that correct?  
 14 A. That's correct.  
 15 Q. Does that license allow you to practice  
 16 engineering as a licensed engineer in the United  
 17 States?  
 18 A. No. It allows me to practice as a licensed  
 19 engineer in the UK, and the European one as a  
 20 licensed engineer all over Europe.  
 21 Q. So you don't have the ability to seal  
 22 documents in the United States; is that correct?  
 23 A. No. I've never bothered with that, that's  
 24 correct.  
 25 Q. And you've never undertaken any effort to

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1 receive a license in the state of Missouri that would  
 2 allow you to practice engineering; is that correct?  
 3 A. That is correct.  
 4 Q. I have just a few questions on the karst  
 5 geology. It's my understanding that a good portion  
 6 of southern Missouri is subject to karst geology. Do  
 7 you understand that to be correct?  
 8 A. A certain portion of it is -- it occurs in  
 9 certain places.  
 10 Q. And I understand your testimony in terms of  
 11 looking at the topography -- and of course if I see a  
 12 sink hole, that would be a pretty good indication of  
 13 karst geology, correct?  
 14 A. Yes.  
 15 Q. But if I look across the topography and I  
 16 don't see any depressions and I don't see any sink  
 17 holes, would you agree with me that the only other  
 18 way to determine if, in fact, it is karst geology is  
 19 to run some borings?  
 20 A. No. You just go -- simply go to local  
 21 exposures of the same rock types in close proximity,  
 22 and you can have a look at those and see if there are  
 23 any karst features there, such as road cuts, the  
 24 large face which is within 650 feet of the property  
 25 that's there at the sewage plant, having a look at

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1 the road cuts, the quarry across the river.  
 2 Q. Could you also look, for instance, for  
 3 situations in which somebody is drilling for a well  
 4 and they are hitting voids in the process of drilling  
 5 that well?  
 6 A. Yeah, that's a possibility.  
 7 Q. Are you aware that, in fact, has happened on  
 8 several of the properties adjacent to the quarry  
 9 location?  
 10 A. No.  
 11 Q. If you were aware of that, would that in any  
 12 way affect your opinion as to whether or not the  
 13 geology at the site is, in fact, karst?  
 14 MR. BROWNLEE: Your Honor, I'm going  
 15 to object. He's assuming -- asking questions on  
 16 facts that he's alleging occurred that aren't in  
 17 evidence.  
 18 HEARING OFFICER: Sustained.  
 19 MR. BROWNLEE: I mean, this -- he  
 20 could be just making this up and getting a no  
 21 response.  
 22 MR. MCGOVERN: That wasn't the  
 23 question.  
 24 MR. BROWNLEE: It's not a proper  
 25 question.

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1 MR. MCGOVERN: The question was, if,  
 2 in fact, he knew that properties surrounding had  
 3 voids relative to drilling of wells, would that  
 4 affect his opinion.  
 5 HEARING OFFICER: And he responded to  
 6 that.  
 7 MR. MCGOVERN: I didn't hear it.  
 8 HEARING OFFICER: I thought he did.  
 9 I'm sorry. It is assuming facts that are not in  
 10 evidence. That's clear. You have a response to the  
 11 question.  
 12 MR. MCGOVERN: I'll ask it again.  
 13 DR. WORSEY: Okay.  
 14 Q. (By Mr. McGovern) You've testified already  
 15 that some of the things that you looked for to  
 16 determine whether or not the geology on the Magruder  
 17 site was karst were some of the outcroppings, some of  
 18 the road cuts, and that's what you looked for. And  
 19 you didn't see anything that would suggest karst,  
 20 correct?  
 21 A. That's correct.  
 22 Q. All I'm asking you is, if you were aware and  
 23 you knew that individuals on surrounding parcels when  
 24 drilling for wells had hit voids, would that in any  
 25 way affect your opinion as to whether or not this

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1 particular site is, in fact, karst geology?  
 2 A. It depends on the size of the void. It's  
 3 typical many times in limestone to hit some voids,  
 4 especially smaller voids. It depends on the size of  
 5 the voids that were hit. You know, Mr. Dressler's  
 6 report said this is karst topography. It's not  
 7 typical karst topography. I did not see a single  
 8 typical karst topography feature on the quarry site  
 9 or looking at what was available around it.  
 10 Q. And was the extent of your investigation  
 11 looking for indications of karst geology from the  
 12 topography?  
 13 A. Yes, and looking at road cuts, et cetera.  
 14 Q. I understand. I don't mean to discount  
 15 that. Did you do any type of borings or drilling on  
 16 the site?  
 17 A. No, I've not done any borings or drillings  
 18 on the site.  
 19 Q. Are you aware that -- I'm sorry?  
 20 A. I wouldn't be surprised if you found an  
 21 occasional horizon where there are some small holes.  
 22 That's normal when we -- it's very normal when we  
 23 drill and blast in quarries in Missouri, because most  
 24 of the quarries are in limestone. And some quarries  
 25 you find absolutely nothing, in other quarries you

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1 find a lot of features. Some places there's  
 2 absolutely nothing, in other places there's a lot.  
 3 Q. And isn't it correct we really won't know as  
 4 to whether or not the geology on that site is karst  
 5 until you actually begin the excavation process? Is  
 6 that correct?  
 7 A. It's very highly unlikely that it's going to  
 8 be karst.  
 9 Q. And that certainly leaves the possibility  
 10 that based upon the region in which it's located it  
 11 could be, correct?  
 12 A. There is a slight possibility, but looking  
 13 at the surface and looking at the site and having a  
 14 look at road cuts and other exposure in the general  
 15 area close by, I can't come to the conclusion at all  
 16 that it's karst.  
 17 Q. I want to ask you some questions now with  
 18 respect to the estimate of 300,000 tons per year to  
 19 be processed through the plant. Okay?  
 20 A. Uh-huh.  
 21 Q. Yes? You're familiar with your testimony on  
 22 that?  
 23 A. Yes.  
 24 Q. And that testimony is simply based upon  
 25 information --

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1 A. No.  
 2 Q. -- provided to you by Mr. Magruder; is that  
 3 correct?  
 4 A. That's correct.  
 5 Q. And I think you just testified a moment ago  
 6 that you don't know what equipment is going to  
 7 actually be utilized on this particular site; is that  
 8 correct?  
 9 A. That's correct, except a 4-inch drill is  
 10 going to be used.  
 11 Q. Do you have any understanding as to what the  
 12 through put capacity will be for this particular  
 13 plant?  
 14 A. No.  
 15 Q. Do you know if 300,000 is the maximum  
 16 through put capacity for this plant?  
 17 A. No.  
 18 Q. When you've provided within your report  
 19 estimates that at 300,000 tons per year it will take  
 20 20 years to get over the hill or ten years to get to  
 21 the pipeline, is it fair to say that if that  
 22 production goes to 600,000 tons per year that they  
 23 will arrive at those different benchmarks in half the  
 24 time?  
 25 A. If the production rating is up, then

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1 obviously the excavation sequence will go faster and  
 2 the time line will be condensed. But still that  
 3 gives a very, very long time for those things to  
 4 occur. And also we're still going to have the same  
 5 amount of data. It's just going to be a compressed  
 6 time frame if that were to occur.  
 7 Q. And when you're testifying that it will  
 8 provide a long time for things to occur, are you  
 9 simply suggesting that any risk of problem or failure  
 10 of the system is going to be ten years out or  
 11 20 years out instead of sometime sooner if 300,000 is  
 12 maintained as production?  
 13 A. I'm sorry. I don't understand your question  
 14 as far as risk and failure.  
 15 Q. I'll ask it again. When you're saying it's  
 16 sometime out before anything would happen, what?  
 17 What are you referring to?  
 18 A. Until they finish excavating that area.  
 19 It's as simple as that. And then move on to the  
 20 next.  
 21 Q. You've also provided testimony with respect  
 22 to the protection afforded by the Missouri Blasting  
 23 Act, correct?  
 24 A. Yes, that's correct.  
 25 Q. And you've indicated that the Blasting Act

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1 protects the structures; is that correct?  
 2 A. It protects the sewage plant.  
 3 Q. And the residents and buildings. The Act  
 4 itself --  
 5 A. That's correct.  
 6 Q. I'm asking these questions --  
 7 A. It's there to protect sheet rock.  
 8 Q. And if, in fact, there is that damage done  
 9 to a surrounding structure, one which of course is  
 10 covered, is it your understanding that the operator  
 11 of the quarry or the coal mine, whatever it might be,  
 12 is responsible to repair that damage?  
 13 A. If it's caused by the blasting. A lot of --  
 14 Q. In fact --  
 15 A. I want to continue on that. A lot of the  
 16 times what we see is people making claims for things  
 17 that weren't blasting.  
 18 Q. I understand.  
 19 A. And it's been blamed on blasting. And I can  
 20 understand these people, because personally sometimes  
 21 blasting really scares them. It's the unknown, and a  
 22 lot of times blasting has been falsely accused of  
 23 causing damage that has been caused by something  
 24 else.  
 25 As an example, I'd like to give you a

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1 straight-up, that during the -- talking about Sunrise  
 2 Beach, I have no real knowledge of Sunrise Beach  
 3 whatsoever; however, I can tell you that in the  
 4 period that has been presented in these proceedings,  
 5 during that period I had a new house built in Maries  
 6 County. It's about an hour's drive away. And during  
 7 that period I had cracks appear in my new house on  
 8 the garage floor, in the foundations and also on my  
 9 basement floor. And I can say without a doubt that  
 10 those cracks were not due to the blasting at Sunrise  
 11 Beach. Now, I can say without a doubt they were not  
 12 due to any other blasting that was done in the  
 13 neighborhood.  
 14 And not only my own personal house, the  
 15 new one, but the old one as well had cracks in it  
 16 which were due to other factors. Okay? And all I  
 17 can say is if there had been a quarry next -- nearby,  
 18 that could have easily been blamed on blasting. I  
 19 know for a fact those things were not. Okay? Houses  
 20 crack up, concrete cracks due to natural causes. You  
 21 can ask virtually any contractor and they'll tell  
 22 you, concrete cracks in houses and things like that.  
 23 Q. In fact, it's supposed to?  
 24 A. It's not made to be thick structure. No,  
 25 it's not thick. When you just put in a few inches of

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1 concrete for a pad or you put in an 8-inch wall and  
 2 then the flimsy reinforcing in it, you know, it's to  
 3 be expected to slightly crack.  
 4 Q. You do understand that concrete on a  
 5 basement floor is supposed to crack, it's supposed to  
 6 because they run zip lines through that concrete,  
 7 correct? Do you know that term?  
 8 A. Well, you look at any house and you'll have  
 9 problems in basement floors and garage floors, they  
 10 aren't straight lines.  
 11 Q. Do you understand they are actually  
 12 constructed in such a way that they're supposed to  
 13 crack?  
 14 A. Well, they have irregular cracks in them  
 15 when you do. I've gone and had a look at a lot of  
 16 houses, and garage floors have irregular cracks in  
 17 them. I can't think of any reason why somebody would  
 18 make something to get an irregular crack.  
 19 Q. That's not what I'm asking. Do you  
 20 understand that concrete floors either in garages or  
 21 in basements are designed to crack?  
 22 A. No, not by the people that put them in  
 23 there. They just crack by themselves.  
 24 Q. Have you ever heard of the concept of zip  
 25 lines within concrete floors?

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1 A. I have --

2 Q. I'm asking if you've ever heard the term zip

3 lines with regard to a concrete floor.

4 A. No.

5 Q. You testified earlier to the vibrations that

6 are experienced from blasting, and you always

7 demonstrated it as back and forth; is that right?

8 A. That's correct.

9 Q. In fact, I think you described it as it goes

10 backwards and forwards and comes back to the point

11 where it began; is that right?

12 A. That's correct.

13 Q. And when you were asked questions about

14 displacement of soil and displacement of material,

15 your answer was, well, no, it doesn't displace

16 because it always comes back to the point of origin,

17 correct?

18 A. It's not a permanent displacement. It's

19 transient displacement.

20 Q. And so what I have from a blast is vibration

21 traveling through the ground that will cause a back

22 and forth type movement, but at least the material

23 you believe will end up back where it started; is

24 that correct?

25 A. It's not a backwards and forwards movement.

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1 It's a very, very small movement.

2 Q. Well, you used the term --

3 A. Hold up a piece of photocopy paper. What

4 you're doing, sir, is you're exaggerating hugely the

5 backwards and forwards movement, and that's what I'm

6 objecting to.

7 Q. And I certainly don't mean to suggest that

8 it's moving this much. I'll monitor my hand

9 movements. But the term you used, you said the

10 vibration is backwards and forward movement; is that

11 correct?

12 A. Side to side. That's my intent.

13 Q. You also testified that the material

14 utilized for the sewer line is stronger. It's PVC

15 pipe and it is ductile as compared to, I think you

16 said concrete and bricks. Is that your testimony?

17 A. I don't believe I said that.

18 Q. You don't recall that?

19 A. No. I said the mortar between bricks and

20 concrete blocks, I believe. The joints between those

21 bricks, the weak mortar layers, is what I'm talking

22 about.

23 Q. And the sewer treatment plant, the basins

24 themselves, do you know as to whether or not they are

25 one continuous formed piece of concrete, or are there

Page 288

1 any seams or joints in them?

2 A. No, but I don't think that's going to be a

3 problem. It's not my opinion that's going to be a

4 problem.

5 Q. Do you know if there are any seams in joints

6 within the construction of the basin containing all

7 the waste at the sewage treatment plant?

8 A. No. I have not seen the detailed designs.

9 Q. Within your report, again at Page 24, you

10 talk about pounds per delay, the 200 pounds. That

11 would be per hole, correct?

12 A. On the right-hand column I have there for

13 Magruder less than 200 pounds of ANFO for a 5-foot

14 hole. That's without decking. Or less than

15 300 pounds emulsion.

16 Q. That's per single hole, correct?

17 A. Per single hole, that's correct.

18 Q. And I think you've indicated to us that

19 you'll typically have three rows of nine holes,

20 approximately, or eight holes; is that correct?

21 A. That's correct.

22 Q. And so I'm going to have 1,600 pounds or

23 1,800 to 2,700 pounds of ANFO or emulsion total with

24 respect to a single, as you've described it, blast;

25 is that correct?

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1 A. A single blast, if we've got 10,000 ton of

2 rock, you can expect somewhere in the region of about

3 5,000 pounds of explosive distributed over the whole

4 blast, in all those holes.

5 Q. Somebody who hears that blast, do they hear

6 it as a series of repeat blasts or do they hear it as

7 what sounds like a single blast?

8 A. They generally hear it as a single blast;

9 however, in blasting occasionally from time to time

10 when the stemming is ejected, when it's not properly

11 done and ejected, then they will -- they might hear

12 it as two quick blasts.

13 Another thing is there's oftentimes echoes

14 and reflections from quarry walls. Speed of sound in

15 air is about 1,000 feet per second, so I can

16 understand very easily how somebody may confuse a

17 single blast for two blasts on occasion, a square

18 blind that were two separate blasts. Another thing

19 as well is that the air speed is a lot lower than the

20 ground speed. This is somewhat of a technical issue,

21 but ground vibrations arrive well before the sound.

22 What I teach in my courses is that you can roughly,

23 if you look at the vibration records afterwards from

24 the seismograph, you can look back and say

25 approximately within 10, 15 percent how far that

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1 blast was away from the structure by looking at the  
 2 difference in time of the first arrival of the blast  
 3 vibrations in the ground and the actual air blast.  
 4 Now, one of the problems here, as I said  
 5 before, is a lot of the energy in a blast -- that  
 6 comes from the air is by air movement, and that is at  
 7 low frequency and it acts like a subwoofer. So what  
 8 happens is people can very, very easily confuse the  
 9 air blast for actual ground movement, because their  
 10 body moves relative to the ground and they think it's  
 11 the actual ground moving. We've actually had one of  
 12 my old mine supervisors actually think a shot that we  
 13 shot caused the ground to move under his feet where  
 14 actually the explosive was not even attached to the  
 15 ground; it was an air blast. It was a suspended  
 16 charge.  
 17 Q. I'd like to move, if we could, Dr. Worsey,  
 18 on to the concept of peak particle velocity that you  
 19 testified to briefly earlier. Okay?  
 20 A. Yes.  
 21 Q. From your testimony and from the report, it  
 22 appears -- I've got two things that can effectively  
 23 result from blasting. One is going to be ground  
 24 vibration. The second is going to be air blasts.  
 25 Would you agree with that?

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1 A. Could you repeat that again, please?  
 2 Q. I've got two really side products of  
 3 blasting. One is ground vibration. The second would  
 4 be air blasts. Would you agree with that?  
 5 A. Yes. That's correct.  
 6 Q. From the standpoint of ground vibration,  
 7 peak particle velocity would be a process by which  
 8 you can try to determine what type and the extent of  
 9 vibration you have; is that correct?  
 10 A. That is the method used to measure blast  
 11 vibrations is using the geophone. And the reason  
 12 they use this is because seismographs are a --  
 13 basically a volt meter, a voltage recorder, and  
 14 historically the only thing they had apart from  
 15 accelerometers was geophones. And geophones, the  
 16 voltage output is proportional to velocity.  
 17 Q. And would you agree with me that the level  
 18 of vibration that is experienced from the blast is  
 19 going to depend on the amount of seismic energy?  
 20 A. It's dependent on a whole series of things.  
 21 One is the input; the second, the pounds per delay;  
 22 the geology involved; the material; site specific to  
 23 the monitoring location even.  
 24 Q. Would you agree with me that particle  
 25 velocity is probably the best means to determine

Page 292

1 blasting seismology?  
 2 A. It's the standard that we use in the  
 3 industry. A lot of people say if we had it any  
 4 different that we'd probably be doing it a little bit  
 5 differently.  
 6 Q. Now, you were asked questions regarding  
 7 scale distance. Do you recall that?  
 8 A. Yes.  
 9 Q. I'm going to read a statement to you just to  
 10 see if you agree with it. "The blaster uses the  
 11 relationship between the so-called scale distance,  
 12 i.e., charge weight distance relationship and  
 13 recorded particle velocities by doing a regression  
 14 analysis." Do you agree with that statement?  
 15 A. Yes.  
 16 Q. And what is a regression analysis?  
 17 A. This is something that we calculate for a --  
 18 a scale distance we calculate for a blast and  
 19 rhomboid scale it to one pound for various distances  
 20 and various sizes and so we can actually compare  
 21 them, and we use that as the standard of the scale  
 22 distance.  
 23 Q. And then -- I'm sorry. Is it something you  
 24 actually do on site once the blasting operations  
 25 begin?

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1 A. A regression analysis will be taking the  
 2 mean through it basically by putting a mathematical  
 3 regression. So instead of a one-dimensional mean  
 4 where for instance we had the height of the people in  
 5 this room, we would have the height of the people in  
 6 this room for an average, but we'd also have it for a  
 7 room in the Capitol building and maybe a room at  
 8 Columbia so there would be different positions, and  
 9 then we'd link all those means together.  
 10 Q. Would you need the actual data from the site  
 11 in order to perform the regression analysis?  
 12 A. Yes, to perform the regression analysis, but  
 13 usually what we're looking at with regression  
 14 analysis is for the means, for determining the means  
 15 of what happened. I don't personally think it's very  
 16 useful because it's doing the mean. There is a  
 17 certain amount of scatter, okay, and instead what  
 18 we're looking at is we're looking at the upper  
 19 limits.  
 20 Q. Would you also agree with the statement that  
 21 it also should be noted here that this kind of PPV  
 22 predictors are site specific and always to be updated  
 23 by including or by excluding certain shot records  
 24 into regression analysis which enables the blaster to  
 25 update site factors and to improve the confidence of

Page 294

1 prediction?

2 A. I've done it before. Basically, certain

3 ledges will give a little bit different in peak

4 particle velocities and scale distances you end up

5 with. And that's something I've done before.

6 Q. And that would be consistent with what

7 you've told us already, that it's important to be

8 able to amend and modify the blast plan based upon

9 the actual data that you receive from the site,

10 correct?

11 A. Yes. And we'll be using that for prediction

12 purposes.

13 Q. Correct.

14 A. But, however, I don't like using it as a

15 prediction to say, well, by the time we get there

16 we'll be okay. You continuously look at that and

17 say, how are we going, what levels are they -- the

18 vibration levels getting to? Based on that you'll

19 say, okay, I feel it's time to deck, for instance.

20 Q. I'm sorry. Time to deck? Okay.

21 A. I feel it's time to deck and I'm going to

22 deck to make sure that my vibration levels remain,

23 you know, to the levels that we're happy with.

24 Q. And when you've indicated that it is

25 important to continuously look at that, what you're

Page 295

1 talking about is the data that you are getting back

2 from the actual on-site operations; is that correct?

3 A. That's correct, yes.

4 Q. I think you referred to it earlier as the

5 empirical data; is that correct?

6 A. That's right. Empirical data is always the

7 best because it's actual measurements compared with

8 what it would theoretically be. With the site we're

9 looking at and starting, we should have a lot of

10 empirical data by the time we get anywhere near the

11 pipeline. And for the sewage plant, the distance,

12 it's really not a problem. I don't think Dyno is

13 really worried about it in any shape, mean or form,

14 but just to be safe, to make sure they can prove that

15 they keep within limits, they'll have probably their

16 own seismograph there to make sure.

17 Q. But just so we understand your use of the

18 term, the empirical data would be that information

19 you get back from the site based upon actual

20 operations; is that correct?

21 A. That's correct, yes.

22 Q. And that would include the seismograph

23 information and other data that you get back from the

24 site or Dyno may get back from the site as to what is

25 actually occurring?

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1 A. That's correct.

2 Q. From that information, you then will have a

3 better understanding or at least some knowledge of

4 peak particle velocity, correct?

5 A. No. On prediction of that.

6 Q. Yes.

7 A. Because we measure it as we go, but we have

8 a good idea of where it's going and some prediction.

9 And the more data we get, the better we are at

10 predicting. And the closer we get there, obviously

11 the better we are at prediction as well.

12 Q. And the converse of data may be theory or

13 conjecture as to what might happen, correct?

14 A. Yes, that's correct.

15 Q. And would you agree with me at least at this

16 point that the blast plan is comprised of your theory

17 and conjecture of what might happen?

18 A. I would say it's theory.

19 Q. Fair enough. Because the blast plan, at

20 least as we have it today, Applicant's Exhibit 7, I

21 believe, does not contain or is not based upon any

22 empirical data, correct?

23 A. Could you repeat that, please?

24 Q. Sure. The blast plan that you prepared,

25 Applicant's No. 7, is not based upon any actual

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1 empirical data which you would have received from

2 this site?

3 A. Not from the site, but, for instance, the

4 Siskand Z curve is based on data. The scale distance

5 of 55 for using the seismograph is based on a lot of

6 empirical data. Came from all over the place. I'm

7 sorry, but to me this is a really simple thing as far

8 as concerning blasting.

9 Q. I certainly appreciate that, Dr. Worsey, but

10 the issue that we're trying to deal with is whether

11 or not there's going to be impact on this particular

12 pipe. You do understand the concerns are that you

13 are providing an opinion relative to compatibility of

14 blasting and pipes with no expertise or knowledge as

15 to what the conditions of those pipes might be, the

16 flexion ability of that pipe, fatigue analysis of

17 that pipe or anything else. You do appreciate the

18 concerns, don't you?

19 A. Well, I appreciate that you're concerned

20 about it, correct.

21 Q. Do you have any errors and omissions

22 insurance with respect to performing engineering

23 services on behalf of clients?

24 A. No.

25 Q. Do you have any type of an agreement with

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1 Magruder which provides any type of limitation of  
 2 liability?  
 3 A. No.  
 4 Q. Any type of disclaimer agreement, whether  
 5 written or verbal --  
 6 A. No.  
 7 Q. -- relative to the services you're  
 8 performing?  
 9 A. No.  
 10 Q. Within the Power Point there's an indication  
 11 that this site is an ideal site. Is that what you're  
 12 suggesting?  
 13 A. This is an ideal location for a quarry, from  
 14 what I've seen.  
 15 Q. Assuming everything else being equal, is the  
 16 site more ideal if these pipes weren't running  
 17 through the center of it or less ideal?  
 18 A. It would be more ideal because we wouldn't  
 19 have to take them into consideration and have to have  
 20 this meeting here today where you're discussing the  
 21 pipes. This is a lot of effort put in by Magruder,  
 22 by -- put in by Dyno, put in by myself. And, yeah, I  
 23 understand I'm being compensated for it, but  
 24 obviously it would have been a lot easier if those  
 25 pipes weren't there because we wouldn't be having

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1 this conversation.  
 2 Q. And I appreciate that. And the conversation  
 3 we're obviously having is there has to be safeguards  
 4 put in place to ensure these pipes don't fail; is  
 5 that correct?  
 6 A. I don't really see this as a problem, these  
 7 pipes -- having a failure of the pipes due to  
 8 blasting.  
 9 Q. You've told us about this piece of pipe that  
 10 you saw lying in the creek bed, correct?  
 11 A. Yes.  
 12 Q. And that was not a functioning pipe. It was  
 13 simply an isolated piece located in the creek; is  
 14 that right?  
 15 A. That's correct.  
 16 Q. We all know the answer to this question, but  
 17 you haven't dug up any portion of the pipe which is  
 18 actually in place servicing the sewage treatment  
 19 plant, have you?  
 20 A. No, I haven't.  
 21 Q. And as you sit here today, you have no idea  
 22 as to whether or not the ductile pipe has experienced  
 23 any brittle fractures, have you?  
 24 A. No.  
 25 Q. You have no idea as to whether or not PVC

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1 has reached a point of fatigue at either the joints  
 2 or in any of the center sections of the pipe, have  
 3 you?  
 4 A. Are you trying to indicate, intimate that  
 5 that pipe is in imminent danger of failing?  
 6 Q. No. I'm simply asking the question if you  
 7 have any knowledge whatsoever at all about the  
 8 condition of the pipe currently under the ground.  
 9 A. None whatsoever.  
 10 Q. I think you've indicated that buried pipe  
 11 can be damaged in one of two ways, one being  
 12 permanent movement of the ground, and the second  
 13 we've been talking about, transient wave propagation;  
 14 is that correct?  
 15 A. No. I don't think I said about the  
 16 transient wave propagation.  
 17 Q. I think you just referred to it as you've  
 18 got vibration. Would that be the same thing?  
 19 A. Yes, but they -- the Bureau reports  
 20 indicated that that isn't -- is not a problem. They  
 21 have to actually mine through them before they fail.  
 22 Q. And the buried -- permanent movement of the  
 23 ground would include the actual failing?  
 24 A. Well, if you mine through it, yes, that's a  
 25 permanent movement to the ground.

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1 Q. I'm not talking about mining through it.  
 2 A. Yeah, they took those pipes as failure  
 3 because they mined right through where the pipes  
 4 were. They actually blasted through the whole thing.  
 5 Q. Who are you referring to?  
 6 A. The Bureau of Mines in their report. So  
 7 that -- you know, that is not transient movement.  
 8 That is, yeah, permanent movement of the ground  
 9 there.  
 10 Q. All I was asking is, there are two ways in  
 11 which it can occur. One would be permanent movement  
 12 of the ground. Agreed?  
 13 A. Yes.  
 14 Q. The second would be through the vibration?  
 15 A. That would have to be extremely high levels,  
 16 from what's shown. We know already in the industry  
 17 what's in the Bureau of U.S. Mines report.  
 18 Q. I'm not sure if I understood your answer to  
 19 this question. Are you aware of any quarries in  
 20 which there are pipelines such as those located by  
 21 the water treatment plant running through the center  
 22 of a rock quarry?  
 23 MR. MAUER: Sewer treatment plant.  
 24 MR. MCGOVERN: What did I say?  
 25 MR. MAUER: Water.

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1 A. Sewage treatment. I can't think of any off  
 2 the top of my head. I know a number of mines have  
 3 actually had to move pipelines because they've mined  
 4 through areas.  
 5 Q. (By Mr. McGovern) Why don't we go back to  
 6 where we started and I can conclude with my  
 7 questions. On Page 96, the second opinion that you  
 8 have provided -- the second bullet point, not second  
 9 opinion -- on that page, "The presence of the  
 10 pipelines may, however, require the modification of  
 11 blasting procedures when a quarry extends close to  
 12 the pipelines so that they remain unaffected." Do  
 13 you see that?  
 14 A. 96. Sorry. I'm just taking awhile to get  
 15 there. The second bullet?  
 16 Q. Yes.  
 17 A. Okay.  
 18 Q. You indicate here that "The presence of the  
 19 pipelines may, however, require the modification of  
 20 the blasting procedures when the quarry extends close  
 21 to the pipelines so that they remain unaffected." Do  
 22 you see that?  
 23 A. Yes.  
 24 Q. And the contingency that you are referring  
 25 to is that the blasting plan as currently in place

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1 could affect the pipes; isn't that correct?  
 2 A. We want to make sure we don't affect the  
 3 pipes. That is the point. I don't want to say, oh,  
 4 I have a factor of safety of 1.2 or 1.1 which  
 5 oftentimes is used in the mining industry. We want  
 6 to make sure, so therefore we want to maintain the  
 7 flexibility to make sure that we do not affect your  
 8 pipeline.  
 9 Q. In fact, you can't guarantee the integrity  
 10 of that pipeline until you're actually on site and  
 11 you have some of this empirical data to at least make  
 12 an educated guess on this, correct?  
 13 A. Well, if I'm sitting her today, we haven't  
 14 started mining operations, so we can't get the data,  
 15 can we? But as we continue with the mining  
 16 operations, we're going to do it in a fashion so that  
 17 we can do that.  
 18 MR. MCGOVERN: I have nothing  
 19 further.  
 20 HEARING OFFICER: Mr. Duggan, do you  
 21 have questions of the witness?  
 22 MR. DUGGAN: I do have a few.  
 23 EXAMINATION  
 24 QUESTIONS BY MR. DUGGAN:  
 25 Q. Dr. Worsey, I represent Larry Coen who's

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1 sitting next to me. He is the Staff Director for the  
 2 Land Reclamation Commission, and he has made a  
 3 preliminary recommendation that this permit be  
 4 granted, and the Commission asked -- decided to have  
 5 a hearing to determine whether this permit, if  
 6 granted, will unduly impair any person's health,  
 7 safety or livelihood. Okay? So what I would like to  
 8 do with my few questions is to help the Commission  
 9 get at that issue. And obviously you're here to talk  
 10 about what threat, if any, blasting at this quarry  
 11 poses to the sewer pipelines that run through this  
 12 quarry and the plant adjacent to the quarry. Okay?  
 13 Now, you have seen the Dressler report?  
 14 A. Yes, I have.  
 15 Q. And it is -- is it fair to say it's a  
 16 critique of your blasting plan?  
 17 A. Correct.  
 18 Q. Now, the Commission is confronted between  
 19 your blasting plan and this critique with two  
 20 different numbers.  
 21 A. That's correct. And I can explain that for  
 22 you.  
 23 Q. I would appreciate it if you would do that.  
 24 And let me -- let me first ask a couple of  
 25 preliminary questions. The Dressler report presents

Page 305

1 basically two numbers which it says is the distance  
 2 you have to maintain from an uncontrolled structure  
 3 depending on whether it's a dry or wet hole design,  
 4 correct?  
 5 A. It has to be taken in context.  
 6 Q. Well, that's what I'm going to get at. So  
 7 the Dressler report says you have to stay 766 feet  
 8 away from an uncontrolled structure.  
 9 A. Okay. If --  
 10 Q. If it's a dry hole design; is that right?  
 11 A. And --  
 12 Q. Is that right? Is that what they're saying  
 13 here?  
 14 A. That's what it says.  
 15 Q. Okay. Now, they used a formula to get to  
 16 that 766?  
 17 A. Yes.  
 18 Q. What is this formula about?  
 19 A. The formula is the scale distance formula,  
 20 and it uses a scale distance of 55.  
 21 Q. Where did they get the 55?  
 22 A. The 55 is in the State regulations. And  
 23 where Mr. Dressler's report is wrong is that this is  
 24 the scale distance at which you determine whether you  
 25 have to use a blasting seismograph or not.

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1 Q. Okay.  
 2 A. Okay? If you have a scale distance of over  
 3 55, then you're not required under the statute to use  
 4 a seismograph. This is the same -- under the same  
 5 type of operation that OSM regulations would be out  
 6 to 500 feet -- I'm sorry -- 5,000 feet, from 301 to  
 7 5,000 feet. The Missouri regulations are simplified.  
 8 We don't have huge coal mines in Missouri with 15,  
 9 16, 17-inch holes. Okay? And as I say, the biggest  
 10 one I've shot at a coal mine is 15 and a quarter.  
 11 And that's a big hole. You have to be careful you  
 12 don't fall down them, it's that big.  
 13 And the other one, the 50 under OSM, is  
 14 for close-in work. Well, to make things simple, we  
 15 don't have huge coal mines, we don't need to use  
 16 three numbers. They use that middle one, which is  
 17 between the 301 to 5,000 feet, and that covers  
 18 quarries most adequately, and that's at which you're  
 19 guaranteed that there's not going to be any blast  
 20 damage whatsoever, okay, as far as ground vibrations  
 21 are concerned. And because of that, you're not  
 22 required to use a blasting seismograph.  
 23 Now, if you come closer, 55 or less,  
 24 you're required to use a blasting seismograph. Now,  
 25 as you get closer and closer to that one pound,

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1 obviously the vibration levels are going up. We come  
 2 up to the level of around about 20, scale distance  
 3 20, which is a lot closer to that one pound, and at  
 4 that point we're getting into the region where we're  
 5 going to exceed -- we have a probability there of  
 6 exceeding the limits.  
 7 Q. Okay.  
 8 A. So what Mr. Dressler has done is a very good  
 9 effect of a smoke screen, basically he's doing his  
 10 job very well for the other side, and has used the 55  
 11 out of the regulations, but it is used entirely out  
 12 of context. That says yes. How many feet does it  
 13 say there, sir?  
 14 Q. For a dry hole design with 194 pounds, which  
 15 is what your plan calls for?  
 16 A. That's correct.  
 17 Q. They calculate 766 feet.  
 18 A. Okay. If we are within 756 feet of the  
 19 sewage plant or somebody's house, we are required to  
 20 use a blasting seismograph. Now, let me put that  
 21 more into context. Dyno, okay, or the blaster in  
 22 charge is required to have a seismograph there at the  
 23 nearest structure.  
 24 Q. Okay.  
 25 A. That's the whole purpose of that.

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1 Q. Okay.  
 2 A. Okay? Now, most of the area within our  
 3 areas there are more than the number you've just  
 4 quoted in feet. Okay? Therefore it's not required  
 5 to do that. Now, I know for certain that Dyno is  
 6 going to put their seismograph there at the nearest  
 7 structure because they want to cover their heinie.  
 8 They -- no matter if they don't have to do it, they  
 9 want to have proof that they did it because that is  
 10 the reasonable thing to do.  
 11 Q. Okay.  
 12 A. All right? It's simply where we stand  
 13 there. And if you want to go for the emulsion hole,  
 14 it's the same. We'll have a little bit more  
 15 explosives, the distance is going to be somewhat  
 16 greater. And that means there's a region within that  
 17 quarry that they are required by law to use that  
 18 blasting seismograph. Now, it is our intent to have  
 19 a blasting seismograph positioned there to make sure,  
 20 because that is -- that is the right thing to do.  
 21 Q. And what Dressler has done, if I understand  
 22 what you just said correctly, they've taken the  
 23 number 766 feet for the dry hole design and they have  
 24 taken the number 930 feet for the wet hole design and  
 25 they have treated these as the closest safe distance

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1 you can get to an uncontrolled structure. Is that  
 2 how you read this?  
 3 A. That is correct, but what they have not said  
 4 is that's the safest distance you can get if you  
 5 don't use a blasting seismograph.  
 6 Q. Okay.  
 7 HEARING OFFICER: Excuse me.  
 8 Mr. Duggan, pardon me for interrupting. Are you  
 9 looking at the calculations shown on Page 5 of --  
 10 MR. DUGGAN: Page 4.  
 11 HEARING OFFICER: Page 4? Actually,  
 12 it is Page 4 of BP-23. I'm sorry.  
 13 MR. DUGGAN: Okay. I didn't have  
 14 that exhibit number.  
 15 HEARING OFFICER: It is numbered on  
 16 my copy in the upper corner as 5, but it is where the  
 17 calculation in the formula D(2) equals, correct?  
 18 MR. DUGGAN: Yes.  
 19 HEARING OFFICER: All right. I'm  
 20 sorry for the interruption, but I wanted the record  
 21 to reflect that we were on that page.  
 22 A. Page 5?  
 23 Q. (By Mr. Duggan) I have Page 4, numbered  
 24 Page 4 of the letter with the Dressler letterhead on  
 25 it.

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1 HEARING OFFICER: It's the one on  
 2 which the formulas appear.  
 3 A. If you'd like me to work the formulas on the  
 4 board, I can do so.  
 5 Q. (By Mr. Duggan) That won't be necessary.  
 6 Here's what I'm trying to get at: You have suggested  
 7 a safe distance of 150 feet from the pipeline itself  
 8 for purposes of your plan?  
 9 A. Uh-huh.  
 10 Q. And they are saying, oh, no, 150 feet isn't  
 11 safe enough; it has to be at least either 766 feet or  
 12 930 feet. How do you reconcile that disagreement?  
 13 A. Okay. The disagreement on this is based on  
 14 uncontrolled structures and what those structures --  
 15 whether they're surface or subsurface and the  
 16 material involved. Now, the Appendix B that is used  
 17 in the State regulations for seismic monitoring --  
 18 what I'm saying is if we get closer than 55 -- 55 or  
 19 closer, then we have to use a seismograph and then we  
 20 have to keep to the Appendix B graph which limits the  
 21 peak particle velocity versus frequency. This is a  
 22 rather complicated thing, but basically we have to  
 23 stay by law below the line for that. Now, that line  
 24 there is for surface on the controlled structures.  
 25 First, surface structures --

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1 Q. Let me stop you right there. Is that  
 2 number, 55, that line that you just described?  
 3 A. The line where you have to start using the  
 4 seismograph.  
 5 Q. Okay. Is that also -- does that define the  
 6 distance that you can get no closer than to the  
 7 uncontrolled structure?  
 8 A. No.  
 9 Q. Okay. That's what I'm trying to get at.  
 10 A. That's only where you have to use a  
 11 seismograph. And this is where Mr. Dressler has done  
 12 a very, very good job for his lawyers, because he's  
 13 put up a very adequate smoke screen there, okay, to  
 14 confuse people, because it's a very, very technical  
 15 issue, I'm afraid.  
 16 Q. Okay. If we assume for the sake of argument  
 17 that the pipe itself, the pipelines, should be  
 18 treated as part of an uncontrolled structure, just  
 19 assume that for the sake of argument because that's  
 20 the argument I understand Dressler is making here, if  
 21 it's attached to a building that has a -- that is  
 22 part of the sewer treatment plant, it is part of that  
 23 building and therefore it is an uncontrolled  
 24 structure, part of an uncontrolled structure. Okay?  
 25 Now, assuming just for the sake of argument that

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1 somebody agrees with that, the Land Reclamation  
 2 Commission is inclined to agree with that, would that  
 3 change your recommendation with respect to the  
 4 150-foot buffer?  
 5 A. No, because we have empirical data that says  
 6 that blasting is compatible with pipelines and that  
 7 pipelines are very resilient to blasting for the  
 8 reasons I've already said. They regulated limits for  
 9 the protection of people's homes to stop vibration  
 10 levels getting above where cosmetic damage starts to  
 11 occur. Now, these studies have been done by the U.S.  
 12 Bureau of Mines many times and others, okay, and in  
 13 other countries as well to show at what point  
 14 cosmetic damage starts to occur. Now, this is the  
 15 cracking of sheet rock, the pulling apart of joints  
 16 in sheet rock, et cetera. And this is very fragile  
 17 material compared with reinforced concrete, iron,  
 18 ductile iron, PVC, things like that.  
 19 Q. Okay. I just want to make sure I  
 20 understand, that your recommendation of a 150-foot  
 21 buffer for purposes of protecting that pipeline has  
 22 nothing to do with whether it is defined as an  
 23 uncontrolled structure or not under the Missouri  
 24 Blasting Safety Act?  
 25 A. That's correct.

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1 Q. Is that true?  
 2 A. Yes.  
 3 Q. The reason I asked that question, the  
 4 Commission might be inclined to approve a permit that  
 5 increases that buffer distance from 150 feet as far  
 6 out as let's say 1,000 feet, because that would  
 7 encompass both the 766-foot number Dressler came up  
 8 with and the 930-foot number that Dressler came up  
 9 with. Why would you not agree with that approach by  
 10 the Land Reclamation Commission?  
 11 A. The reason I would not agree with that  
 12 approach, because it would be far too restrictive,  
 13 unnecessarily restrictive, and would also preclude  
 14 the mining of significant amounts of reserves on that  
 15 property.  
 16 Q. Now, when you came up with 150 feet as a  
 17 safe buffer zone, you took into account to some  
 18 extent the economics of that to Magruder; is that  
 19 right?  
 20 A. Yes. And it's not worth them to take that  
 21 rock because the hillside is sloping down. The  
 22 closer and closer they get to the pipeline easement,  
 23 the less and less rock there is to take. And it  
 24 means very short blast holes as they get there, and  
 25 it just doesn't make sense to do it. They're not

1 making any money from it, and if you're not making  
 2 any money from it, there's not really a purpose in  
 3 doing it in the first place.  
 4 Q. And I want to make sure I understand that  
 5 answer. You're basically saying from a cost benefit  
 6 approach it becomes more expensive to blast that  
 7 close than the revenue you're going to realize from  
 8 the rock that you recover?  
 9 A. That's correct. It may be there, but that  
 10 doesn't mean to say that you have to mine it.  
 11 Q. Okay. Were you here this morning to hear  
 12 the testimony of the three witnesses about the  
 13 impacts of the Sunrise Beach quarry operation --  
 14 A. Yes, I was.  
 15 Q. -- on their properties?  
 16 A. Yes.  
 17 Q. I'm most interested in Ms. Joyce Sallach's  
 18 testimony. As I recall -- and I hope I get this  
 19 right -- she essentially testified that she was not  
 20 there for a certain day. When she returned after  
 21 that day, there was a broken pipe in her yard which  
 22 was connected between her well and her house and that  
 23 her neighbors told her that there had been a blast at  
 24 the Sunrise Beach quarry in her absence, and she drew  
 25 the conclusion that that blast broke that pipe. Now,

1 as a blasting expert, do you have enough information  
 2 from that testimony to even make a determination  
 3 whether the blasting could have caused the break in  
 4 that pipe?  
 5 A. It's highly unlikely that the blasting  
 6 created the breakage in that pipe simply for the  
 7 reason that the house is there right next to the pipe  
 8 and there are limits by which the blasting is  
 9 regulated to now since the summer of last year. It's  
 10 very highly unlikely.  
 11 Q. Are you saying that this law was in effect  
 12 last year when this incident occurred?  
 13 A. I'm saying the law went into effect... I'm  
 14 trying to think exactly when it was, but it was last  
 15 summer. It was signed into place at the end of  
 16 the -- well, the Governor had to sign it, and he was  
 17 a bit late in signing it, so it occurred mid summer,  
 18 probably, last year, the Governor signing it and  
 19 putting it into place.  
 20 Q. Okay.  
 21 A. And at that point we were bound by the  
 22 regulations.  
 23 Q. So let me make sure I understand this.  
 24 First of all, as an expert do you believe there could  
 25 have been a blast from that quarry -- forget the law

1 right now -- that was so substantial that it could  
 2 have damaged the pipe as she described it?  
 3 A. If there was, we would have expected a lot  
 4 of damage to the house. That's my answer.  
 5 Q. Okay.  
 6 A. Now, I'd like to add at this point that I  
 7 have myself had water pipes in the house go on two  
 8 occasions, and I didn't realize that I had a break  
 9 until I was -- had a very, very large amount of water  
 10 on my water meter. When you've got a well -- I have  
 11 a well at my new house because I'm out in the  
 12 countryside, and there's nothing wrong with having a  
 13 well, it's a great thing to have if you're on a well.  
 14 There's no meter on it, and the first indication I  
 15 had on my old house when I was connected to rural  
 16 water that something was wrong was there was an  
 17 unusually high meter reading and it had been leaking  
 18 for sometime. And I actually had problems two, three  
 19 occasions with that pipe. And I'm not sure exactly  
 20 why, but I could certainly say that it was not due to  
 21 any blasting.  
 22 Q. So based on the scenario she described in  
 23 her testimony, would you say more likely than not the  
 24 pipe broke because of a blast or more likely than not  
 25 it broke for some other reason?

1 A. It's more likely than not that it broke for  
 2 some other reason, because to do that damage, you  
 3 would expect to see some significant damage done to  
 4 the house if that was the case.  
 5 And I'd also like to put on that, you  
 6 know, contractors building things don't always do the  
 7 best jobs. And when somebody has a house inspected,  
 8 I was told by one of the St. Louis inspectors,  
 9 housing inspectors, said, Paul, when I inspect a  
 10 house, it has to meet minimum requirements, and that  
 11 would be the equivalent of you giving somebody a D in  
 12 one of your classes. That would be a pass.  
 13 MR. DUGGAN: I don't have any other  
 14 questions.  
 15 HEARING OFFICER: Mr. Brownlee, do  
 16 you have redirect?  
 17 MR. BROWNLEE: One question, I think.  
 18 EXAMINATION  
 19 QUESTIONS BY MR. BROWNLEE:  
 20 Q. On Page 14 of your presentation you  
 21 mentioned three main items of interest for  
 22 protection. I think Steve asked you why the -- or if  
 23 the Ameren line was included or something like that.  
 24 Do you see that, sir?  
 25 A. Yes.

1 Q. Is there a reason you did not -- that you  
2 omitted mention of the Ameren line at that point?

3 A. Well, in the industry we blast around power  
4 lines all the time and it's not a problem.

5 Q. It's a non-issue on this site?

6 A. Yeah. It's pretty much a non-issue. We  
7 take them into consideration, but it's not seen as a  
8 big issue. You can blast right up to them I've seen  
9 on many, many sites. And Dyno has blasted next to  
10 power lines in quarries and construction jobs many,  
11 many, many times.

12 Q. Well, we've had testimony on that.

13 MR. BROWNLEE: That's all I have.  
14 Thank you.

15 EXAMINATION

16 QUESTIONS BY HEARING OFFICER:

17 Q. Just to follow up on that before we go to  
18 recross, Dr. Worsey, within the areas of A, B and C  
19 on the mine -- of the blasting plan that you have  
20 drafted, is there an electrical transmission tower of  
21 Ameren UE's located on any of those that you recall?  
22 If you recall.

23 A. I'm recalling, but I think there is one, if  
24 I remember rightly. One on each hilltop, if I  
25 remember.

1 Q. Would that be within -- your recollection is  
2 it's one on each hilltop spanning across the Magruder  
3 property, correct?

4 A. Yes. That's correct.

5 Q. So one of those hilltops as far as plan  
6 areas A, B and C isn't located in those, is it?

7 A. The edge of the property is pretty much,  
8 from what I understand, to be the center line of the  
9 power lines.

10 Q. Okay.

11 A. And that is taken into respect. Their  
12 intention is to come back 50 feet off the power  
13 lines.

14 HEARING OFFICER: Recross, Mr. Mauer?

15 EXAMINATION

16 QUESTIONS BY MR. MAUER:

17 Q. Dr. Worsey, just a couple of things. I  
18 thought I heard you say that there were studies  
19 involving the impact of blasting on pipelines, and  
20 I've looked through your report and I only see one  
21 study, this one study that you've referenced on Page  
22 15 and 16 in your report. Have I missed something or  
23 is -- does your report simply make reference to this  
24 one study?

25 A. No. We make reference to this one study

1 because it was done by the U.S. Government.

2 Q. So, in fact, your report does rely upon and  
3 gives us information about one study?

4 A. This is the one that we use; however, there  
5 have been numerous other studies. If you want to  
6 look into them in detail, you should have a look at  
7 Louie Oriard's book on blast vibration and blasting.

8 Q. With respect to Mr. Dressler's report, he  
9 does believe that the pipeline should be considered  
10 an uncontrolled structure under the Act, right?  
11 Isn't that the way his report was written?

12 A. Yes. That's what he said.

13 Q. And you disagree with that?

14 A. Yes.

15 Q. But if -- do I understand it correctly that  
16 under your opinion whether it's considered a  
17 controlled structure or an uncontrolled structure is  
18 irrelevant for purposes of impact on the pipeline?

19 A. Yes.

20 Q. And then with respect to Sunrise Beach, you  
21 were asked about Ms. Sallach. Have you seen any  
22 reports about the actual blast that occurred on  
23 November 20th?

24 A. No.

25 Q. Are you aware that there are reports from

1 the Missouri Division of Fire Safety?

2 A. It's normal for the Missouri Division of  
3 Fire Safety to investigate if there's a complaint.

4 Q. Have you ever seen that --

5 A. Yes. That material becomes public record  
6 once they do so.

7 Q. Have you ever seen that report before?

8 A. No, I have not seen this report before.

9 Q. Have you made any effort to investigate any  
10 reports that may be on file regarding the activities  
11 of Magruder with the Missouri Department of Fire  
12 Safety?

13 A. No.

14 Q. Do you see the highlighted portion there on  
15 that report?

16 A. Yes.

17 Q. And according to the report, the  
18 determination is that it would have -- the blast  
19 would have exceeded the allowable limit; is that  
20 right?

21 A. I'd have to read the whole report in  
22 context.

23 Q. I understand, but is that what it says?

24 A. It says where you've highlighted "This would  
25 have temporarily exceeded the allowable chart wave,

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1 the actual scale distance."  
 2 Q. All I want to know, then, sir, is, before  
 3 rendering an opinion to Mr. Duggan's questions about  
 4 whether or not the pipeline might have been broken by  
 5 blasting, would you have wanted to review the reports  
 6 from the Missouri Division of Fire Safety and  
 7 whatever other reports might be available about that  
 8 blast?  
 9 A. No.  
 10 Q. Since you talked about Sunrise Beach, do you  
 11 remember the testimony of Mr. Bisogno this morning?  
 12 A. Yes.  
 13 Q. You talked about your own house having  
 14 cracks, your new house. Do you attribute those  
 15 cracks to settling of the foundation?  
 16 A. To shrinkage of the concrete itself and  
 17 other factors.  
 18 Q. Previously you told me about how settling  
 19 usually occurs and after a period of time it's done  
 20 or it's very small. Do you remember that testimony?  
 21 A. Yes. That's correct.  
 22 Q. Would you have expected this settling or  
 23 shrinkage of the concrete -- how long does that  
 24 usually take?  
 25 A. Well, concrete shrinking itself starts to

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1 occur fairly quickly; however, there are other  
 2 factors involved, such as the weather. We have dry  
 3 seasons and then we have wet seasons, and  
 4 specifically when we have clay materials, those  
 5 materials do move quite a lot. And we see quite a  
 6 lot of problems with this, and people talk about  
 7 expansive clays quite a lot.  
 8 Q. Let me just try it this way: With respect  
 9 to Mr. Bisogno's testimony, do you remember he said  
 10 the house was constructed in 1978 and he purchased it  
 11 in 2003?  
 12 A. That's correct.  
 13 Q. And his testimony was that in 2003 it passed  
 14 inspections. Do you remember that?  
 15 A. That's what he said.  
 16 Q. And it was only after the quarry started  
 17 blasting across the street that he experienced  
 18 failures in his foundation. Do you remember that  
 19 testimony?  
 20 A. Yes.  
 21 Q. Is there any other information that you  
 22 would need in order to render a similar opinion as  
 23 you did on Ms. Sallach's damage on whether or not the  
 24 damage that Mr. Bisogno testified to would be  
 25 attributable to blasting?

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1 A. Well, I'd have to look at his building to  
 2 see if there was anything there that would cause the  
 3 cracking. And I've been to a lot of structures and  
 4 looked at them. We take classes out and we look at  
 5 things that are natural defects and things that  
 6 happen and we look at specifically areas where there  
 7 hasn't been blasting, and we see very, very similar  
 8 things to what people claim when blasting occurs  
 9 nearby.  
 10 Q. So before you can render an opinion about  
 11 the damage experienced by Mr. Bisogno, you'd have to  
 12 go out and look at the property; is that right?  
 13 A. Yes, that's correct.  
 14 Q. Would you want to do the same thing for  
 15 Ms. Sallach and actually go out and look at the  
 16 property and look in her basement and see the cracks  
 17 that she described before rendering the opinion that  
 18 the blast didn't cause the water line to break?  
 19 A. I don't think there would be any real great  
 20 point in it.  
 21 MR. MAUER: Nothing further.  
 22 HEARING OFFICER: Mr. McGovern?  
 23 MR. MCGOVERN: Very briefly.  
 24  
 25

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1 EXAMINATION  
 2 QUESTIONS BY MR. MCGOVERN:  
 3 Q. Dr. Worsey, you've given us two examples of  
 4 your experience with respect to PVC pipe, one of  
 5 which had to do with a pond or a dam at your home,  
 6 and the second now has to do with a leak you  
 7 experienced in your water line, correct?  
 8 A. I'm not sure whether the water line was PVC.  
 9 Q. The leak that you --  
 10 A. I didn't take a sample of it and take it off  
 11 for analysis.  
 12 Q. The leak that you described for us, during  
 13 the period of time that you've indicated your meter  
 14 had gone up, were you still able to get water in the  
 15 house?  
 16 A. Yes.  
 17 Q. Did you look at Exhibit 55, which would be  
 18 part of the pipe that Ms. Sallach brought in? Have  
 19 you seen it?  
 20 A. Oh, the piece of plastic pipe?  
 21 Q. Yes.  
 22 HEARING OFFICER: It's 52, for the  
 23 record.  
 24 Q. (By Mr. McGovern) Exhibit 52?  
 25 A. It was placed on the desk in front of me.

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1 Q. Does that appear to be a break that would  
 2 allow the water to continue to flow into  
 3 Ms. Sallach's home?  
 4 A. Certainly the break could start to occur and  
 5 cause seepage before it broke the whole way.  
 6 Q. Ms. Sallach indicated that she first noticed  
 7 the water coming out when she got home, testified  
 8 that there wasn't any -- she wasn't aware of a leak  
 9 before that. Are you suggesting that this indicates  
 10 to you a leak that then became a total failure over  
 11 some period of time?  
 12 A. No.  
 13 Q. And your testimony with respect to the home,  
 14 I assume that you're suggesting that the proximity of  
 15 the pipe to the home, that the pipe would be  
 16 protected in some fashion because it would absorb  
 17 some of the blast. Is that your testimony?  
 18 A. No.  
 19 Q. Then what was the significance of the  
 20 proximity of the pipe to the home?  
 21 A. The significance of the proximity of the  
 22 pipe to the home is that the blasting vibration  
 23 levels that were being needed to compromise the pipe  
 24 would do significant damage to the home.  
 25 Q. And you're providing us this testimony

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1 despite the fact you have no expertise with respect  
 2 to the pipes at all; is that correct?  
 3 A. That's correct.  
 4 Q. And you're providing us this opinion despite  
 5 the fact that you have no knowledge whatsoever  
 6 relative to the condition of that pipe just before it  
 7 failed; is that right?  
 8 A. That's correct.  
 9 Q. With respect to Mr. Bisogno, you indicated,  
 10 "I would need to see what else is out there." Is  
 11 that what you said? With respect to the damage to  
 12 his home, you said, "I need to see what else is out  
 13 there?"  
 14 A. I don't believe I said what else, did I? I  
 15 said I'd have to take a look at what was out there.  
 16 Q. And are you referring to something other  
 17 than the quarry?  
 18 A. The house. And have a look at the  
 19 conditions. A lot of the houses I've looked on  
 20 before -- and of course I can't say relative to  
 21 Mr. Bisogno's house, but most of the houses I've been  
 22 to there are conditions there that have caused the  
 23 cracking and the damage, and it wasn't the blasting.  
 24 Q. What type of conditions have you seen in  
 25 other homes that has caused the damage consistent

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1 with the type described by Mr. Bisogno other than  
 2 from the blasting?  
 3 A. Certainly in -- and I'd have to have a look  
 4 at Mr. Bisogno's house in detail.  
 5 Q. I understand. You're telling us about other  
 6 houses. You said based upon your review of other  
 7 homes there have been conditions that existed that  
 8 you believed caused the damage. What are those  
 9 conditions?  
 10 A. One of the first ones that is most common I  
 11 see is when somebody excavates a basement, they  
 12 actually dig out the hillside and they take that  
 13 material and use it to fill, and then the house is  
 14 built partially on the fill material or walls or  
 15 sidewalks or whatever. And the material that's been  
 16 dug out is then fluffed up and it's a lot lighter.  
 17 It's uncompacted and then it has to be compacted.  
 18 Most occasions the people doing the construction  
 19 don't compact it, and this leads to undue stresses on  
 20 the structure because the area that was dug out is  
 21 already compacted and you get one -- the compacted  
 22 area -- the uncompacted area starts to go down, and  
 23 I've seen a lot of that. And that's one.  
 24 Other places I've seen quite large  
 25 expanses of concrete wall with clay packed up

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1 against -- directly against the concrete wall, and  
 2 what happens with the clay is that it takes on  
 3 moisture and it expands. And then in dry spells it  
 4 shrinks, and we get horrific amounts of movement of  
 5 clays due to dry and wet spells, particularly this  
 6 year we're having a very wet season which makes clays  
 7 expand and things move up.  
 8 Personally, over the last couple of years  
 9 and maybe a few more, the farm down in Rolla, we've  
 10 had drought conditions and this has caused the ground  
 11 to shrink and crack and things go down. And  
 12 typically if we were to have, for instance, a  
 13 concrete foundation and, for instance, somebody had a  
 14 front porch that was built separate to the house and  
 15 the foundation is not going down to the same level,  
 16 the porch wouldn't -- the concrete porch, the steps,  
 17 would move up and down relative to the house, also  
 18 move backwards and forwards from the house. And I've  
 19 seen some considerable movement due to this as well.  
 20 Also, the bowing of garage floors due to  
 21 the outside footings being on ground that was dried  
 22 out, so it actually shrunk, but the area in the  
 23 middle of the garage still remaining wet and  
 24 retaining more moisture and staying where it was. So  
 25 the outside went down and the middle stayed where it

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1 was and you could see bowing, in fact.  
 2 Q. This inadequate compaction you just  
 3 described for us, the first condition, that's  
 4 something that you would see in new construction,  
 5 correct?  
 6 A. Yes, but sometimes it appears later on --  
 7 Q. Would you expect to see it 20 years after  
 8 the house was built?  
 9 A. Not generally, no.  
 10 Q. You also indicated that you have the  
 11 expansion and contraction of clay?  
 12 A. Yes.  
 13 Q. That's something you would expect to see  
 14 early after the house was constructed, correct?  
 15 A. Well, it depends on the seasons and what it  
 16 is year to year. I'm being told we're having one of  
 17 the wettest years at the moment; however, I know  
 18 certainly for our area in the last few years we've  
 19 had some of the driest years on record. So it can  
 20 get extremely large differences from year to year.  
 21 Another thing -- and I know this is probably taking a  
 22 little bit of time, but on my old house --  
 23 Q. I simply asked a yes or no question, but go  
 24 ahead, if you want.  
 25 A. I had a bridge I built over a pipe. Okay?

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1 I put concrete and some reinforcing in, and we had a  
 2 particularly cold year and the frost level went down  
 3 way, way, way below what it normally went and caused  
 4 ice underneath it. It caused the upheaval of the pad  
 5 and the pipe and caused the cracking along the center  
 6 of the concrete. So, you know, these things occur.  
 7 Q. You don't know if any of these things  
 8 occurred in Mr. Bisogno's home, do you?  
 9 A. No. I couldn't tell without actually going  
 10 and having a look. That's important.  
 11 MR. MCGOVERN: Fair enough.  
 12 HEARING OFFICER: Any redirect?  
 13 Mr. Duggan?  
 14 MR. DUGGAN: No.  
 15 HEARING OFFICER: Dr. Worsey, thank  
 16 you for your testimony? We appreciate your patience,  
 17 you are excused. We need to take a short break, and  
 18 then we're going to have Mr. Mirabelli, correct?  
 19 MR. BROWNLEE: Yeah. We're checking  
 20 to see if he could come back. He's got to get back,  
 21 and it's been a long, long day.  
 22 HEARING OFFICER: That's fine with  
 23 me. We've got the 4th and 6th set out. We're off  
 24 the record, ten-minute recess.  
 25 (Brief recess.)

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1 HEARING OFFICER: We're back on the  
 2 record. We're going to adjourn the hearing until  
 3 9:00 on Wednesday, June 4th. That's our next  
 4 scheduled day. And we will be here. The remaining  
 5 two days of hearings, if we need both of them, will  
 6 be here in this room. We will take Mr. Mirabelli's  
 7 testimony then, and you have one more expert witness,  
 8 Mr. --  
 9 MR. BROWNLEE: Henderson.  
 10 HEARING OFFICER: Henderson.  
 11 MR. BROWNLEE: And Mr. Dressler.  
 12 HEARING OFFICER: And then we'll take  
 13 Mr. Dressler and then we'll have any rebuttal  
 14 witnesses that anybody feels they need to call at  
 15 that time. You all have put in a good day's work,  
 16 Ladies and Gentlemen, and with that, we are  
 17 adjourned. We're off the record.  
 18  
 19  
 20  
 21  
 22  
 23  
 24  
 25

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1 CERTIFICATE OF REPORTER  
 2  
 3  
 4 I, Judy K. Moore, Certified Court Reporter  
 5 within and for the State of Missouri, do hereby  
 6 certify that the hearing aforementioned was held at  
 7 the time and in the place previously described.  
 8  
 9 IN WITNESS WHEREOF, I have hereunto set my  
 10 hand and seal.  
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 Certified Court Reporter  
 within and for the State of  
 Missouri