TRANSCRIPT OF PROCEEDINGS BEFORE THE
STATE OFFICE OF ADMINISTRATIVE HEARINGS
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
AUSTIN, TEXAS

IN THE MATTER OF THE APPLICATION OF BFI WASTE SYSTEMS OF NORTH AMERICA, LLC) PROPOSED SOLID WASTE PERMIT AMENDMENT NO. 1447A) SOAH DOCKET NO. 582-08-2178) TCEQ DOCKET NO. 2007-1774-MSW

HEARING ON THE MERITS

THURSDAY, JANUARY 22, 2009

BE IT REMEMBERED THAT AT approximately 9:10 a.m., on Thursday, the 22nd day of January 2009, the above-entitled matter came on for hearing at the State Office of Administrative Hearings, 300 West 15th Street, Hearing Room 402, Austin, Texas, before WILLIAM NEWCHURCH, Administrative Law Judge; and the following proceedings were reported by Virginia L. Bunting, a Certified Shorthand Reporter of:
Volume 3 Pages 537 - 802

P R O C E E D I N G S
THURSDAY, JANUARY 22, 2009
(9:10 a.m.)

JUDGE NEWCHURCH: It's 11 minutes after 9:00 a.m. This is the continuation of hearing of 582-08-2178 concerning BFI. I think -- let's see. BFI is still presenting its direct case.

And, Mr. Carlson, are you ready to call your next witness?

MR. CARLSON: Yes, Your Honor. Applicant calls Gregg Adams.

JUDGE NEWCHURCH: Mr. Adams, if you will come forward, please. And you'll need to take the oath.

(Witness sworn)

JUDGE NEWCHURCH: Thank you. Please have a seat.

Mr. Carlson?

PRESENTATION ON BEHALF OF
BFI WASTE SYSTEMS OF NORTH AMERICA, INC.

GREGORY WADE ADAMS, P.E.,
having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. CARLSON:

Q Please state your full name.

A Gregory Wade Adams.

Q What is your business address, Mr. Adams?

A 1700 Robert Road, Mansfield, Texas.

Q What is your occupation, sir?

A I'm a civil engineer.

Q What did you do with respect to this particular application?

A I prepared portions of the Attachment 4, which would be the Geology and Geotechnical Report; I also prepared the Attachment 10, which is the Soil Liner and Quality Control Plan; and Attachment 12A, which would be the Final Cover Quality Control Plan.

Q Did you prepare any prefiled testimony for this hearing, sir?

A Yes, I did.

Q Will you look at a binder behind you and find Exhibit GA-1, please, sir?

A (Witness complies.)

I don't believe it's in here.

JUDGE NEWCHURCH: Off the record.

(Recess: 9:12 a.m. to 9:13 a.m.)

JUDGE NEWCHURCH: Back on the record.

Q (BY MR. CARLSON) Would you please take a quick look at Exhibit GA-1, please, sir?

A (Witness complies.)

Q Does that appear to be a true and correct copy

of your prefiled testimony?

A Yes, it is.

Q Okay. Has your resume been attached as an exhibit to that testimony, to that Exhibit GA-2?

A It's not in this notebook. It was in the other notebook.

Q But you did -- you recall doing that; is that correct?

A Yes.

Q Okay. Mr. Adams, do you have any changes or revisions or clarifications that you would like to make to either your prefiled testimony or to your resume at this point in time?

A Yes, I do.

Q What are they?

A On Page No. 6 of my prefiled.

Q What line?

A Line 6. I would like to change the word "once" to "twice."

Q And is that in the context of how many times you've testified before?

A Yes, sir. I have testified one additional time since I prepared this prefiled.

Q All right. Do you have any other changes or clarifications or revisions you would like to make?

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A I have a grammatical correction to make.
On Page 16, Line 7, the last of the line, it reads: "We pushed Shelby tubes cored," should insert the word "and" between "tubes" and "cored."
Q All right.
MR. CARLSON: And, Judge, I was proud of myself for being very organized and having printed off copies of those, and I can't find them. If I do, I will try to find a clean copy of them; otherwise, I would like to have the witness make those changes.
JUDGE NEWCHURCH: Why don't you just make them with a pen on the copy that you have in front of you, which is the official record copy.
THE WITNESS: (Complies.)
JUDGE NEWCHURCH: Mr. Carlson -- in fact, for all of the parties, we've been making sure that the record copy has all of the changes. There is an appellate copy. So traditionally counsel or perhaps their legal assistants will make sure those changes are made in the appellate copies.
MR. RENBARGER: We will do that, sir.
JUDGE NEWCHURCH: And you can coordinate that with the court reporter to make sure it's done.
MR. RENBARGER: Okay.
JUDGE NEWCHURCH: Okay.

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MR. BLACKBURN: If I may ask while we're in this interim period and the witness is quiet, could you repeat that last change, please, just so I can note it on my copy?
THE WITNESS: Sure.
MR. CARLSON: I believe it was Page 16, Line 16.
THE WITNESS: Page 16, Line 7. And insert the word "and" between the word "tubes" and "cored."
MR. RENBARGER: Okay. That's it?
THE WITNESS: That's it.
Q (BY MR. CARLSON) Do you have any other changes or clarifications to your prefiled, sir?
A No, sir.
Q Will you turn to Page 7 of your prefiled?
A Okay.
Q You testified what you did in connection with this application. You're sponsoring portions of the application; is that correct, sir?
A Yes, sir.
Q And those portions are reflected on Page 7?
A Yes.
Q Could you please read both the portion number and what are called Bates labels, the letters and numbers that say "APP" and have a number after them, please.

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A Part III, Attachment 4, Section 3, and Appendices 4E, 4F, 4G, and 4H. And that's APP 000444 to APP 000455, APP 000724 to APP 000824.
Part III, Attachment 10, APP 001156 to APP 001339.
And Part III, Attachment 12, Appendix 12A, APP 001426 to APP 0014847.
Q Is that everything?
A Yes, sir.
Q Mr. Adams, do you adopt your prefiled testimony as true and correct in the same manner as if you were providing that testimony live here today?
A Yes.
MR. CARLSON: At this point, Judge, we would offer both prefiled Testimony Exhibit GA-1, as well as the exhibits cited therein, GA-2 through GA-7.
JUDGE NEWCHURCH: And can I assume -- I don't recall with regard to Mr. Adams, but do they incorporate all prior rulings on any objections?
MR. CARLSON: My recollection is there were no objections.
JUDGE NEWCHURCH: Okay. So is there any further objection to Mr. Adams' prefiled or his resume or the portions of the application he sponsors?

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MR. RENBARGER: Nothing.
THE COURT: And those are all admitted.
(Exhibit BFI Nos. GA-1 through GA-7 admitted)
MR. CARLSON: And I pass the witness.
JUDGE NEWCHURCH: Cross-examination, Mr. Terrill?
MR. TERRILL: No questions, Your Honor.
JUDGE NEWCHURCH: Travis County?
MS. NOELKE: No questions.
JUDGE NEWCHURCH: Austin, Travis County?
MR. MORSE: No questions.
JUDGE NEWCHURCH: Ms. Mann?
CROSS-EXAMINATION
BY MS. MANN:
Q Good morning.
A Good morning.
Q My name is Christina Mann. I'm with the Public Interest Counsel with TCEQ. I just have a couple of broad questions to help me understand a little bit more.
What's the difference, if you could just give us a little narrative explanation, the difference between the pre-Subtitle D liner that's in place at the Sunset Farms Landfill and the post-Subtitle D liner that's in place?

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A The pre-Subtitle D liners mainly consist of three feet of compacted clay, and those will have then a foot of protective cover over them. And that's in there. On this one, I believe there may be some variances throughout the years.

The Subtitle D liners consist from bottom up, two feet of compacted clay, and it's compacted to have a permeability of less than one times 10 minus seven centimeters per second. And then there will be a 60-mL-thick high density polyethylene membrane liner, and then a geocomposite drainage layer, and then two feet of soil that we know is a protective cover layer.

Q And if you were -- if one were to design a liner -- obviously a post-Subtitle D liner for a set footprint such as the one we have at Sunset Farms, would you -- how would the liner design change depending on the height of the landfill?

In other words, you have a landfill permitted at approximately 720 feet right now; is that correct -- in height -- maximum height?

A Are we speaking elevation?

Q Yes. Yes.

A I believe it's in that neighborhood.

Q And, you know, we're here for a vertical

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expansion to 795 feet; is that correct?

A Yes, ma'am.

Q If you were designing a liner from the beginning for a 795-foot versus 720-foot elevated structure, would there be any difference in the structural design of that liner?

A No, ma'am.

Q Let's talk a little bit about the dewatering system that -- the temporary dewatering system that's at Sunset Farms. How does that work at Sunset Farms?

A Yes, ma'am. And first, let me tell you a little bit what it is intended to accomplish.

Q Okay.

A The dewatering system is designed to prevent the buildup of excessive hydrostatic forces on the bottom of the liner system. Hydrostatic forces is technically the force that is exerted by water. And so if we have -- if we have -- we talk mostly in terms of head, but that's basically the depth of the water. That translates to a force. And so to prevent the force from the water of exceeding the weight of the materials above it, because we don't want it to move, we have a temporary dewatering system.

Q And this is underneath the liner --

A Yes, ma'am.

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Q -- to prevent naturally occurring groundwater from pushing up on the liner?

A Yes, ma'am. And so this particular temporary dewatering system consists of a series of blanket drains on the side walls or on the side of the excavation, and then what we refer to as drains. That's just a -- it's a trench. And some of the earlier ones were filled with gravel. I think some of the lighter ones that we have designed have a composite drainage. It's almost like an elongated pipe. And the water is collected from the blanket drain from the side wall and from the drains -- and on some of the lighter cells in certain places, there's also drains interior. And these drains collect the water and transmit it to a sump, a place, a collection point, and it's pumped out. And this all lies beneath the liner system.

Q Does it -- is it the same dewatering system that lies under the entire Sunset Farms' footprint? In other words, both the post and pre-Subtitle D liner systems?

A I believe it's just in the Subtitle D.

Q Okay. So there's no -- y'all are not altering the green water -- or the groundwater drainage area under the pre-Subtitle D; it's just the three feet of clay?

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A Yeah. I mean, I wouldn't use the term altering the drainage area. What we're doing is that we are preventing buildup of excessive pressure.

Q Can you help me understand what a slip line is, as you mention now on Page 24 of your testimony, Line 23?

A Okay. In that context where I'm using motion applies to mean actually a plane that movement occurs across. In this case we're talking about if you were -- as a footing would sink or settle if it failed, there would be material from beneath it that would move laterally out from each side. And the plane that it moved along would be a slip line.

MS. MANN: I have no further questions. I pass the witness.

JUDGE NEWCHURCH: The Executive Director?

MR. SHEPHERD: The Executive Director passes.

JUDGE NEWCHURCH: TJFA?

CROSS-EXAMINATION

BY MR. RENBARGER:

Q Good morning, Mr. Adams. My name is Bob Renbarger appearing on behalf of TJFA.

As I understand your prefiled testimony, essentially you're covering a number of areas to include

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the liner and vinyl cover systems, right?
A Yes, sir.
Q Subsurface investigation at the site?
A In conjunction with Mike Snyder?
Q Unstable areas?
A Yes, sir.
Q Slope stability?
A Yes, sir.
Q And quality assurance for liner and final cover construction; is that right?
A Yes, sir.
Q Okay. Now, you're a registered professional engineer in the state of Texas, right?
A Yes.
Q In addition to your personal involvement in this application, you did rely on other experts, correct?
A Yes.
Q Would you please identify those?
A I relied on Mike Snyder, Adam Mehevec. Let's see. Greg Lewis and Ray Shull. And I also relied on work from previous geotechnical studies that were performed, but I don't know the individuals that were in charge of that work at that time.
Q Do you recall the firm name?

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A Raba-Kistner did quite a bit of the work.
Q What work of Mr. Mike Snyder did you rely upon in performance of your duties on this application?
A I relied on basically the work that he has sponsored and presented. And the boring logs would be an attachment or Appendix 4B.
Q Anything else?
A The geological cross-sections. I also used the results from the permeability test and the slug test that he had reported.
Q Anything further from Mr. Snyder?
A That's all I recall at this time.
Q Okay. How about Mr. Mehevec?
A I would rely on -- and when I say "Mr. Mehevec," of ACE Engineers as a group. Of course, I relied on the excavation and final contour plans they produced, the fill cross-sections. They also -- relied on the liner design and details, the leachate collection system design and details, and the final cover design and details.
Q Okay. I thought a moment ago you said you weren't going to speak to the issues of the liner and final cover systems. Did you just allocate different portions of those, as between ACE and yourself?
A No. They actually -- they performed the design

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of the liner final cover systems. I prepared the quality control plans.
Q Okay. So your work on those was limited to the quality control plans?
A Yes.
Q And when you refer to ACE, are you referring to Mr. Greg Lewis and Mr. Renfro as well?
A Yes.
Q But collectively that would be the work that you relied upon from ACE; is that right?
A Yes.
Q Were any of the engineers at ACE working under your supervision or control?
A No, I don't recall any work that it would be like that.
Q Okay. Mr. Adams, did you affix your professional engineering seal to any portions of the application?
A Yes, sir.
Q Do you have the application handy there by you?
A I'm sure I do.
MR. RENBARGER: Go off the record just a moment?
JUDGE NEWCHURCH: Off the record.
(Recess: 9:29 a.m. to 9:30 a.m.)

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Q (BY MR. RENBARGER) Do you have the application in front of you now?
A Yes, sir.
Q Okay. We're back on the record.
Could I direct your attention to Page 422 of the application?
A Yes, sir.
Q Do you see your professional engineering seal affixed to Page 422?
A No, sir.
Q You do not? You do not?
A 422?
Q Yes, sir.
MR. CARLSON: It should be the third page of the binder, Mr. Adams -- or thereabouts, the third, fourth, bottom right-hand corner.
A Oh, I apologize. I was reading the page numbers from the permit. Page 4/22.
Q (BY MR. RENBARGER) Okay. Excuse me. Very well. Page APP 000422.
A Yes, sir.
Q And your seal does appear on that page, correct?
A Yes, sir.
Q What was your intention in affixing your seal

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to Page 422 of the application?
A That was to denote that I had taken part in portions of this work.
Q You took part in portions of the work that is reflected in Attachment 4; is that right?
A Yes, sir.
Q Now, are you familiar with TCEQ's rules with regard to the sealing of applications in according with the Engineering Practices Act?
A Yes, sir.
Q Would you agree with me that rule 330.51(d) sets forth those requirements?
A I can take your word for it.
Q Let's don't take my word for it. Let me give you a copy of that rule.
Mr. Adams, I just handed you a copy of TCEQ's old rules in which this application was processed; is that right?
A Yes, sir.
Q If you will go halfway down the page, you will see the entry, small case "d," Preparation?
A Yes, sir.
Q Do you see that?
A Yes, sir.
Q And if you would, please just go ahead and read

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that into the record, that Paragraph (d) and the subpart below that, please.
A "Preparation of the application must conform with the Texas Civil Statutes, Texas Engineering Practice Act, Article 3271a and Texas Geoscience Practice Act, Article 3271b.
"The responsible engineer shall seal, sign, and date each sheet of the engineering plans, drawings, or title" -- "and the title or contents page of the application as required by the Texas Engineering Practice Act 15c, and in accordance with 22 TAC 131.166, relating to the engineers' seals."
Q Thank you.
Would you agree with me that the Engineering Practices Act requires professional engineers when they affix their seals to documents to delineate those portions of the work done by that engineer and delineate those portions of the work not completed by that engineer?
MR. CARLSON: Objection; calls for a legal conclusion.
JUDGE NEWCHURCH: Do you have a response?
MR. RENBARGER: Yes. This gentleman is a professional engineer. I assume he knows the rules and issues in which he practices, governing.

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JUDGE NEWCHURCH: He certainly should have some expertise. So I assume you're offering it for the limited purpose of showing his understanding as preparatory to other questions, rather than as a final legal conclusion?
MR. RENBARGER: Certainly not a legal conclusion, Judge.
JUDGE NEWCHURCH: So for that limited purpose, I will allow the question and overrule the objection.
Q (BY MR. RENBARGER) Again, what is your understanding of the requirements for a professional engineer with regard to delineating work performed under seal?
A That it should be obvious what parts of the work the engineer is providing the seal for.
MR. RENBARGER: May I approach, Judge?
JUDGE NEWCHURCH: Yes, sir.
Q (BY MR. RENBARGER) Okay. Mr. Adams, I just handed you a document. Will you identify for the record what that is, please?
A Texas Administrative Code, Title 22 Part 6, Chapter 137, Subchapter B, Rule 137.33.
Q And what is the indication for that to the right of Rule 137.33, please?

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A Sealing Procedures.
Q Okay. Do you understand these to be the procedures that are required of you as a professional engineer?
A Yes, sir, that's what they appear to be.
Q Can I ask you to flip over to the second page of that document, please?
A (Witness complies.)
Q Are you with me now?
A Yes, sir.
Q At the top of the page, there's a Subpart (g). Do you see that?
A Yes, sir.
Q Would you mind reading that into the record, please?
A "Work performed by more than one license holder shall be sealed in a manner such that all engineering can be clearly attributed to the responsible license holder or license holders. When sealing plans or documents on which two or more license holders have worked, the seal and signature of each license holder shall be placed on the plan or document with a notation describing the work done under each license holder's responsible charge."
Q Thank you. Going back to Page 422 of the

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application, do you see a seal there for Mr. Gregory Adams, as well as a seal there for Mr. Michael Snyder?
A Yes, I do.
Q Mr. Michael Snyder is not an engineer, correct?
A Correct.
Q But Mr. Michael Snyder did participate in portions of Attachment 4, right?
A Yes.
Q Okay. As did you, correct?
A Yes.
Q Is there any place on 422 where you have delineated the work that was performed by you in Attachment 4?
A Yes. I believe the title delineates that.
Q The title, where is that?
A The geology and geotechnical report.
Q I'm not following your testimony. I'm sorry. Let's back up a minute.
Next to your seal on Page 422, is there a designation in Attachment 4 of which of those portions were completed by you and which were not?
A Next to the seal there is not.
Q Thank you.
Is it your testimony that the seals that you have affixed in the BFI application before us today

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are in accordance with Engineering Practices Act?
A Yes, sir.
Q Mr. Adams, can you please identify some of the general geotechnical references that you relied upon in completion of your work, Attachment 4?
A For this particular Attachment 4 -- I will go on to where I can go back to the calculations.
For portions of the slope stability analysis, I relied on a text, Designing with Geosynthetics, 2nd Edition, by Koerner.
Q If you will excuse me, please. Are you reading from the application?
A Yes, sir, I am.
Q Could you direct me to the page on that, please?
A Yes, sir. That would be 811. It would be in Appendix 4G.
Q Are you referring to APP 000811?
A Yes, sir.
Q And I'm on that page of the application, Mr. Adams, and I'm not sure I'm following your -- oh, excuse me. At the top of the page?
A Yes. Beside the references.
Q Thank you.
Other than those two references there, are

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there any other geotechnical references in which you relied in performing your work on the application?
A Yes. If you turn to APP 000820.
Q Okay.
A There are also -- there are two references listed on that calculation page.
Q Very well. Any others?
A That is all of the ones that I recall.
Q Mr. Adams, I'm going to run a couple of references by you and see if you're either familiar with those or if you have had any experience working with them in the past.
The first is entitled Fundamentals of Soil Mechanics by Taylor. Are you familiar with that reference?
A No, sir.
Q How about the Earth Manual published by the Bureau of Reclamation, the 1974 edition?
A I've seen it.
Q Soil Mechanics in Engineering Practice, 3rd Edition, Wiley and Sons, 1996.
A Who is the author of that?
Q I do not know the author of that. I just know Wiley and Sons is attributed to the title.
A I don't know on that one.

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Q Okay. You're familiar with the Geotechnical Manual produced by the Texas Department of Transportation, are you not?
A I have -- yes. There's been versions of it.
Q The 2000 version?
A I have seen excerpts from it. I have not read the entire manual.
Q Subsurface Exploration and Sampling of Soils for Civil Engineering Purposes, and I'll have to spell that, H-v-o-r-s-l-e-v American Society of Civil Engineers, 1949, reprinted in '65?
A That sounds familiar.
Q And last but not least, Slope Stability and Stabilization Methods, 2nd Edition. The author is Lee Abramson, A-b-r-a-m-s-o-n.
A Again, I believe I've heard of that.
Q And you do hold yourself out to be an expert in the field of geotechnical engineering; isn't that correct?
A Yes, sir.
Q Mr. Adams, we're going to go over a little testimony that may have been addressed to another witness, but, nonetheless, I do think it's relevant certainly to the portions of the application in which you participated.

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The current application has no plans for BFI to install a separatory liner; is that correct?
A That is correct.
Q And as you understand it, what is a separatory liner?
A As I understand it, that would be a liner system put over existing waste.
Q Do the old MSW rules provide for separatory liners?
A No, they do not.
Q But do the new MSW rules, do they provide for separatory liners?
A Yes, they do.
Q To your knowledge, did BFI consider the installation of a separatory liner with respect to this expansion application?
A I had no knowledge whether they did or didn't.
Q You never discussed it with anyone at BFI?
A No, sir.
Q Nor did you provide any recommendations for or against a separatory liner system?
A Correct.
Q As a geotechnical engineer and with your understanding of the TCEQ's rules, do you see any technical merit in installation of separatory liners

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between pre-Subtitle D and Subtitle D landfill waste units?
A I've not seen enough evidence to lead me to a conclusion on that.
Q But you do recognize that under the new MSW rules they are required whenever one is considering expanding over a Subtitle D landfill -- pre-Subtitle D landfill?
A Yes. I recognize that they are part of the new regulations.
Q You also understand that BFI Sunset Farms Landfill has areas that were filled under the pre-Subtitle D rules as well as the post-Subtitle D rules?
A Yes. That's correct.
Q Is it your understanding that the pre-Subtitle D portion of the landfill consists of approximately 92 acres?
A Yes. That's what I understand.
Q And I believe as you've just discussed with the office of the Public Interest Counsel, the pre-Subtitle D liner consists of the packing clay, correct?
A Yes.
Q Is there a leachate collection system in place

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in the pre-Subtitle D areas?
A I'm not aware of one.
Q Have you investigated that?
A I have looked at the details and asked questions. So to that extent, yes, I have.
Q So your conclusion is there's not a leachate collection system in the pre-Subtitle D portion of the landfill; is that correct?
A That's my understanding.
Q Are you familiar with how BFI addresses leachate in the pre-Subtitle D portion of this facility?
MR. CARLSON: Objection. Addresses leachate how?
JUDGE NEWCHURCH: You're saying the question is too vague?
MR. CARLSON: Yes, sir. It's vague.
JUDGE NEWCHURCH: Did you want to rephrase?
MR. RENBARGER: Certainly.
Q (BY MR. RENBARGER) In your work on this application, have you become familiar with any measures taken to remove leachate from the pre-Subtitle D portions of the Sunset Farms Landfill?
A I'm not aware of any.
Q Do you have any reason to believe there exists any procedures to remove leachate from the

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pre-Subtitle D portions of the landfill?
A No.
Q The pre-Subtitle D portions of the Sunset Farms Landfill have not undergone final closure; is that your understanding?
A That's correct.
Q So they do not have a cap?
A That is my understanding.
Q And if we have a landfill without a final closure or a cap installed, doesn't it ring true that any kind of rainfall will ultimately infiltrate the landfill?
A No.
Q Why is that?
A Infiltration into the landfill, even under interim conditions -- it will have cover. It may not have the final cap, but there will be cover on it -- typically is a low percentage of rainfall. So it's not that any rainfall that falls on the area will enter into it. It is some percentage may infiltrate in, but the majority of it will run off.
Q But there will be a percentage that will enter into the waste itself, correct?
A Yes, there should be some percentage.
Q Regarding leachate in a landfill, would one

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expect leachate to migrate downward in the landfill?
A Ultimately given a path, it should go downward.
Q And as leachate moves downward in a landfill, ultimately it will come in contact with the bottom liner system, correct?
A If it ultimately gets to the bottom, that's what it will contact.
Q If leachate lies on a compacted clay liner for a period of time, just hypothetically, would one expect a prolonged contact with the leachate on a compacted clay liner to result in some saturations of the clays?
A Depending on the saturation of the clay, prior to the leachate coming into contact with it, and also is there a head from the groundwater beneath it.
Q So one would expect some saturation to occur; is that correct?
A Depending on the circumstances.
Q Okay. Hypothetically, if there was one foot of leachate lying directly on a compacted clay liner, under what conditions would you expect the liner to become more saturated?
A Well, the -- I would have to know what the moisture content of the liners that was installed would be and is there an opposing head from groundwater coming from underneath.

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Q If there is a head of groundwater coming from beneath the compacted clay liner, would that also not provide an opportunity for additional saturation from the bottom side of the liner?
A If it's greater than the head from above it. I mean, water is going to move to lower head.
Q BFI's expansion application contemplates a vertical expansion over some pre-Subtitle D areas; isn't that correct?
A Yes.
Q And with expansion with vertical loading, wouldn't one also expect there to be additional loading over those waste materials in the pre-Subtitle D areas? Are you not following my question?
A Not exactly.
Q Let me rephrase it.
A Okay.
Q Okay. With a vertical expansion in a landfill, there will be additional placement of waste, correct?
A Yes.
Q And that will result in additional weight over the existing portions of the landfill, correct?
A Yes.
Q So that would in turn result in additional loading in the areas of the vertical expansion, correct?

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A So you're talking about additional weight?
Q Additional weight.
A Yes.
Q Okay. Based on your general knowledge of landfills, would one not expect there to be leachate in the pre-Subtitle portion of BFI's Sunset Farms Landfill?
A I would expect there to be some leachate.
Q Would you also expect there to be some level of water intrusion into the pre-Subtitle D landfill portion as well?
A From where?
Q Rainfall.
A Water intrusion from rainfall?
Q Correct.
A You mean infiltration?
Q Infiltration. Correct.
A Yes, I would expect some infiltration.
Q What generally happens when significant weight-loading occurs over existing landfill waste?
A It depends on the condition of existing landfill waste. You may accelerate the settlement that's going to occur.
Q Would you agree with me that waste placed in a landfill possesses pore spaces? And by that I mean gaps or voids.

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A P-o-r-e?
Q Excuse me?
A P-o-r-e?
Q P-o-r-e, yes.
A Not p-o-o-r?
Q Well, there may be those too, but I can't identify those in this question.
Yeah, p-o-r-e.
A Yes, it would have -- there would be some pores.
Q And would not one also expect with additional weight or loading of that waste that it would either tend to reduce or remove those pore spaces?
A They should be reduced.
Q And perhaps, Mr. Adams, I will try to be very nontechnical. That's best where I should stay. But how about an analogy? If you had a wet sponge and somebody stepped on it, would it not also displace those pore spaces in the sponge?
A Yes, if the pore spaces become smaller, the water will move.
Q It's going to move from that area of additional loading, correct?
A It depends on what you load it with. If I load it with a steel plate, it will move away. If I load it

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with another sponge, it may move toward it.
Q Well, let's assume for the sake of my example that we're talking about a human being of 150 pounds stepping on a six-by-six sponge that's fully saturated. What would happen?
A He would, I would assume exact -- if a human being stepped on a sponge, it should squeeze the water out of the sponge.
Q Okay. To the extent that the pore spaces may be filled with landfill gas, would one also expect that same phenomenon?
A You would have to talk to the landfill gas experts.
Q As a geotechnical engineer, you have no idea about what would happen to landfill gas if additional loading were placed on the pore spaces contained in the --
A I would say in general principle, I know that being a fluid, it should move.
Q Mr. Adams, you were not personally present when the liners were installed over the pre-Subtitle D portions of the landfill, were you?
A No, sir.
Q But you maintain a belief that they were properly installed, correct?

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A Yes, sir.
Q And the basis for that belief is what?
A The certifications and the SLERs that were curved in and ultimately approved by the agencies.
Q So essentially your belief that the liner systems were correctly installed is based on a records review; is that right?
A Yes.
Q The same can be said for the post-Subtitle D portions of the landfill?
A Except -- yes, because the last liner being constructed, I did make a site visit while it was being constructed, but I was not in charge of the CQA.
Q You were not in charge of certifying the proper installation?
A Right. Someone else did that. I just happened to -- I went by one day just to observe.
Q Let me ask you a general question about groundwater and liners. Are you aware of the term "groundwater mounding"?
A Yes. I was familiar with that term, and it comes from years past and other work I had done.
Q If one witnessed a groundwater monitoring inside of a fully closed, lined landfill, what would be the explanation for that or one explanation for that?

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MR. CARLSON: Objection. That's confusing. I think you said, "groundwater monitoring."
MR. RENBARGER: Did I "say monitoring"? Excuse me. Let me rephrase that.
Q (BY MR. RENBARGER) If groundwater appeared to be mounding or increasing in height within a fully lined, closed landfill, what are some of the potential causes of that type of phenomenon?
A Now, let me get clear on this. Groundwater is increasing in height inside the landfill?
Q That's correct. In a mound.
A So -- well, if groundwater is increasing in height in the landfill, then I would assume the groundwater must be flowing into the landfill.
Q Would that suggest to you that the liner might be leaking?
A Well, or -- or the permeability of whatever liner system is such that it allows the groundwater to come in.
Q So that would be, in essence, a leak, would it not?
A Yes. I will give -- permeability and leakage, they're not synonymous, but if you wish to use them that way.
Q Well, if a liner is performing as designed, it

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would not allow water to enter into the landfill; isn't that correct?
A Depending on the design of this hypothetical liner.
Q Well, help me with this. As I understand the MSW rules, the purpose of liner systems is to prevent either the entry or the escape of water in or out of the waste areas; is that right?
A It's designed to minimize.
Q So you're suggesting that liner systems commonly allow transmission of fluids either into the landfill or outside of the landfill?
A No, not at all.
Q What are you suggesting? Then I don't understand.
A Well, we're speaking of a hypothetical landfill --
Q Yes, we are.
A -- that has water entering through it. And so hypothetically --
Q In a mound.
A So I don't know what the hypothetical liner is.
Q The hypothetical liner is not performing to prevent water intrusion, is it?
A Well, is -- I mean, is that our situation, that

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we have an impermeable -- a liner designed to be impermeable?
Q Is a liner system that is designed and installed to provide ten to minus seven hydraulic conductivity, would such a liner be expected to allow water to be transmitted through it into the waste?
A Only at that flow rate.
Q Only at what?
A At the ten to minus seven. At the designed flow rate.
Q At the designed flow rate.
And if it allowed water to flow into it at less than that designed flow rate, then it would be leaking, wouldn't it?
A Yes.
Q Would mounding of groundwater underneath a landfill be indicative of leaking from the landfill?
A Not necessarily.
Q Are there any circumstances where it would be reflective of leaking?
A I guess -- any circumstances?
Q Yes, sir.
A Okay. Yes.
Q Could you identify one?
A No.

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Q Mr. Adams, I believe you indicated in your prefiled testimony that a proper subsurface investigation was used for a number of different purposes in an application, correct?
A Yes, sir.
Q And a properly done subsurface investigation provides needed information for not just the geotechnical design parts of the application, but other things such as groundwater designs, designs of the groundwater monitoring system itself, use of the materials for other structural uses of the landfill, things of that nature; is that fair to say?
A Yes, that would be fair to say.
Q BFI's application contains a subsurface investigation and a geotechnical report, correct?
A Yes, sir.
Q And those are required by the rules as you understand it, right?
A Correct.
Q Mr. Snyder, BFI's lead geologist, participated in some of the field work leading up to the preparation of the subsurface investigation report, didn't he?
A Yes.
Q Let's talk a little bit about the boring plan that was utilized there. What activities did you

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personally perform with respect to the preparation of the boring plan that was submitted to the TCEQ in the application?
A Now, when you speak of boring plans, you're speaking of the letter and the proposal to do the borings?
Q That is correct.
A Okay. Mr. Snyder prepared that and showed me what he was proposing to do and asked me would that provide the -- did that satisfy what I would need.
Q And I assume you concurred that it would?
A Yes, sir.
Q Did you personally participate in any fill activities with respect to implementation of that boring plan?
A I made one site visit.
Q What did you do on your site visit?
A On the site visit, basically went to observe existing excavations. I wanted to see what the soil looked like in the slopes -- in the cut slopes.
Q Did you physically participate in the actual drilling part of the boring plan, I think was my question.
A Oh, no. I did not help the drillers do it.
Q In your site visit did you observe the

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drillers?
A Let me be honest with you. I don't recall at the time I was there if they were actually drilling.
Q So as you sit here today, you have no recollection of any view of the boring program being implemented at the site?
A As far as watching a drill rig go in and out of a hole, I don't recall.
Q Who decided the fill exploration methods that were to be carried out regarding the boring plan?
A Initially, Mr. Snyder proposed those and asked for my input.
Q Do you recall providing any input?
A Yes.
Q What was that?
A For the most part, I told him that after reviewing all of the existing data, I needed samples from a limited number of holes.
Q So you recommend to Mr. Snyder, then, that he limit the sampling in the boring plan?
A No. He asked me what I needed.
Q Correct.
A And I told him that would satisfy what I needed.
Q I see. But you did not direct him to limit

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samples; is that right?
A No.
Q No, as in you did not direct him?
A No, I did not direct him to limit samples.
Yes, sir.
Q Thank you.
Are you familiar with a gentleman named Doug Jones?
A Excuse me, sir. I didn't --
Q Are you familiar with a gentleman named Doug Jones?
A Yes, sir.
Q Who is Doug Jones?
A Doug Jones is a geologist that works for Biggs & Mathews.
Q To your knowledge, is he a registered geoscientist?
A I don't know.
Q How about Mike Brown?
A I know that Mike Brown used to work at EMCON where I work.
Q Do you know if he is a registered geoscientist?
A I don't know for sure.
Q Mr. Adams, in your prefiled testimony, you opine that the facility will be protective of

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groundwater due to the existing liner systems and final cover systems working effectively, correct?
A Yes.
Q And you base your opinion on these views that both liner systems and final cover meet the MSW's rules, and the facility is located in a stable area, right?
A Correct.
Q Hypothetically, if it were shown that the current landfill's design stability assumptions were flawed and the completed landfill was not stable, then that would necessarily change your opinions on protection of groundwater as well, wouldn't it?
A That the completed landfill --
Q Yes. The completed landfill --
A Two things, the -- what was the first thing?
Q If your assumptions with regard to the landfill design's stability was incorrect, it was flawed, would that not also affect your opinion on the protection of groundwater that you've expressed in your prefiled testimony?
A If my assumptions were flawed?
Q Yes, sir.
A It potentially could.
Q Let's talk a little bit about unstable areas and slope stability for a moment. I think we're

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probably in agreement that Rule 330.305 of the former MSW rules is a relevant regulation to address unstable areas, right?
A That sounds correct.
Q Okay. Let me -- would it help you to have that rule in front of you?
A Yes, sir, it would.
MR. RENBARGER: May I go off the record a second?
JUDGE NEWCHURCH: Off the record.
(Off the record)
Q (BY MR. RENBARGER) Do you have in front of you a copy of the former MSW Rule 330.305?
A Yes, I do.
Q And what is that rule titled?
A "Unstable Areas."
Q And looking at that rule -- I'll just offer this. "For the purposes of this section, an unstable area is defined to be a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of a landfill's structural components responsible for preventing releases from the landfill; unstable areas can include poor foundation conditions, areas susceptible to mass movement, and karst terrains."

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Do you see that?
A Yes, sir.
Q These are the key factors in the rule, right?
A Correct.
Q Looking at this rule, Mr. Adams, what kind of natural events would you consider to cause or to contribute to an unstable area as defined by the rule?
A I would understand the natural event to be something like an earthquake.
Q So a seismic event, is that what you're saying?
A Yes.
Q What about excessive rainfall, would that fall into that category "natural"?
A Yes, I believe so.
Q What do you consider to be human-induced events capable of creating an unstable area?
A Probably something along, maybe, digging a mine shaft under a landfill.
Q Okay. So essentially an activity of a human creating unstable conditions?
A Yes. Yes, sir.
Q Would you consider a vertical expansion of a landfill to be a human-induced event?
A I would -- well, the expansion would be human-induced. I don't know if I would consider it to

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be an event capable of impairing the integrity of some components of the landfill.
Q And we'll get to that in a moment. I'm just saying essentially a vertical expansion is a human event, right? A human-induced event, correct?
A It's a human event.
Q It doesn't just happen by itself.
A And I would --
Q Humans have to --
A Yes, sir.
Q -- construct that?
A I would agree with that.
Q What about allowing excessive ponding of water on the landfill surface? Would that be human induced?
A Yeah, I think it would fall into that category.
Q Allowing high levels of leachate within a landfill, would that be reflective of human-induced events?
A I'm not sure about that. I would say that would be -- at what point in the landfill's life? So are we talking about during the active period?
Q Hypothetically we're talking about allowing leachate to accumulate and remain at high levels of the landfill, that somehow resulted in a compromise of stability. Wouldn't that be human-induced, the failure

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to remove the leachate?
A I don't know about that.
Q You don't agree with that or disagree with that?
A At this point -- yeah. I don't agree or disagree.
Q How about improper fill sequencing in a landfill? Would that be a human-induced event?
A Yeah, I think that would be human induced.
Q Improper stockpiling of soils on a slope?
A Yes.
Q Failure to maintain proper erosion controls in a landfill?
A Yes. I think that would fall into that.
Q Within the meaning of rules, would you agree with me that the structural components referenced in 330.305 refer to such things as the liners, the leachate collection systems, the final covers, the runoff systems?
A That's how I understand it.
Q In fact, that's how it's defined in the rules, is it not?
A Yes, sir.
Q What would you consider to be poor foundation conditions within the meaning of Rule 330.305?

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A Soils that would not be able to support the overlying structures.
Q So we're talking about foundation conditions within the context of unstable areas? We're not talking about something like a rigid building foundation, are we? We're talking about the physical properties of the soils used to build the landfill with, right?
A Well, the foundation is actually the soils to support these components.
Q Exactly.
A Yes, sir.
Q And you agree that Rule 330.305 does apply to vertical expansions of landfills, correct?
A Yes.
Q Thank you.
I believe the public interest counsel asked you a few questions concerning a temporary dewatering system that you addressed in your prefiled, right?
A Yes, sir.
Q Okay. As I understand it, the system that you specifically addressed related to a dewatering system that had been installed under, I believe it was -- is it Cell 22?
A I believe this one would be Cell 21, 22, and 23.

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Q Okay. And you designed that, correct?
A Yes, sir. And if you would allow me to give you a little bit of history on -- when we were preparing the amendment, at the time they were beginning construction of those cells.
Q Correct.
A And so I know that we updated the liner quality control plan and the design of the underdrain in some of those cells so they would be consistent with what was in the amendment. And so that's why I say I don't know -- yeah, I think it was 21, 22, and 23. At some time there was a transition between the previous underdrain to the one that we have in the amendment.
Q Okay. So it's an ongoing process; is that right?
A Yes, sir. There was -- we were doing -- working on the permit, and they were working under the -- and developing the landfill simultaneously.
Q Is it your understanding that temporary dewatering systems are required by the MSW rules whenever one excavates below groundwater levels?
A Yes, sir, that's my understanding. Well, they are one method of providing sufficient factors of safety. They're not -- they are not required, but they are one method that can be used.

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MR. RENBARGER: Can we go off the record just a second, Judge?
JUDGE NEWCHURCH: Off the record.
(Off the record)
JUDGE NEWCHURCH: Back on the record.
Q (BY MR. RENBARGER) Now, I believe you described, if I'm not mistaken, to the Public Interest Counsel the circumstances that led to the installation of the dewatering system at BFI's facility, right?
A Yes, I believe I did.
Q Other than -- I'll call it Cells 21, 22, and 23 to use your vernacular, are you aware of any other temporary watering systems at the BFI Sunset Farms Landfill?
A It's my understanding that there's a dewatering system installed under all of the Subtitle D liners.
Q So as we sit here today, that would be the majority of acreage at the facility, correct?
A Yes.
Q Do you know how long the temporary dewatering system would be operational under Cells 21, 22, and 23?
A No, sir. It has to be operational until sufficient ballast is placed to offset the hydrostatic forces, but I do not know how long that will be.
Q Will it largely depend on the rate of

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deposition of waste in those cells?
A Yes, sir.
Q When we achieve this condition of sufficient waste, as ballast, I'll call it, has been added to stabilize the bottom liners from the hydrostatic forces, will the temporary dewatering systems just be turned off at that point in time?
A That's the option of it. That's why it's temporary.
Q And I understand the temporary dewatering systems have pumps, right?
A Sorry?
Q The temporary dewatering systems have sumps to collect the water that's being removed?
A Yes.
Q How is that groundwater collected by the temporary dewatering system effectively removed from beneath the landfill?
A Once an area is completely lined -- and this is just in general -- the process as you build liners, you can continue putting your sumps in as open sumps in unlined areas, the future excavation. At some point when you place -- have all of the floors lined, that sump will be under the liner system. It looks much like a leachate collection sump. It has a sidewall riser and

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a submersible pump goes into it.
Q And I would assume from that, that as the water collects in the sump, that the electric pumps are turned on and it's pumped away, right?
A Yes, sir.
Q Do you know where that water is deposed or redirected once it's pumped out of the sump?
A Typically it goes into the perimeter drainage.
Q System?
A Yes, sir.
Q What happens to the groundwater collecting in the sumps once the temporary dewatering system is no longer needed to support the landfill liner?
A We suppose that it eventually rebounds and reverts back to the conditions before the dewatering system was put in. That's what we design to.
Q Okay. Is a temporary dewatering system essentially decommissioned at some point in time?
A Yes, sir. That's the actual term. You can apply it -- once you have sufficient ballast in place, you submit a ballast evaluation report to the TCEQ and you request permission to decommission the temporary dewatering system.
Q But once the system is installed, it remains virtually forever, correct?

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A Oh, yes. The system remains forever. You would pull the pump out.
Q The point being is it's now covered with waste, it's now covered with the liner, and it remains in the ground as a permanent feature of the landfill, correct?
A Correct.
Q Now, since the temporary dewatering system is below the clay liner and the geomembrane or the liner surface, and it remained in the ground, doesn't it provide a potential pathway to spread contamination should there ever be a leak in the liner system?
A I'm not sure that I follow.
Q Okay. Let me try to address it slightly differently. The temporary dewatering system remains permanently underneath the landfill, correct?
A Yes.
Q And by its nature, it is in contact with the groundwater underneath the landfill, correct?
A Yes.
Q And, in fact, it's designed to actually accumulate and communicate with the groundwater underneath the liner, correct?
A Correct.
Q So once it's decommissioned, and the fact that it remains there, doesn't that provide a potential

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pathway to disperse contaminants should that liner leak into the temporary dewatering system?
A I don't really envision -- I can't envision that situation. It's -- you're saying after it's decommissioned, it is not being pumped?
Q That's right. That's right.
A No, I don't believe so.
Q Why is that?
A Well, because the movement of water -- I mean, the movement of water is controlled by the materials around it. It's not going to move faster or slower through the dewatering system. The dewatering system is static at that point.
Q It's underneath the weight of the entire landfill, though, right?
A Yeah. But I mean, it doesn't provide any more of a -- it doesn't alter the movement of the groundwater if it's not operational. It's of no effect.
Q Okay. The contaminant that came from the landfill from a liner leak, if it entered the temporary dewatering system, are you saying that that would not provide an area for it to disperse within that temporary dewatering system?
A Within the temporary dewatering system?
Q Right.

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A Depending on the contaminant, how it disperses. I mean, would it be in the temporary dewatering system at that point? It would be in the groundwater at that point in the water in that system.
Q Yes.
You're saying, yes, it would be; is that -- do I understand your testimony?
A Yes, but I'm not speculating on how it would disperse.
Q That's fine.
Let's go back to Rule 330.305 for a moment. The rule addresses areas susceptible to mass movement, correct?
A Yes.
Q What do you consider to be an area susceptible to mass movement, within the terms of this regulation?
A Typically, an area of mass movement would be some area that -- if you had a large sinkhole, that would be a mass movement. I guess if I lived out west in California, a major landslide would be a mass movement.
Q Would that include seismic areas?
A Yes, I believe so.
Q Subsidence?
A Sir?

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Q Subsidence?
A Yes.
Q Would a slope stability failure of the landfill itself equate to an area susceptible to mass movement?
A I don't -- I mean, I personally don't really think that's the scale that mass movement speaks of.
Q Are you suggesting that a slope stability failure could not result in mass movement of a landfill?
A Now, are you saying could it be -- is it a mass movement, or could it result in a mass movement?
Q Could it result in a mass movement?
A I mean, in some -- there may be a situation where it could.
Q The MSW rules do not provide any specific direction on how to conduct or perform a slope stability analysis; isn't that right?
A That's my understanding.
Q Would you agree with me that slope stability analyses are required to make the necessary demonstrations as to unstable areas as much of what we've been talking about in this rule?
A I think in practice that is how we do it.
Q Could I direct your attention, please, momentarily to Page 23 of your prefiled testimony?
A Okay.

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Q Do you have that in front of you?
On Page 23 of your prefiled testimony beginning at Line 8 and then continuing on to the top of Page 24 through Line 6, I believe you discuss your opinion regarding one of TJFA's expert witnesses, Mr. Pierce Chandler and a view he took in another proceeding regarding foundation bearing capacity analysis. Do you see that?
A Yes, sir.
Q Now, Mr. Chandler is not asserting that a foundation bearing capacity analysis is needed for this application, is he?
A I'm not aware -- no, sir, not that I know of.
Q Have you read Mr. Chandler's prefiled testimony?
A Yes, sir, I have, but I received it after I prepared mine.
Q Okay. Well, in fact, Mr. Chandler's assertions regarding foundation bearing capacity analysis were actually brought in a different MSW case, were they not?
A Yes, sir, correct.
Q Have you ever heard of the McCarty Road Landfill application?
A Yes, sir.
Q Are you aware that the McCarty Road application

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involved a citing of a landfill in the Gulf Coast geology in the general vicinity of Houston, Texas?
A I'm aware that it's in Houston.
Q Would you agree with me that the geology of the Gulf Coast presents different engineering considerations than that of the Central Texas Taylor marl?
A Yes, sir.
Q So for purposes of your prefiled testimony in this case, your opinions regarding foundation bearing analysis really don't have any bearing in this proceeding, do they?
A No, sir. Since the question was not raised, they don't.
Q Okay. Mr. Adams, are you aware of some landfill failures attributed to slope stability problems?
A Could you be more specific?
Q I will be more specific.
Have you ever heard of the Kettleman Hills Landfill failure?
A Yes, sir.
Q Have you ever heard of the Rumpke Landfill slope failure?
A Yes, sir.
Q Do you know what the underlying cause was of

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the Kettleman Hills failure?
A My understanding from some of the after-the-fact papers and research that I have read was that one of the causes is that it slid along the geomembrane. It had a smooth geomembrane, and it slid along one of those interfaces.
Q When you are referring to the smooth geomembrane, you're referring to the bottom liner of the landfill, correct?
A I believe it had a smooth geomembrane everywhere. But, as I've said, I've heard of it and I've read some of the papers, but there's not a lot about the Kettleman Hills that I can speak to specifically.
Q Okay. What about the Rumpke Landfill failure? Are you aware of what may have caused that?
A No. I've seen that there have been several theories put out about it, but I've not seen any -- I don't know what caused it, no.
Q So you wouldn't know one way or another if one were to suggest that it was a failure of a smooth geomembrane bottom liner, would you?
A I wouldn't speculate on that.
Q Okay. Are you aware of any slope stability failures that have occurred at any Texas landfills?

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A Yes.
Q Have you ever heard or read about a slope stability failure at the Skyline Landfill in North Texas?
A Yes.
Q Have you ever heard about a slope stability failure that took place in the City of Irving's landfill?
A Yes.
Q Both the Skyline and City of Irving landfills are situated either in the Taylor marl or what I would call a similar geological setting; isn't that right?
A Yes.
Q And you were aware of both the City of Irving and the Skyline Landfill failures at the time you prepared your prefiled testimony, correct?
A Correct.
Q And at the time you performed your work on this application, correct?
A Correct.
Q Mr. Adams, are you aware of a slope stability failure that occurred in 1999 at the adjacent Austin Community Landfill?
A No, sir.
Q So you've never reviewed any TCEQ records that

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documented the spill?
A No, sir.
Q Since you're not familiar with it, assuming for the sake of discussion only, then, if there had been a documented failure in 1999 at the ACL Landfill, that necessarily would also have occurred in the Taylor marl geological setting, correct?
A Was it in -- the slope failure in the soils?
Q Well, my question is, the setting in which that landfill is situated, you would agree with me that the Austin Community Landfill is also situated in Taylor marl, wouldn't you?
MR. CARLSON: Objection. That was a confusing question, I believe, Judge.
JUDGE NEWCHURCH: Well, the last question wasn't. So objection is overruled.
Mr. Renbarger, are we about ready for a morning break? Is this a good time for you?
MR. RENBARGER: It would be, yes.
JUDGE NEWCHURCH: Okay. Let's break for 10 minutes.
(Recess: 10:30 a.m. to 10:48 a.m.)
JUDGE NEWCHURCH: It's now 10:48.
Mr. Renbarger?
MR. RENBARGER: Yes, Judge.

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Q (BY MR. RENBARGER) Mr. Adams, as I understand from your prefiled testimony, that you believe that -- well, first of all, as we touched on before the break, there are no specific directions in the MSW rules on how to properly perform a slope stability analysis, correct?
A Yes, that's correct.
Q And from your testimony, as I understand your testimony, you also believe that slope stability analyses are developed to be consistent with the standard of practice that has evolved since the adoption of Subtitle D in 1993, correct?
A Correct.
Q Okay. Could I direct your attention in your prefiled testimony to the bottom of Page 28, please.
A (Witness complies.)
Q Do you have that in front of you?
A Yes.
Q Beginning at the bottom on the Page 28 of Line 23, I believe it indicates: "Again, I note that all of the excavated slopes and all previously constructed liner slopes have been completed in accordance with the approved excavation plan and the Soil and Liner Quality Control Plan that are presented in the amendment application and have not failed." Is that your testimony?

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A Yes.
Q In reviewing that testimony, am I correct to infer that the slopes have not failed is some representation that they will not fail in the future?
A Yes, sir. That is -- the intent is that these slopes exist. Many of them have -- many of the excavation slopes, the majority of them have already gone past the point of the stability analysis that we have performed.
Q All right. But, nonetheless, we're going to be adding -- assuming this application is approved, we're going to be adding vertical expansion to the existing stresses that are on these preexisting slopes, are we not?
A Yes, sir, but we will be adding it on the -- we will be adding more resistance to failure.
Q Okay. One way of looking at it, I guess.
I guess, from my perspective, the simple fact that a slope has not failed in the past is no guarantee that it may not fail in the future under different circumstances, is it?
A Under different circumstances, correct.
Q Now, in developing in what I believe you referred to as a standard of care for engineers in performing slope stability analyses, does one look to

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the consensus of the geotechnical engineering community for the purposes of determining that standard of care?
A That's one thing that you look at.
Q As a matter of fact, because we're dealing with Subtitle D regulations and the EPA, among others, that would be something of a nationwide consensus, would it not, as far as the proper implementation of those rules with regard to geotech?
A Well, it's not really that formal.
Q I understand it's not formal. But we're playing by the same rules in California of the EPA rules for MSW as we are in Texas, aren't we?
A For the basis of the rules, yes, but we're in very different settings.
Q I agree with you on that, but I'm just saying from the context of the EPA Subtitle D program, it's the same in California as it is in Texas with respect to the federal program, right?
A Yes.
Q So it makes sense for there to be some national consensus in geotechnical engineering with regard to such things as slope stability analysis, right?
A Yes. I don't know that I would say that there's a consensus.
Q Well, engineers do conduct nationwide seminars

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and conferences to address engineering challenges presented by Subtitle D?
A Yes.
Q And I will agree with you, while certain local site specific or even local ordinances may somehow affect or dictate individualized engineering responses, the standard of practice at least for geotechnical engineering and landfill engineering, in particular, I mean, that's the function of geotechnical literature in practice, right?
A Yes.
Q Okay. As I understand the performance of a slope stability analysis, that these can take the form of either manual or hand-performed calculations as well as computer programs, right?
A Yes.
Q And would you agree with me that these calculations are no more accurate nor realistic than the inputs that are used to perform the calculations?
A Yes.
Q No doubt you've heard the expression "garbage in and garbage out." No pun intended. You've heard that expression, right?
A I've heard that expression.
Q Okay. The fact of the matter is --

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JUDGE NEWCHURCH: Did you plan that line for a long time?
(Discussion off the record).
Q (BY MR. RENBARGER) Okay, Mr. Adams. Now, if the inputs to either the manual calculation of the slope stability analysis or a computer program, if those inputs were erroneous, then the results of those calculations would also be erroneous, wouldn't it?
A Yes.
Q Isn't it true that one of the key inputs in performing a slope stability calculation is to determine the shear strength of the materials involved?
A Yes, the shear strengths are important.
Q And what does the term "shear strength" mean, just for purposes of geotechnical engineering?
A There are -- in the landfill slope stabilities, there are two shear strengths to look at. One would be internal, and that basically is the resistance to movement, internal within the matrix. We also have interface, and that would be resistance of one type of material moving against or sliding against another.
Q And I think I've heard you use the term "interface" on more than one occasion in your testimony already. Could you describe just in general for the Judge the kinds of interfaces that one would encounter

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in a landfill liner design, for example?
A Yes, sir. We would have -- in a liner, you will have -- this type of Subtitle D liner, you would have two foot of soil protective cover. That two foot of material rests or is placed over a geocomposite. So there's an interface between the soil and the geocomposite. The geocomposite then sits on a geomembrane. So there's an interface between that geocomposite and that geomembrane. That geomembrane, then, sits over a compacted clay liner. So there's an interface between that compacted clay liner and that geomembrane. So those are just -- when we say "interface," that's where two materials come together.
Q Right. And for purposes of slope stability analyses, though, these interfaces can be considered to be critical structures because they could provide sliding planes, right?
A Yes, they could be planes.
Q And would you also just briefly discuss for us, for the benefit of the record, what you consider to be critical layers when deciding which parts of the landfill design are needing slope stability analysis? Let me rephrase that.
For purposes of a slope stability analysis, what do you consider to be critical layers to evaluate?

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A Well, naturally we want to look at each of the interfaces. And do -- we, typically, want to look at the waste itself. And we want to look at the -- at -- well, for the -- for the excavation slopes, we want to look at the natural soils.
Q So if I understand your testimony correctly, when we're looking at performing a slope stability analysis at a typical Subtitle D landfill, we're wanting to evaluate not just one group of components, shall we say, but we want to look at the different factors or forces that may be brought to bear on all of those different components; is that -- would that be fair to say?
A Yes.
MR. CARLSON: Judge, I object again. I believe the question is confusing because there are different types of analyses -- slope stability analyses that are applied to different types of slopes. I'm not clear myself, the question being asked, what he's referring to.
MR. RENBARGER: Perhaps I should rephrase.
JUDGE NEWCHURCH: Okay. That would be best. I'll strike the last answer and let you rephrase.
MR. RENBARGER: Thank you.
Q (BY MR. RENBARGER) Mr. Adams, I believe you

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testified that it's certainly important to evaluate the interfaces for purposes of slope stability in a composite liner system, correct?
A Correct.
Q And it's also important to identify the -- I believe you used the term just the waste themselves in terms of any kind of strengths that they may involve in the performance of a slope stability analysis, right?
A The waste?
Q The waste. I believe you did mention the waste, correct?
A Yes.
Q As well as the native soils. I believe you stated that, correct?
A Yes.
Q I guess where I was coming from is that -- and perhaps Mr. Carlson's objection is getting us back to the same place. But I think where I'm coming from is that each one of the separate either liner components, the waste itself, or the surrounding soils, each one of those either independently or in combination with each other may provide a proper area to investigate for purposes of slope stability, right?
A Yes.
Q Would you agree with me that it is the standard

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of practice for geotechnical engineering to perform slope stability analysis to use what are sometimes termed conservative assumptions in those analyses?
A Yes. That's a long-standing tradition is to be conservative.
Q And that's true in many aspects of engineering as it relates to landfill design; is that right?
A Yeah. We attempt to not design on the edge.
Q Right. And isn't one of the reasons why the standard of practice involves conservative practices is to either maximize or ensure the safety of ultimately the structure that's going to be there?
A Yes.
Q And another reason for conservative assumptions in landfill practice is that you're dealing with, hypothetically at least, a variety of materials at a site that aren't uniform in terms of their strengths or in terms of their permeabilities or any number of things like that, right?
A What is the question, sir?
Q The question is: Another reason to have conservative assumptions going into slope stability analyses is because the actual materials, the materials physically present at the site, do have some variances in strengths and permeability and any number of things

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like that, correct?
A Correct.
Q Now, there's a considerable amount of engineering literature out there, isn't there, that emphasizes the selection of appropriate strengths of materials to be --
A Not a considerable amount.
Q There's not a considerable amount?
How would you suggest the amount of literature that's out there?
A I would say there's some literature.
Q Okay. Is this stuff that geotechnical engineers would typically rely upon in developing their slope stability analysis?
A I think it's things that they would really consider.
Q Okay. I think we may be going back over some ground we've already done, but isn't it true that one of the crucial elements in performing a proper slope stability analysis would be the selection of appropriate shear strengths for the materials involved?
A Yes.
Q And would it also be that -- identifying what would be called -- I'll call them critical layers -- would be another crucial element of that analysis,

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correct?
A Yes.
Q Now, slope stability is something of a moving target, is it not, in a working landfill?
A Well, as far as the interim -- the interim waste slope, that is continually changing.
Q My point exactly. We have, in some cases -- not in BFI's, but in some cases we have on-going excavation activities, correct? We have waste placement going on?
A In some places.
Q We have deposition of placement of intermediate cover in some places?
I mean, all of those things, one would expect is the general operations of an active landfill, correct?
A Yes.
Q And those can affect slope stability, can't they?
A They can affect some of the areas of slope stability.
Q And, of course, for a landfill we would also want to look at the long-term conditions, would we not, once we've got the landfill at the completion or closure time so we know that after the landfill is completed and

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closed, that all waste deposition is ceased, that we've got a stable structure there in place, right?
A Right.
Q Going back to this notion of conservative approaches to slope stability analysis, would you agree with me that if one utilized the lowest published values, the lowest published values for materials' shear strength -- or I'll call it the worst case analysis -- that that would provide a conservative slope stability analysis?
A If you use the lowest published?
Q Yes, sir.
A Anytime you use the lowest or reduced something, that would be more conservative. Not necessarily reasonable, but it would be conservative.
Q I understand.
Now, did you, Mr. Adams, in performing your slope stability analysis for the BFI application, did you use the lower or lowest published strength -- shear strength values for the Taylor marl materials present there?
A Well, for the Taylor marl, which published -- where were they published?
Q Well, you tell me. What published values did you review?

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A Okay. I reviewed published values -- I mean, typically I look in -- there's some in NAVFAC. There's several other texts that have published values, but for this particular one, I've worked in it a long time. I didn't pull a text out and use -- I know about the range of the values. And so, no, don't use -- I typically don't use lowest published.
Q Did you use any published value?
A No. I've looked at the published values, but I did not use a published value.
Q And then are there published values for the properties of Taylor marl materials?
A Of similar materials, there are. There are values that -- there are a range of values.
Q And those are published?
A For clays.
Q Yes.
How about for the geosynthetic materials comprising the liner systems?
A Yes, there are a range of published values.
Q Did you use those?
A I looked at those.
Q But did you use them?
A I considered them. I mean, if I had a range of materials from Point A to Point B, I may not use either

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end of the range.
MR. RENBARGER: May I approach, Judge?
(Off the record)
(Exhibit TJFA No. 13 marked)
JUDGE NEWCHURCH: Back on the record.
Q (BY MR. RENBARGER) Mr. Adams, I just handed you a document which has been marked as Exhibit TJFA-13. Do you have that in front of you? I believe the court reporter may have marked it. Perhaps your copy is not marked.
A Yes, sir.
Q So I'm referring to these two pages here in front of you. That's TJFA-13, correct?
A Yes.
Q And TJFA-13 consists of what appear in the lower right-hand corner of the documents, Bates-stamped APP 32073 and APP 32074, correct?
A Yes.
Q And looking at Document No. 32073, that would seem to represent that this was an e-mail that was retrieved in -- e-mails retrieved during discovery, right?
A Yes, sir.
Q Let's go to Page 32074, please.
Do you have that?

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A Yes.
Q At the top of the page it appears to be an e-mail directed from you and sent to Greg Lewis, correct?
A No. I believe it's from Mike Snyder.
Q Excuse me. Mike Snyder. Beg your pardon. Mike Snyder to Greg Lewis, correct?
A Yes.
Q Would you look at the second full paragraph of that e-mail, please?
A Yes, sir.
Q Are you there? Okay. And I believe it indicates -- and I'll just read it: "Gregg has completed his review of the GeoSyntec comments," right?
A Yes.
Q And I'm assuming that Mr. Snyder is referring to you, Gregg Adams; is that right?
A Yes, sir.
Q Who is GeoSyntec?
A GeoSyntec is an engineering firm, and they have an office here in Austin.
Q Did GeoSyntec play a role in the BFI application?
A They were working on -- I believe they were doing the quality control for the liner construction.

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Q Actually, GeoSyntec was involved in some other parts of the application as far as the actual documents, right?
A I don't recall if they prepared any. I believe at this time, when we were looking at initially going -- deepening the landfill --
Q Right.
A -- I think they -- I mean, my recollection is that they reviewed some initial work we had done when we were looking at some of the deeper excavations.
Q Okay. Have you got the application there handy? I believe you do, don't you?
A Yes, sir.
Q Okay. If you would, please, if you would go over to -- I believe it is Page APP 1245 in the application. I think that's Appendix 10G to the Attachment. Volume 3.
JUDGE NEWCHURCH: What was the page again, please?
MR. RENBARGER: Volume 3. Volume 3 of the application, but the page numbers are APP 1245 is where we're starting.
Q (BY MR. RENBARGER) Are you there?
A Yes, sir.
Q Appendix 10G was performed by GeoSyntec,

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correct?
A Yes.
Q And doesn't it appear in Appendix 10G that most of the engineering seals reflected in there is from an engineer by the initials B.A. Gross, correct?
A Yes, sir. They did this. This is the -- this appendix is actually -- it comes from the -- what was the current soil liner quality control plan at the time.
Q It is included in the current application, correct?
A Right. It was done in 1999. And the TCEQ requested for continuity that we just attach the previous design to the Attachment 10, make an appendix.
Q And B.A. Gross, that's Beth Ann Gross, isn't it?
A Yes.
Q Now, Ms. Gross doesn't work for Biggs & Mathews, does she?
A No.
Q And she doesn't work under your direct supervision or control either, does she?
A No.
Q Did you delineate Ms. Gross' engineering work in the -- in Attachment 10 with your seal?
A It's delineated by the fact that Appendix B has

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her seal on it.
Q Let's go back to Page 32074 of the exhibit for a second. Are you with me there?
A Yes, sir.
Q Okay. On the second sentence of the second paragraph, it says: "He says that their review was a good one; they asked some good questions, some of which he addressed and some of which he disagrees with."
As you sit here today, can you recall what you may have disagreed with from GeoSyntec's review?
A No, sir.
Q You do not remember, Okay.
Going on to the next line, it says: "One of the questions they have asked has to do with the fact that some of the tested soil strength parameters don't match 'published values' for a marl. "
And I'll just read on for completeness: "Gregg agrees that the actual tested parameters don't match published values, but they were the results."
As a result of the comment there in the e-mail regarding the published values, what did you do, if anything?
A As a part of the published values?
Q As a result of the comment from the GeoSyntec folks as reflected on Page 3274, did you do anything to

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go back and check your values against the published values?
A Yes. As I said, this was an initial review of a slope -- some slope stability calculations from the excavated slope for a deeper landfill, not what's in the permit, but for an earlier edition when they were considering can we go deeper.
We had run strength tests on some of the unweathered marl, the shell. And some of the values from those tended to be higher than published values. Those are not the values -- we didn't -- and so we went back and looked at the lab tests, looked at the way the tests were run, and determined yes. Eventually we did not use those values, those higher values.
Q Were ultimately the soil strength parameters utilized in your slope stability analysis greater or smaller than published values?
A They're in the range. Ultimately, for the soil parameters, for these type soils, published values were ranged up from somewhere in the neighborhood of 15 -- and this -- I'll give you two points. A strength parameter or shear strength is calculated or estimated from two properties. One is cohesion. And think of -- and one is friction angle. Now, friction angle is that grain-to-grain contact. And it is -- strength provided

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by friction is a function of how much load you put on top of it. If you put more load on top of it, then it gives more resistance to movement.
Cohesion is best thought of in terms of stickiness. Think of clay, something that sticks together. And so any material will have a shear strength. It may be some combination of these two items that provide that strength for these parameters.
For clays, highly plastic clays, I've seen published values range from somewhere in the neighborhood of 15 degrees for friction upwards to 27, 28 degrees. I believe the value that I used for the weathered Taylor marl for friction was -- I believe I used 16 degrees. So I was in the lower end of the range of published values.
Q Okay. Then if the soil strength -- this is hypothetically. If the soil strength parameters used in a slope stability analysis are greater than the lower or lowest published values, wouldn't that ultimately result in the slope stability analysis providing a higher factor of safety than it would otherwise?
A I mean, a higher factor -- if -- you say that for any -- if I used the lowest published value, I would get a higher factor of safety than if I used the lowest published value minus one.

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Q I believe I'm confused now. If it wasn't happening before, it --
A I'm saying mathematically, yeah, but the lowest published value -- just because you did not use the lowest published value does not mean you are unconservative.
Q I didn't suggest that in my question. I'm just saying, hypothetically, let's say you've got the lowest published value strength of material and you elect not to use that, and you use a value that has higher strength than that lowest published value, would that not have necessarily the effect of at the end of the day your calculation of providing a higher factor of safety than had you used that lower value?
A Yes. If you use higher input values, you'll get higher numbers at the end.
Q Thank you.
Did BFI perform any kind of testing on the soil materials that were utilized in your slope stability analysis to justify going higher than the lowest published values?
A There are a number of tests that are provided in the application. If you would like, I could show you.
Q If you could point those out, that would be

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appreciated.
A Yes, sir. If I can find the right volume.
MR. RENBARGER: Judge, while we're waiting a moment, in housekeeping, I failed to request admission of TJFA-13.
JUDGE NEWCHURCH: Any objection?
MR. CARLSON: I do, Your Honor. It's hearsay.
JUDGE NEWCHURCH: Your response?
MR. RENBARGER: My response is this information was produced as noted in the Bates stamps in the lower right-hand corner on both of the pages. It was produced in discovery and as such is self-authenticated.
MR. CARLSON: I'm not objecting to its authenticity.
JUDGE NEWCHURCH: All right. It purports to be an e-mail from Mike Snyder who testified yesterday to Greg Lewis, who is testifying today, and a response from Greg Lewis to Mr. Snyder.
MR. RENBARGER: I would be happy to go back with this witness and do further examination, if that's the interest of the Court.
MR. CARLSON: I don't think he can get it through this witness, unless if he wants to make it a

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business record. I guess he can try, but that's still hearsay within hearsay.
JUDGE NEWCHURCH: Now, I'm sorry. That's hypertechnical. Both witnesses have testified. Both witnesses have been called. Both witnesses can be recalled. It's not hearsay.
Objection is overruled.
If you want to cross-examine him, you are free to do that, either now or on rebuttal.
Q (BY MR. RENBARGER) Mr. Adams, did you find parts of the application that you were going to direct my attention to for purposes of your strength testing?
A Yes. The first place we'll go to would be Attachment 4, Appendix 4E.
Q And is there a Bates stamp number on that?
A Yes, sir. That would be 000727.
JUDGE NEWCHURCH: I'm sorry. I misread. I read Greg Lewis as Gregg Adams. This is Gregg Lewis, right?
MR. RENBARGER: Yes, sir.
JUDGE NEWCHURCH: That's my mistake. Let me think about that a second.
Greg Lewis is not among the witnesses.
MR. CARLSON: He is a witness, but he's not testified yet, and he's not a Biggs & Mathews' employee.

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And my point is that this witness is not included in either exchange.
Judge?
JUDGE NEWCHURCH: Yes, sir.
MR. CARLSON: I'll withdraw the objection.
JUDGE NEWCHURCH: Objection is withdrawn. So Exhibit 13 is admitted.
(Exhibit TJFA No. 13 admitted)
Q (BY MR. RENBARGER) Mr. Adams, I think we're back on the record. I think you were directing our attention to Page 727 of the application; is that right?
A Yes.
Q And from your review of Page 727, can you identify the types of testing that may have occurred to justify the strength numbers you used in your slope stability analysis?
A Yes, sir. If you will look in the -- I guess probably the left-hand side, would be the second, third, fourth, and fifth columns. They have classification tests denoted as liquid limit, plastic limit, and plasticity index. Those tests are indicators of material properties, so we would consider those.
Unit dry weights, move over one column where you see the area there. Those would be dry weights of the different materials in place.

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And then unconfined compressive strengths is on the -- all of those things together give us ideas of the properties of materials, of what type of properties we can expect.

Now, if you will go back to Appendix 4B. If you will look on 4B, you will notice in some locations on the logs, I'll note the first one, EB-1, which is stamped 000518, there's -- again, that laboratory test is on the log, also, the same test from the summary table. Plus, there's a hand penetrometer. Again, it's an indicator. Not a direct measurement, but it's an indicator. If we were to move from those logs to beginning at 000560.

Q Okay.

A And if you are looking, and if so, we'll start with B-1 and look at the -- at that log, there's a column, blows per foot. That's an indication of the number -- there was a split-spoon sample taken there. They drove a spoon in and they counted the number of blows it took to drive it one foot. And so throughout those logs where the split-spoon samples were taken, you will have a blow per foot. Another strength indicator of consistency and strength of material.

The next column you have unit dry weights. You can look at those and see how dense the material is.

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And then finally on that column -- on these logs, we also have moisture contents, plastic limits, and liquid limits. And it's a little difficult to read, but if you will look along the scale on the far right-hand side there's a little circle with an X and an arrow on it. That would be the compressive strength. And what they've logged those as, that scale is in tons per square foot, so you see 1.4. They're reporting those something greater than 1.4. So, again, those are -- those are all the information that we use to develop -- that I've used to develop an idea of the condition of the soil.

Q Okay. Well, just looking at the boring logs, and I believe Page 518 was your example, and also Page 560 boring logs from what was apparently a prior subsurface investigation, just looking at those, it appears to be the property of these materials change with depth; is that correct?

A The materials tend to become -- as you get deeper, they tend to become denser.

Q So would you agree with me there is quite a bit of variance within the material themselves?

A Not quite a bit.

Q Well, they do change, don't they?

A Yes, there is variance.

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Q So there's not a hundred percent consistency from the ground surface to the unweathered Taylor, for example, with regard to the physical properties of these materials, right?

A Well, physical properties of the -- tend to be -- there's unweathered and there tends to be a little more difference between the weathered and the unweathered with any section. I would expect the unweathered to be denser and stronger than the weathered.

Q Correct.

A And that's borne out. That's what I see.

Q In selecting the strengths utilized in your stability analyses, did you look at any of the published values for those materials in the Abramson text that I referred to earlier in your testimony?

A No.

Q I believe -- in your prefiled testimony, Mr. Adams, I believe you talked about, again, the term factors of safety with regard to slope stability, right?

A Yes, sir.

Q And with your indulgence, would you please reiterate what the term "factors of safety" means vis-a-vis landfill slope?

A Yes. It would simply be if we were to

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calculate all of the driving forces, the forces to make something move -- well, I take that back.

If we calculate the resisting forces, the forces that resist movement, divide that by the forces that would cause movement, we would get a number. So if the resisting forces equal the driving forces, we would have a factor of safety of one, and we would be at equilibrium -- we would be stable. If we were to have a resisting force less than the driving forces, then we would expect movement and failure, and we'd have a factor of safety less than one.

Q Okay.

MR. RENBARGER: May I approach, Judge?

JUDGE NEWCHURCH: Yes, sir.

(Exhibit TJFA No. 14 marked)

Q (BY MR. RENBARGER) I believe you've just been handed a copy of a document, and I believe this is going to be referred to as TJFA-14. Do you have that in front of you?

A Yes.

Q What is TJFA-14?

A It says the "Recommended Minimum Values of Factor of Safety For Slope Stability Analyses."

Q I'll represent to you, Mr. Adams, this chart came from the EPA's Solid Waste Disposal Facility

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Criteria Technical Manual. Have you seen this before?
A Yes.
Q And you have no reason to dispute that's the source of the document, do you?
A No.
Q Now, what factors of safety does the EPA recognize as reflected on Table 2.4 as appropriate if the consequences of a slope failure would result in an imminent danger to human life or a major environmental impact if a slope fails?
A Are we talking in their matrix --
Q Correct.
A -- you are on the bottom row, and they have "Imminent danger to human life or major environmental impact," they recommend -- they have four recommendations.
Q Right.
A 1.5, 2.0 or greater. They also recommend a 1.3 and 1.7 or greater.
Q And I believe the EPA's chart also distinguishes between those numbers based on the uncertainty of strength measurements, correct?
A Yes.
Q For example, looking at the column for imminent danger to human life or nature or environmental impact

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if slope fails, that can be a 1.5 factor of safety, can it not?
A Yes.
Q If there is very little uncertainty about the strength measurements of the materials involved, right?
A Yes. If they're --
Q According to the chart?
A Yes. According to the chart, if that ends up too small.
Q And if it is large, in other words, there's a great deal of uncertainty about the strength measurements, then that factor of safety then goes up to two or greater, correct?
A Correct.
Q Do you agree or disagree with the factors of safety represented in Table 2.4 of Exhibit TJFA-14?
A In principle, I agree.
Q And you do recognize this as a common resource document utilized in Subtitle D, right?
A I don't know how common it is. I recognize the document.
Q It's from the EPA, isn't it?
A Yes.
MR. RENBARGER: Move to admit TJFA-14.
MR. CARLSON: We don't have any objections.

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I think this is already part of PC-5, which is not in the record at this point.
JUDGE NEWCHURCH: 14 is admitted.
(Exhibit TJFA No. 14 admitted)
Q (BY MR. RENBARGER) Mr. Adams, if I could direct your attention to Page 753 of the application.
A Okay.
Q You've got that in front of you, right?
A Yes.
Q Now, Mr. Adams, you did not include the strengths of geosynthetics in your slope stability analysis, did you?
A In some I did. I did where it was appropriate.
Q Okay. Well, let's take a look at Page 753, if you would, please. And at the top of the page, I believe it's got a couple of notations. One is "Required" followed by a colon. And below that the word "Solution" followed by a colon. Do you see those?
A Yes.
Q Would you please read that into the record?
A Which part? Oh, after "Solution"?
Q After "Required" and then after "Solution."
A Okay. "Required: Select the appropriate soil parameters for slope stability analyses.
"Solution: The following materials will be

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included in the slope stability analyses, geosynthetics will not be included in the slope stability analyses. The stability of geosynthetics is included in the liner stability calculations."
Q Okay. So with respect to Page 753, there is an indication that geosynthetics with regard to the liner are not included in your slope stability calculations, right?
A They are not included in these slope stability calculations, these that follow.
Q These that follow?
A Yes. There are slope stability calculations that include the geosynthetics.
Q And would that also be true with respect to the bottom liner system?
A Yes.
Q Okay. So when you're -- on Page 753, when you're reading the second sentence under that heading Solution, "The stability of the geosynthetics is included in the liner stability calculations," is that reference to all liner systems or just some liner systems?
In other words, are we talking about just the side-slope liner systems, or are we talking about those liner systems as well as the bottom liner systems?

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A Well, in the calculation I presented, I believe what is presented is the side-slope liner.
Q But not the bottom-slope liner?
A Those are not presented in there.
Q Okay. Thank you.
Would you agree with me that the geomembranes or the geosynthetic materials used in landfills are generally not considered to be stronger materials than, say, the compacted clay liners?
A Stronger? No, I couldn't agree with that.
Q Could not.
Would you agree that the geomembranes or geosynthetic materials used in landfill liners are considered to be of lesser strengths than the compacted waste?
MR. CARLSON: Objection, Judge. It's confusing. I don't know what strengths he's talking about.
MR. RENBARGER: I'm talking about in general.
Q (BY MR. RENBARGER) Generally, if you have a compacted waste, would you expect that material to have greater strength than your geosynthetic material?
A Well, geosynthetics have strengths and tension. They have a wind shear -- I mean, I don't know which

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strength we're speaking of.
Q Okay. Let's talk about shear. How about shear strengths?
A Okay.
Q Same question.
A I would expect that the compacted waste would probably have a higher internal shear strength than the -- and I'll have to specify -- than some of the interface strengths between geosynthetics.
Q Okay. Could I direct your attention now to Page 780 of the application?
A Yes.
Q Do you have that in front of you?
A Yes.
Q And Page 781, as well. That's in front of you as well, correct?
A Okay.
Q Now, if you will look at Page 781 from the application, what does that document reflect?
A 781?
Q Yes, sir.
A That is the output file from a PC-STABL run.
Q It's a computer run, isn't it?
A Yes.
Q And is the cover page of a computer run

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examining what area of the landfill for slope stability analyses?
A That one -- that should be for a final waste slope.
Q Final waste slope?
A Yes.
Q This would be a completion of the landfill, correct?
A Correct.
Q When is Page 781 dated, at least the cover page for that?
A The cover page for that run is 4/18/2006.
Q Okay. Now, if we go to the bottom of Page 781 under the large heading Isotropic Soil Parameters -- do you see that?
A Yes.
Q We have three types of soil identified, correct?
A Correct.
Q Let's look at Soil No. 1, the bottom of the page. And what type of soil does Soil Type No. 1 represent?
A I would say Soil 1 represents -- let's see -- would represent the weathered Taylor marl.
Q What about Soil Type No. 2?

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A Soil No. 2 -- I believe Soil No. 2 would be the unweathered.
Q Unweathered Taylor?
A Yes.
Q What about Soil Type No. 3?
A Soil Type No. 3 would be solid waste.
Q So for each of these soil types, we've got weathered Taylor, unweathered, and solid waste, correct?
A Yes.
Q So if I understand it correctly, the three soil types that are represented at the bottom of Page 781 reflect the inputs into that computer run, correct?
A Correct.
Q Okay. Look at Page 780 of the application. At the top of the page there's the indication Sunset Farms Waste Slope.
A Yes.
Q "FS Min = 1.978," what does that reflect?
A That was the minimal factor of safety that was calculated.
Q By the computer run that starts on Page 781; is that right?
A Yes.
Q But the factor of safety on Page 780 of 1.978, that does not take into account the interfaces between

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the geomembrane or geosynthetic materials compromising the liner system, does it?
A No. This run is for a -- this is a circular failure --
Q Does not on Page 780 with your diagram, doesn't it indicate there that some of these surfaces come in contact -- well, strike that. Let's start over.
On Page 780, we have kind of a -- I'll call it a multiple-lined curved structure. Do you see that in the -- on that page?
A Yes.
Q What does that represent?
A That is the surface that -- the calculation run that we predicted the resistance along that plane and the driving weight along that plane.
Q Okay. And if you look on Page 780, kind of at the right-hand column, there's a horizontal line between two large dots. And underneath that is the notation S3. What does that mean? Are you with me?
A Yes. That is Soil Type 3.
Q Soil Type 3.
Similarly, as you go down the curve again, you've got an S1 and S2. Are those also reflective of soil types?
A Yes.

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Q What does the horizontal line underneath the curved lines represent? And I'll say it's at Elevation 580. Let's use that one first.
A At 580?
Q Yes, sir.
A I believe that's a grid line.
Q What do you mean when you say "grid line"?
A Are you talking about the dashed line --
Q Yes, sir.
A -- that says 580?
Q There's a dashed line and a median line above the dashed line that says 580. Within the confines of the curved multi-lines going left to right, there's a dark line just above that 580 dashed line. What does that represent?
A That is the bottom of the excavation.
Q The bottom of the excavation.
And what about the dark line that is below the 580 dotted line, proceeding from left to right across?
A I believe that -- that's the top of the soil layer, too.
Q Top of the soil layer where? At the bottom of the landfill?
A In that location of that section. This is a

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profile.
Q I understand.
A And the line that goes from immediately below, that would be the top of what we have designated as Soil Layer No. 2. There are two soil layers.
Q And Soil Layer No. 2, as I recall, is the unweathered Taylor, correct?
A Correct.
Q Isn't that the bottom of the landfill?
A No. The bottom of the landfill is the line above that.
Q It's which line? I'm sorry?
A The bottom of the landfill is the line -- in this section, the bottom of the landfill does not touch the unweathered. It's close, but it doesn't touch it.
Q And where on Page 780 -- could you point to it to help me find that?
A The bottom of the landfill?
Q Yes, sir.
A If you were to look at -- there's a point -- you see W1?
Q I do.
A If you were to go from W1 to W1 to the far side, there's a line between those.
Q Correct.

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A That's the bottom of the landfill. I've also set the water surface at the bottom of the landfill, and so they coincide.
Q And the bottom of the landfill is actually where we've got our composite liner system, correct?
A Yes. And if you will notice, this particular analysis passes through the liner system, not along it. And the liner system, the reason I don't include them in this analysis, this particular run, is because they don't -- they do not provide substantial resistance or driving weight. We'll see it passing -- this surface is passing through them and are they overlying at the bottom of the surface. And the geosynthetics just don't contribute enough driving force or resistance force to make a difference in this calculation.
Q Okay. How do we know that?
A Well, I know that from my experience. They're not thick. If you look at the resistance forces, how much resistance is along an area, well, they're only 60 mL thick.
Q Correct.
A So when I pass through it, it's just not enough area to provide any resistance force.
Q Okay. Well, in looking at the line, I believe you indicated it's at the bottom of the landfill, which

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is the dark line which is just above the 580 dotted line, correct?
A Yes.
Q Okay. Now, isn't there a point on this diagram where the multiple curved lines intersect that line, correct?
A Yes.
Q And at that intersection is there not forces brought to bear on that liner?
A For this particular surface that just passes through the liner and below it, the liner is inconsequential.
Q Well, perhaps what I'm struggling with is the fact that the multiple curved lines appear to go beneath the liner system. And in real-world conditions, that is not going to take place, right?
A Well, this is -- well, I went through a number of analyses.
Q I understand.
A And I was trying to pare it down to find which one is going to provide the lowest factor of safety.
Q Correct.
A This is the one that provide -- that I calculated to be the lowest factor of safety.
Q Okay.

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A Now -- and it passes through. It passes beneath the liner system. Those that pass through the liner system had numbers greater than this.
MR. RENBARGER: May I approach, Judge?
JUDGE NEWCHURCH: Yes, sir.
(Exhibit TJFA No. 15 marked)
Q (BY MR. RENBARGER) Okay. Mr. Adams?
A Yes, sir.
Q I just handed you a several-page document that's been presumably marked by the court reporter as TJFA-15. Do you have that in front of you?
A Yes, sir.
Q Now, TJFA-15 is comprised of pages of documents received in discovery starting at 31521, 31523, 31524, 31973, and 31974, correct?
A Yes, sir.
MR. BLACKBURN: Is that all one exhibit?
MR. RENBARGER: That is all one exhibit.
Q (BY MR. RENBARGER) Okay. Looking at Page 31521, again this would appear to be from e-mail files from discovery. Going on now to Page 31523, what does 31523 appear to reflect, Mr. Adams?
A It looks like an e-mail that was sent -- let's see. It was sent to Michael Stewart from a J. Lang, and it is -- it looks like they were giving the results of

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some interface shear testing for the Sunset Farms Landfill.
Q Have you seen this before?
A Yes, sir.
Q Who is Michael Stewart?
A I think Michael Stewart works for BFI.
Q Did he participate in the BFI permit application?
A I've met him. I don't know his level of participation.
Q But he is affiliated with BFI's parent company, Allied Waste, right?
A That's how he was introduced to me.
Q How about J. Lang? Do you know him?
A No.
Q But you did indicate, I believe, earlier in testimony that GeoSyntec apparently did some quality control review of the liner analyses, correct?
A It's my understanding they were doing quality control of the liner installation.
Q Look on the third paragraph on Page 31523, starting with the words "Slope stability." Do you see that?
A Yes.
Q Would you mind reading that third paragraph

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into the record, please?
A "Slope stability analyses that consider potential slip surfaces through the liner system during waste placement (an interim condition) and with the landfill at final grades were not conducted by EMCON. In GeoSyntec's experience, these cases may be the most critical for slope stability. GeoSyntec strongly recommends that both of these cases be evaluated. It may be that these analyses have already been conducted by Biggs & Mathews and are included in your expansion permit. It is further noted that the liner system on the floor of the landfill is a smooth geomembrane and has a lower interface shear strength with compacted clay and geocomposite than a textured geomembrane. The presence of the smooth geomembrane was not considered in the slope stability analysis."
Q Mr. Adams, do you agree with GeoSyntec's statements that the most critical of slope stability analysis may involve the potential slip surfaces through the liner system during the waste placement?
A I agree that that can be critical and it should be considered.
Q It should be considered?
A Yes.
Q Do you agree with GeoSyntec's comments that one

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of the most critical slope stability analyses may also involve the potential slip of surfaces through the liner system with the landfill at final grade?
A In some cases that can be -- that can be the case.
Q The last two sentences that you just read into the record also state that the liner system on the floor of the landfill, by being a smooth geomembrane, does not possess the interface strength as the compacted clay and textural geomembrane surfaces, right?
A Correct.
Q In fact, the last sentence appears to reflect that the smooth geomembrane liner was not considered in the former slope stability analysis provided by EMCON, correct?
A That's what it appears to me it said.
Q And in the last paragraph of Page 31523, it would appear to suggest that "You may want to pass the results of the interface tests to Biggs & Mathews to make sure the results are consistent with the assumptions used for the vertical expansion," correct?
Do you see that?
A Yes.
Q Okay. Let's move on to Page 31974, please.
Well, first of all, before we get there,

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how about 31973? This is a document info page that would reflect e-mails from GWA. And I presume that to be your e-mail files, right, Mr. Adams?
A Yes, sir.
Q Okay. Now let's go to 31974. And as I read it, 31974 appears to be a string of e-mails involving Michael Stewart, as we mentioned earlier, also Adam Mehevec and yourself, that relate to the geosynthetic memo described on Page 31523, right?
A Yes.
Q What date appears -- excuse me. What date appears on Page 31974 for this e-mail string?
A August the 30th, 2006.
Q Okay. And going back to Page 31523, I believe that e-mail also indicated it was also produced on August the 30th, 2006, as well, right?
A Yes.
Q At the top of Page 31974, it appears that you responded to an e-mail received from Mr. Adam Mehevec, right?
A Yes.
Q Would you please read into the record the second complete sentence at the top of the page in your e-mail response to Mr. Mehevec?
A "We did evaluate the potential slip surface

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through the liner system for the final waste heights and found that it was not the critical surface, so we did not include it in the permit."
Q Okay. And if I understand that statement, Mr. Adams, you indicated that a slope stability analysis was run for the potential slip surface through the liner system, but found that it was just not a critical surface, right?
A Yes, sir.
Q And that's why it was not included in the application, correct? Right?
A Yes, sir.
Q Mr. Adams, if this particular analysis was not included in the application, do you have any reason to know why this analysis was not provided to the parties in discovery in this case?
A Because I run multiple analyses, and I do not -- I don't keep any of them.
Q You no longer have a copy of this analysis?
A No, sir.
Q So even if I were to request it here today, you would not be able to provide a copy of that analysis for my review; is that right?
A That's correct.
Q Do you recall what strength values that you

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assigned to the smooth membrane of this referenced analysis?
A No, sir, not off the top of my head.
Q How about cohesion numbers?
A No.
Q Friction numbers, do you recall those?
A No.
Q Assume with me, just for the sake of discussion, that the properties of the smooth geomembrane liner and its interface with the clay liner to be a critical area of analysis, wouldn't you expect the factors of safety to be lower than the factors of safety that were calculated that we just looked at in exhibit -- excuse me -- on Page 801 of the application?
A Can you rephrase that, please?
Q I'll try.
We just talked a moment ago about Page 801 of the application, the different soils on the bottom of the liner --
A Yes.
Q -- or the bottom of the landfill. Excuse me.
Now, if you had --
MR. GOSSELINK: 781? 801?
MR. RENBARGER: I meant to say 801. Did I say 781?

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MR. GOSSELINK: You said 801. I don't recall us talking about 801.
MR. RENBARGER: What did I do with that page number? I'm going to confuse the record here.
Q (BY MR. RENBARGER) I beg your pardon. It was 780 and 781, I believe.
A That's actually where I turned.
Q Let's start over on this one, okay?
We talked about -- we talked about the analysis that you performed on Page 780 and 781 a moment ago.
A Yes.
Q I guess my question is, again, just for the sake of discussion: If we had -- assuming that the properties -- this smooth geomembrane and its interface with the clay liner, that's a critical area, wouldn't we expect that the factors of safety for that interface to be lower than the factors of safety as represented on Page 780?
A No. It would be the configuration of the slope.
Q I beg your pardon? I couldn't hear you.
A No. I said I wouldn't expect them to be lower.
Q You wouldn't expect that factor of safety to be lower?

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A No. The factor of safety is calculated from all of the resisting forces. I mean, strengths are important, but the configuration of the slope and the layer of the materials is also important. There has to -- to create a low factor of safety, you either have to have a very low resistance or you have to have a high driving force.
Q Okay. Let's move along, then.
Mr. Adams, is it your testimony that you received a copy of the e-mail from J. Lang to Michael Stewart as reflected on Page 31523?
A Yes. I recall receiving an e-mail.
Q Okay. Based on the --
A This looks familiar.
Q Very well, then. And it is of the same date as the dates of the e-mail string on 31974, correct?
A It appears to be.
Q And if we start at the bottom of Page 31974, we've got Michael Stewart sending a document, the subject of which is titled "Fwd: RE: Sunset Farms - Interface Testing," right?
Do you see that?
A Are we on 31974?
Q Yes, we are. At the bottom of the page, the original message.

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A Yes, I see that.
Q Okay.
MR. CARLSON: Mr. Renbarger, if you're going to offer this, I'm not going to object to it.
MR. RENBARGER: I just want to connect the dots.
MR. CARLSON: Just trying to speed stuff up.
MR. RENBARGER: Thank you.
In the interest of time, then, we would offer TJFA-15.
JUDGE NEWCHURCH: And there's no objection?
MR. CARLSON: No, Your Honor.
JUDGE NEWCHURCH: So TJFA-15 is admitted.
(Exhibit TJFA No. 15 admitted)
JUDGE NEWCHURCH: Mr. Renbarger, I think we're ready for lunch. Let's eat.
MR. RENBARGER: Okay.
JUDGE NEWCHURCH: We'll break until 1:30.
(Recess: 12:00 p.m. to 1:33 p.m.)

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AFTERNOON SESSION
JANUARY 22, 2009
(1:33 p.m.)
JUDGE NEWCHURCH: Any preliminary matters?
MR. CARLSON: No, Your Honor.
JUDGE NEWCHURCH: Mr. Renbarger, you may continue.
MR. RENBARGER: Thank you.
PRESENTATION ON BEHALF OF
BFI WASTE SYSTEMS OF NORTH AMERICA, INC.
(CONTINUED)
GREGORY WADE ADAMS, P.E.,
having been previously sworn, continued to testify as follows:
CROSS-EXAMINATION (CONTINUED)
BY MR. RENBARGER:
Q Good afternoon, Mr. Adams.
Mr. Adams, going back to the testimony we were dealing with right before our lunch break, if I could direct your attention back to Page 780 and 781 of the application.
A Yes, sir, I have that.
Q You have that in front of you? Okay. If you look at the diagram -- strike that.
Would you agree with me that because of

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their comparatively low strengths that geosynthetic interfaces control the failure surface?
A Not as a global statement, no.
JUDGE NEWCHURCH: Mr. Renbarger, could you pull your microphone a little closer?
MR. RENBARGER: I beg your pardon. Sure. Did you hear that all right, or do I need to repeat?
JUDGE NEWCHURCH: Sure. That would be great.
MR. RENBARGER: All right.
I was just asking Mr. Adams because of their comparable low strengths, don't geosynthetic interfaces control the failure surface in a landfill? And I believe he answered --
A No.
Q (BY MR. RENBARGER) Excuse me. Go ahead.
A And my answer would be not necessarily.
Q Okay. Let me ask it in a different way. Hypothetically, could these interfaces control the failure surface?
A If the interfaces were located at the right location, they could.
Q Okay. Now I would like to refer you to Page 780 of the application. I believe you've got that in front of you, correct?

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A Yes.
Q Looking at the diagram on Page 780 of the application, is there any representation made on that diagram to reflect any geosynthetic interface?
A No.
Q Would you agree with me that in order to properly calculate the slope stability analysis, those geosynthetic interfaces should be included in that analysis?
A Not in that particular analysis.
Q The fact of the matter is, isn't it, Mr. Adams, that the materials reflected on Page 780 and 781 are not how the landfill is actually constructed, correct?
A That is an idealized analysis because I'm looking at a particular failure surface, and that is a global failure surface through the waste or through the soils and that foundation materials beneath it.
Q Correct. And my question is limited to Page 780 here, and that is: This does not represent how the landfill will be constructed with respect to this liner, correct?
A Correct.
Q Now, going back to TJFA Exhibit 15, do you have that still with you?
A Yes.

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Q Now if we look at Page 31974 of TJFA Exhibit 15, this is our e-mail chain, correct?
A Yes, sir.
Q And I believe we established the date of that was August 30th, right?
A That's what it says on my copy.
Q Similarly, that same exhibit on Page 31523, once again, we have the date of August 30th, 2006, correct?
A That's what it says, yes.
Q Now, looking again at Page 781 of the exhibit, I believe we established that that computer program run took place on 4/18 of 2006, correct?
A Yes.
Q So the e-mail string in Exhibit TJFA-15 actually occurred after this computer program run on Page 781 took place, right?
A Yes.
Q And it is your testimony, as I understand it, that subsequent to that you didn't go back and recompute that, correct?
A That -- subsequent to this?
Q Subsequent to the e-mails in -- on August 30th, 2006, you did not go back, based on that information, and recompute your stability analysis, correct?

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A No. I believe it -- when I actually had made those runs -- I can't tell you the actual dates, but I believe that before this 4/18 run was made, that's when I had made multiple runs of different scenarios.
Q I understand that, but I'm saying subsequent to that. Subsequent to August 30th --
A Did I make additional runs?
Q Yes, sir. That's my question.
A I don't recall.
MR. RENBARGER: Pass the witness.
JUDGE NEWCHURCH: Mr. Blackburn?
CROSS-EXAMINATION
BY MR. BLACKBURN:
Q I have just a few questions. First, I'd like to talk with you a little bit about the expansion above the area that has no Subtitle D liner on it or beneath it. Are you aware that there's a portion of the landfill that has no Subtitle D liner?
A Yes, sir.
Q And would you agree with me that if the landfill were proposed under the new rules, it would need a Subtitle D liner put between the old waste area and the new waste area?
A Yes.
Q Would you agree with me that is best

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engineering practice?
A No.
Q Do you think it is necessary to have such a divider between the old waste area and the new waste area?
A I don't have a firm opinion on that right now. I have not been asked to evaluate one, and so I've not really come to a firm conclusion on what I believe is best.
Q Did you have any discussions with the BFI personnel about putting such a liner in?
A No.
Q You were never asked to consider placing such a liner in; is that correct?
A That's correct.
Q Were you involved in the rule-making process at TCEQ that led to the adoption of the new rules?
A Only in that I read the proposed rule, but, no, I was not a part of the rule-making process.
Q And you didn't participate in that process or put forth opinions or arguments one way or another?
A That's correct.
Q Have you undertaken any investigation as to the integrity of the pre-Subtitle D liner, whatever it may be?

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A At Sunset Farms?
Q At Sunset Farms.
A Only -- I have asked about them, and I have looked at the certifications, the paper trail.
Q That would be the paper trail that followed the construction process when it was laid down initially?
A Yes.
Q And when was that done?
A I believe -- and they occurred sometime from the early 1980s, and that would -- then that would take it up through -- well, pre-Subtitle D, by definition, it would be up through 1993.
Q Now, when new waste is deposited over the existing waste that is atop of the pre-Subtitle D liner, will precipitation falling on that waste essentially work its way down to the pre-Subtitle D liner?
A It could if it over -- if there's more water than the capacity of the waste to hold on to it.
Q I guess that presumes it would rain again in the future.
A Enough to overcome the fill capacity.
Q Right. And so being a pre-Subtitle D liner means that there's no leachate removal system; is that correct?
A That's my understanding of these liner systems.

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Q So that means that as the height is increased, the potential amount of water that accumulates on top of the pre-Subtitle D liner would increase over time?
A I've not looked at the water balance calculations for this area, so I couldn't say that.
Q Has anyone calculated what that buildup would be as a part of this application process?
A I'm not aware if they have. I mean, I can't speak to it.
Q You can't point me to a section of the application that would have that analysis?
A No, sir, I couldn't.
Q Okay. Now, do you know what the depth of the pre-Subtitle D landfill area is?
A Below existing ground, around the outside?
Q Yes, sir.
A My understanding of that is that it is somewhere between 10 to 20 feet.
Q Okay.
A I do not know the elevation, so I've had to ask and make some assumptions for the configurations that I put together.
Q And if the water level internal to the landfill were to rise above ground level -- and that's an assumption I'm asking you to make -- would that in any

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way threaten the structural integrity of the side of the landfill?
MR. CARLSON: Objection; confusing. The water level would rise above the ground level?
MR. BLACKBURN: The water level with the -- internal to the landfill.
Q (BY MR. BLACKBURN) The landfill is carved out of the existing ground. Do you follow that, Mr. Adams?
A Yes.
Q And I think your prior testimony was that it was 10 to 20 feet. You weren't quite sure which, but there was some distance that the excavation was to the ground?
A Yes.
Q And I'm asking you to assume that whatever that distance is, that it fills up with water.
A Uh-huh.
Q And that the water level rises higher than the adjacent ground level. I'm just asking you to make that as an assumption. Do you understand my question now?
A I understand your premise.
Q The premise.
And the question would be: In your mind, if that water level rose internally above ground level, would that threaten the stability of the side of the

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landfill?
A As a general statement, I don't know. I would have to look specifically at the configuration and where is the water level. Just to say it rises above ground level, I would say that that is -- that is a factor to consider.
Q It would be of some concern to you as a civil engineer?
A Limited concern.
Q Now, I want to ask you a bit about the underdrain system that I believe you were questioned on earlier. Now, my understanding is that on the subtitle -- I think it's on the new liner, the Subtitle D portion of the liner, but I may be mistaken. Can you tell me where that underdrain is at the Sunset Farms Landfill at the current time?
A My understanding is that it is under the Subtitle D liner.
Q And that underdrain was placed for the purposes of removing water that would lead to pressure until there was sufficient waste to ballast the liner; is that correct?
A Yes, that's correct.
Q And am I correct in my understanding that the underdrain is now disconnected because there's

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sufficient waste to ballast the liner?
A I do not know.
Q You don't know?
Do you know as a general proposition what the practice is with regard to these underdrains? Are they generally disconnected, or are they left intact after there has been sufficient waste deposited to essentially offset the upward thrust of the groundwater?
A From client to client, it's not consistent. Some people decommission them as soon as they have enough waste. Some wait and don't do it that quickly.
Q Do you know what the status is of the underdrain at Sunset Farms?
A No.
MR. BLACKBURN: No further questions. Pass the witness.
JUDGE NEWCHURCH: Is there redirect?
MR. CARLSON: Yes, Your Honor.
REDIRECT EXAMINATION
BY MR. CARLSON:
Q Mr. Adams, you were asked, oh, several -- almost an hour of questioning on slope stability this morning before lunch. I would like to follow up on that for a bit, please.
Does TCEQ have any rules that say exactly

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what an applicant must do in connection with a slope stability analysis for a permit application?
A No.
Q Do they have any rules -- does the agency have any rules that say what an applicant must include in the application pertaining to slope stability?
A Not that I'm aware of.
Q Okay. Are there any TCEQ technical guidance documents that you're aware of that pertain to slope stability and slope stability calculations and demonstration?
A No.
Q Okay. When Mr. Renbarger was asking you questions this morning about slope stability, were some of the questions mixing and matching -- mixing concepts?
A To some degree.
MR. BLACKBURN: Objection; it's confusing.
MR. RENBARGER: Objection.
MR. CARLSON: Withdrawn.
JUDGE NEWCHURCH: The question is withdrawn. Strike the answer and go to the next question.
Q (BY MR. CARLSON) I'd like to talk a little bit about some basic slope stability concepts. Okay?
A All right.

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Q Okay. What types of slopes are there at a landfill?
A Basically, we have belowgrade slopes. That would be the slope that we excavated below grade, into the ground, and alternately we'll call those excavated slopes. If they're for the lined area, we may refer to them as sidewall slopes.
Q Any other categories of slopes?
A Yes. We will have waste slopes. They can be either -- we classify as an interim slope, one that's not reached its final configuration.
And then we can have final waste slopes. In this case, it would be the slope of the trash above ground at final grades.
Q Any other categories of slopes?
A Well, we --
Q What's an interim slope?
A An interim slope would be -- as far as an interim waste slope, it would be any waste slope that's not at its final configuration. It could be -- typically that would be interior to the landfill. I mean, generally, you want to build the exterior slopes to final grade as you come up with them. And interior, as you develop lined areas themselves, you may have slopes that aren't to the perimeter and aren't final

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grade.
Q So if I understand you correctly, you're saying there are excavation slopes or sidewall slopes; those are below the ground, right?
A Yes.
Q And then there are waste slopes. There's two categories. There's a final waste slope; is that what you're talking about that is aboveground?
A Yes.
Q Okay. And an interim type of a slope, is that -- an example of that would be a slope of garbage at a working face?
A At a working face would be one. It's a temporary slope. It's one that is not -- it's not completed yet.
Q In connection with your slope stability analysis, did you look at all of these different types of slopes that we've just been discussing?
A Yes. I considered each of those. And I did different degrees of calculations and analyses on those.
Q There are different types of slope failures, as well, correct?
A Yes, that would be correct.
Q Can you please tell the Judge what type of slope failures there are, categories?

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A Yes. And if I could refer to my diagram that I had put --
Q Please do.
A Okay.
Q Are you referring to Exhibit GA-3, Mr. Adams?
A Yes, sir. Yes. That would be Exhibit GA-3. This is one -- I drew this. There are probably better representations in textbooks, but I simplified this to show exactly how I have used the terms.
A circular failure is -- it basically describes the way the failure surface looks. It's a traditional slide that you may see where the soil slides out in a circular pattern. It almost looks like you took a spoon and scooped it. We refer to that as a circular failure surface.
Q Is that also sometimes called a rotational failure?
A It could be rotational, yes.
Another one we see is if a mass moves in as what we refer to as a block failure, sometimes a translational failure it's called, but there may be a plane that's weaker and a big mass just slides along that plane. And that term -- I like to use the term "block failure" just because that's visual to me. It's a block that's moved.

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Q And that is sometimes called a wedge failure too?
A I've seen that referred to as a wedge failure or a translational failure.
Q Okay.
A And then we have a sliding failure. And sliding is just as it's described; one surface sliding over another. But unlike a block failure, we really use this -- and I use this to denote -- it would be a veneer failure.
And veneer, you're talking about something -- you know, it's a shallow -- parallel to the surface of the slope, typically. In landfills, if you are looking at where we would have a liner system that's constructed parallel to the slope, if that liner system were to move down the slope, that would be a sliding or a veneer failure.
Q Are those the three basic type of slope failures that are used for MSW landfill slope failure analyses?
A Yes. That's the ones I'm aware of.
Q Did you consider each of those types of potential failures in connection with your analysis on this permit application?
A Yes. Absolutely.

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Q What sort of risks are there that are associated with a slope failure at a landfill?
A Well, with a slope failure, the first risk you could have, it could be a monetary risk. If you have constructed -- if you're in the process of constructing a liner system or you're building one and it falls down and you have to put it back up there, that costs money, so you have a monetary risk.
There's a -- any time that you have a slope failure, potentially there could be a safety risk. You know, if someone was on a piece of equipment or standing at the top or the bottom of a slope and it fell, they could get hurt.
And then, finally, you know, depending on where it occurs and all of the conditions, there could be some environmental risk.
Q And that would be -- can you give an example of that, please, Mr. Adams?
A Well, if you had a slope failure that breached a containment system and allowed leachate to pass through the containment system you're counting on, that would be some risk.
Q Now, are there different methods of analyses to analyze potential risks associated with these different types of slope failures you've been talking about?

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A Well, there are different methods to analyze the potential for the slope failure. That's where we get back into the -- we do that and judge it by a factor of safety.
Q Okay. What is a global stability analysis?
A A global stability analysis would consider -- or I give you -- a circular failure would be a type of global stability analysis. A block failure could be a global stability analysis. Other terms that -- sometimes you will see -- you will see it referred to as a deep-seeded failure analysis.
Q Did you perform global analyses in connection with your work on this project?
A Yes, I did.
Q What is an infinite stability analysis?
A An infinite is a method -- a calculation method for looking at a sliding or a veneer type of failure surface.
Q Is that an analysis where you're looking at a potential slide between layers in a slope? For example, at the interface --
A Yes. And we --
Q Let me finish my question.
Is that an analysis pertaining to a potential failure along a plane where two different

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materials are meeting in a slope?
A Yes. When we use the term "infinite," we're not really concerned how long the slope is, because we don't -- we just neglect the effect of the material downslope and upslope from it and we're just thinking for a particular slope would it be stable.
Q Did you perform an infinite stability analysis, one or more, in connection with your work on this application?
A Yes, I did.
Q What is an interim stability analysis?
A Well, an interim would be a stability analysis of some interim condition or a temporary condition.
Q Such as a waste that's currently being placed into the landfill?
A Yes.
Q And the stability of that mass of waste?
A Yes.
Q Did you consider interim stability in connection with your work on this application?
A Yes. I considered those. I looked at the configuration of the landfill and basically how it was going to be built out.
Q This morning we looked at some computer printouts and there was the word "PC-STABL6" on the top

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of that. Do you recall that?
A Yes.
Q And that was some material from the application, correct?
A Correct.
Q Okay. What is PC-STABL6?
A It's a computer program. PC-STABL was the name of the program that was developed. Six is a particular version that is put out by Purdue University. It basically calculates slope stability -- run-slope stability calculations. It provides you several methods to run those calculations.
Q Is that program a program that is commonly used by geotechnical professionals who are working on landfill design issues, at least in your experience?
A In my experience, it's a common program.
Q Are there other similar types of programs?
A Yes.
Q Could you name a few?
A UTEXAS is one that I know some people use.
Q What sort of analysis did you do or can you do with your PC-STABL6 program?
A With PC-STABL6 we can look at circular failure surfaces. We can look at block failures. So that's the main type. There's several methods for doing each of

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those.
Q I assume you put in -- you input data; is that correct?
A Yes. You pick a cross-section that you want to analyze. So you will have to construct a profile of that section through a series of points that shows the ground surface and then each layer. You can add the layers in at the locations you want. And then you assign strength values to each of those layers, and then you go through a routine that searches. If I'm doing a circular failure, I have to -- what I want to do is I want to look at a lot of potential surfaces and try to narrow down to the one that gives me the lowest factor of safety.
Q Let me break this down a little bit. You create -- you input data, including a slope and some other input parameters; is that right?
A Yes.
Q And then you run your calculations using the program; is that right?
A That would be correct.
Q And what does that show you?
A Well, simply the output is like on Page 000780. For a particular run, that shows me where the surface that it calculated was, what the minimum factor of

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safety. I also -- in this particular version of PC-STABL, I get a histogram, which is basically a statistical analysis that tells me if I'm getting close to that minimum. Most of my runs are going through that area. But, basically, the output is in the form of a factor of safety.

Q Okay. How long does it take you to set up and run one iteration of that program?

A Well, it would take me about -- it takes me about 30, 35 minutes to set one up.

Q And after you set it up and run it, you get some results; is that correct?

A Yeah.

Q And then can you tweak the variables?

A Oh, absolutely. As a matter of fact, you have to. I said it's an interim process. So you have to begin and you have to narrow it down and you can tweak the variables as you sit there at the computer and just change the numbers and see how it affects things.

Q And you can look at different cross-sections of the landfill; is that correct?

A As many as you want to input.

Q And you can -- for each cross-section, you can do -- you can input different parameters, for example, soil shear strengths; is that fair to say?

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A Yes.

Q And can you look at different types of slope failures or look for different types of potential slope failures?

A Yes.

Q Okay. How many times over the course of your work in this application did you run an iteration or iterations of the PC-STABL6 program?

A On this application?

Q Yes, sir.

A Well up in the hundreds.

Q Did you look at a number of different scenarios?

A Yes.

Q What was the goal of running well over a hundred -- several hundred iterations?

A I wanted to -- I wanted to find where was the lowest calculated factor of safety, which one was critical and which one would provide the lowest factor of safety so I could present that in the permit.

Q And there was some discussion of a critical factor of safety. And I'll talk about that a little bit later on, but what factor of safety were you looking for to either meet or exceed?

A Well, I was using it as an acceptance

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criterion. I made all the runs to find what was the lowest calculated factor of safety to accept it as acceptable. I was using 1.5 for long-term conditions and 1.3 for a short-term condition.

Q Regarding -- strike that.

Did you perform infinite slope stability calculations?

A Yes.

Q Okay. Are those done on a computer typically, or is that done by hand?

A Well, I do them on a computer. I use an Excel spreadsheet that I set up.

Q Is it a complicated program or -- excuse me, calculation or relatively easy --

A Relatively easy, because I coded the Excel spreadsheet.

Q Maybe for an engineer. For a lawyer, it might be a little more complicated.

What is a critical case or a worst-case scenario in this context?

A In the context of?

Q Of a potential slope failure -- an analysis for a potential slope failure.

A Are you talking about the worst-case result?

Q I'm saying during this iterated process, you're

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looking for slope failures; is that correct?

A Right.

Q And you're looking for a slope that's most likely to fail, to do your analysis; is that fair to say?

A Yes.

Q Using numbers that would cause it to fail; is that right?

A Well, as part of the iteration, I typically reduce the -- I will reduce the numbers until I get a factor safety of less than one just out of curiosity to see where that occurs.

Q How do you go about looking for slopes to use for your analysis?

A Well, the geometry becomes very important, so I have to take the excavation plan and the final cover plan, the bottom to the top, and all the boring logs, but what I'm looking for is where -- where do I have the long slopes or tall slopes, what are the slopes, three-to-ones or four-to-ones, and just general characteristics of the geometry.

In the case of a block failure to occur across the floor of a liner, I would need a case where I have some grade towards the outside and maybe a very small perimeter berm, very little resistance. So I'm

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looking for these type situations that -- where experience has told me will lead to low factors of safety or potentially unstable slopes.
Q So if I understood you, in terms of geometry, you're looking at the potential steep slopes? Is a steeper slope potentially a slope that's more prone to failure?
A Yeah, the steeper.
Q Okay. And a longer slope, is that more or less prone to failure, all other things equal?
A Yes. Because -- remember, the driving force is the weight above it. So if it's taller, then it has more weight to drive it.
Q Do the materials, the properties of the materials in and around the area you're looking at, do those factor into your consideration of a potential worst-case or critical-case scenario?
A Yes, they do.
Q What sort of material properties would factor into your analysis?
A Well, if we were to have a, let's say a condition of alignment and we have just synthetics and I may have a -- you know, a plane that could develop, a slip along the liner, the orientation of that liner to the final slope configuration, if it's very deep in the

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bottom of the landfill and I have, you know, berms around it and I can't generate -- gravity can't generate a force to create a high force, then it's not critical. If it's very shallow, up close to the top, then, you know, it could get enough gravity.
Q Okay. Now, you mentioned calculating a factor of safety. What is a factor of safety, sir?
A It is the sum of the resisting forces divided by the sum of the sliding forces.
Q Can you explain that a little more in lay terms? When you're talking about driving factors, what is a driving factor, in lay terms?
A It is what force wants to push this material downhill, which would be -- it's -- it's weight. It's gravity. And so it wants to fall down the hill.
Q Okay.
A And what is -- and the resisting forces are what are -- what's keeping it from bobbling down the hill.
Q And you -- you use those two -- you use -- you compare the two of them together and you get a number; is that correct?
A That's what a slope stability calculation is.
Q Okay. And you're looking for what number to ensure that you have a stable slope?

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A Well, like I said, we typically use -- on short-term conditions, we feel good when factors of safety are 1.3 or greater. And for long-term permit conditions, traditionally 1.5 or greater has been the level of risk, level of confident -- that's where -- that's where we like to see that number.
Q When you're talking about short-term, what are you talking about, sir?
A A short-term is, say, an excavated slope before we put the liner on it and put trash in it. It's going to be in that condition for a short period of time.
Q Or perhaps --
A Or an interim slope. You know, it's going to be there for some short period of time. It won't be there for a long duration, so the level of risk is less.
Q And when you're talking about a long-term analysis, what are you talking about there, sir?
A Essentially, final configuration, permanent.
Q What is, in your experience, the industry standard, the MSW industry standard for long-term factor of safety, an acceptable long-term factor of safety for a landfill design?
A I have always seen 1.5 used.
Q What is your approximate understanding of what the TCEQ is looking for in terms of an acceptable

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long-term factor of safety?
A Well, based on my prior submittals to them, I believe they're satisfied with the 1.5.
Q Have you seen -- personally seen other engineers in the field use that 1.5 number as the design criterion for their work?
A Yes, sir.
Q Okay. Will you pull up TJFA-14, please, sir. It's the Table 2.4 from the EPA Manual.
A All right.
Q Do you have it?
A Yes.
Q Do you recall the discussion about the -- this table this morning?
A Yes.
Q If you look in the lower left-hand corner of the four -- the series of four numbers, the 1.5 and the 1.3. Do you see that?
A Yes.
Q Is that what you're referring to when -- when you're talking about using 1.5 for the long-term factor of safety analysis and the 1.3 for the short-term analysis?
A Well, that's actually not the -- the 1.5 would be the long-term. The 1.3 is the long-term seismic

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because seismic -- based on probabilities for -- they suggest a lower number for seismic stability. So the 1.5 would be long-term.

The 1.25 above that would be where we derive a short-term.

Q I'm sorry. Maybe I wasn't following you. I would like to direct your attention to the series of numbers there that say 1.5, and then have the parentheses 1.3 underneath. Do you see that?

A Yes.

Q Is the 1.5 there the long-term factor of safety that we've just been discussing as far as a design goal or criteria?

A Correct.

Q Okay. And the 1.3 is the short-term design criteria, correct?

A No.

Q No?

A The 1.3 is the one -- the seismic long-term.

Q Seismic. All right.

Now, for a landfill, when you're designing a landfill, do you see the two consequences of slope areas there?

A Yes.

Q Okay. We don't use in Texas the "no imminent

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danger" standard, do we?

A Well, that -- that would apply to an excavated slope before you put any liner on it.

Q Okay.

A I mean, imminent danger would be more in terms of a dam failure and washing the houses out downstream or something to that effect.

Q Okay. And in terms of uncertainty, we've got the small versus large distinction here?

A Yes.

Q Could you read the Footnote 1, please, that's -- it's right by the word "Small"?

A "The uncertainty of the strength measurements is smallest when the soil conditions are uniform and high quality strength test data provide a consistent, complete, and logical picture of the strength characteristics."

Q How would you characterize the soil conditions at the Sunset Farms site, sir?

A I would characterize them as uniform and homogeneous.

Q In your opinion, do they provide a consistent, complete -- what you've seen provide a consistent, complete, and logical picture of the strength characteristics of these soils at the site?

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A Yes, they do.

Q Footnote 2, could you read that, please, sir?

A "The uncertainty of strength measurement is greatest when the soil conditions are complex and when available strength data do not provide a consistent, complete, and logical picture of the strength characteristics."

Q I take it from your prior testimony you do not believe that the soils at this site are complex. Is that fair to say?

A That would be fair.

Q And, again, you believe that there's a consistent, complete, and logical picture of the strength characteristics at this site?

A Yes.

Q Okay. So to get into the nuts and bolts just briefly about the calculations themselves, there was some discussion of shear strengths. Do you recall those discussions?

A Yes.

Q And what is shear strength in terms -- in lay terms, sir?

A It would be the resistance to movement. And it is provided by -- in a soil matrix. It is provided -- there's two components to it. Basically, what we can

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measure -- we can take a soil and we can put it in an apparatus and move it until it fails, it slips, and we know how much force it took to accomplish that.

From that, we're able to determine some parameters that will allow us to predict it because the shear strength varies with the load that you put on it.

Q I believe you testified earlier about internal shear strengths versus interface shear strengths.

A Right.

Q Is there a distinction there, sir?

A Yes, there is some distinction. Internal shear strength would be the strength of the -- within the soil matrix itself. And as I said, there's two components that we use to describe and to calculate that strength or to estimate it. One would be an angle of internal friction, and the second thing would be cohesion.

Q Right.

A The interface shear strength would be the strength of the resistance between two materials to slide against each other. It's not internal to the material. It's actually at the interface between two materials. And they have similar properties. We have an angle of interface friction, and we have a term we refer to as adhesion. Some people call it apparent cohesion, but it's a similar term.

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Q Okay. So for the purposes of your analysis, sometimes you use internal shear strength numbers, which would be cohesion and angle of friction; is that right?
A Yes.
Q And then when you're looking at interface values, you look at adhesion and interface friction angles; is that correct?
A That would be correct.
Q Did you do that in your analysis here?
Did you use numbers like that inputting the analysis we were talking about earlier on the computer?
A Yes.
Q Okay. Let's talk about cohesion or adhesion. How is that measured? What's the unit of measurement for cohesion?
A It would be a force over an area. We typically see it as pounds per square foot.
Q What sort of ranges do you typically see from materials that you would be looking at at a landfill?
A Well, cohesion for solid waste would range somewhere between probably 250 to 500 pounds a square foot. In the -- in clays, we may see -- we may see the number run from 500 up into the thousands. In the rocks, it gets higher than that.
Q Is zero the lowest value you can have for

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cohesion?
A Yes. If you have a material that was, say, a clean sand, it would not have a cohesion.
Q All other things equal, is -- would that be the most conservative number for the purposes of slope stability calculations?
A A zero?
Q Yes.
A Well, that's as low as you could go, so that would be the most conservative.
Q What about angle of friction?
A Angle --
Q How is angle of friction measured?
A Angle of friction is actually the slope of a line. And it's the way we -- when we run a test to determine the shear strength. And we -- what we get from that test is actually the total shear strength.
Q And when you talk in terms of slope, are you talking about degrees, then?
A Yes. So if we run at several normal loads, we can plot a line through that and that line has a slope. And that slope has a -- the degrees. And so that's where we get an angle of friction.
It is measured in degrees. It is -- those degrees multiply -- the tangent is multiplied by the

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load above it, and that's how we translate that into a load.
Q Is zero the lowest angle of degree that you can have, then?
A Yes.
Q And so for materials that one would typically see at a solid waste site, what would be the highest number you would see in that range?
A In waste, you know, I have not seen anybody use numbers above about 35 degrees.
Q Now, do all materials have these shear strength parameters?
A Yes.
Q Okay. Soils?
A Yes.
Q Geocomposites?
A Yes.
Q Geomembranes?
A They have -- and they have interface -- there's an interface strength associated with any two materials laid against each other. And something like soils have internal strengths. So it would be soil-to-soil strength.
Q Solid waste has shear strength values as well; is that correct?

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A Yes.
Q Did you consider the shear strength values -- various shear strength values for these various materials when you did your calculations, sir?
A Yes. I mean, I've been running these type calculations for 15 years. I do them on a lot of different sites. And so I have -- I -- that's an ongoing process of always evaluating shear strength values.
Q And without getting into the weeds here very much, there's a lot more going on here, but there's considerations of effective stress and total stress; is that fair to say?
A Yes.
Q That's one of the analyses that's typically done -- well, a type of analysis that's done for slope stability at the sites, right?
A That has to do with the internal strength of soil. And we actually -- or actually use two analyses. The total stress is a short-term when you look at it. It's basically undrained.
And long-term would be an effective stress.
Q Did you consider total stress and effective stress when you did your calculations?
A Yes.

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Q What about Peach shear strengths and residual shear strengths? That's another way of looking at things, isn't it?
A Well, and that has to do with interface strength values. A Peach strength would simply be how much force does it take or what is the strength up to the point of movement.
Q Okay.
A And residual strength is once you get something to moving, to keep it moving, it takes less force.
Q Okay. Did you consider Peach shear strengths and residual shear strengths in your analysis, sir?
A Yes. I considered those.
Q With everything that you did, did you find any long-term slope at the final design that's proposed in the application that had a factor of safety less than 5.0 (sic), long-term factor of safety?
A 1.5?
Q Yes, sir.
A I found nothing less than 1.5.
Q And in terms of short-term factors of safety, anything lower than 1.3?
A I didn't find anything less than 1.3.
Q Did you attend the deposition of Pierce Chandler, Mr. Adams?

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A Yes.
Q You were personally present during that deposition; is that correct?
A Yes, I was.
Q Do you recall discussion there about interface -- interface analysis?
A Yes.
Q And some criticisms that Mr. Chandler had of your interface stability calculations, correct?
A Correct.
Q Do you recall an exercise that Mr. Gosselink had Mr. Chandler go through?
A Yes, I do.
MR. CARLSON: May I approach, Your Honor?
JUDGE NEWCHURCH: Yes, sir.
(Exhibit BFI No. 6 marked)
Q (BY MR. CARLSON) Mr. Adams, do you recall that the thrust of Mr. Chandler's criticisms of your calculations was that you didn't use conservative-enough inputs for shear strengths?
A Yes.
Q Did you use conservative values when you did your calculations --
A Yes, I believe I did.
Q Let me finish my question.

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Did you use conservative values when you did your calculations?
A Yes.
Q Now, I've handed you a document that's been marked as BFI-6. What is BFI-6?
A It appears to be a correlation between slope angle and slope ratio.
Q Will you look down at the bottom under the word "exhibit."
A Yes.
Q What does it say?
A It says December the 18th, 2008, Chandler 203EC.
Q Does that appear to be Mr. Chandler's signature and a date underneath that in the middle of the page?
A Yes, sir. It's a signature and a date.
Q Okay. Does this appear to be the result of the exercise that Mr. Gosselink had Mr. Chandler go through at the deposition?
A That's what it appears to be.
Q Do you specifically recall this exercise?
A Yes, sir.
Q What was Mr. Chandler asked to look at?
A He was asked to calculate, based on the lowest published interface shear strengths, what would

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be factor of -- what would be the slope you would have to factor safety of one.
Q Okay. Now, we talked about different types of analyses, right?
A Right.
Q Global analysis versus an interface analysis, do you remember that?
A Yes.
Q Is this a global analysis or an interface analysis?
A This would be an interface or veneer analysis.
Q Okay. And this is the one I believe you said can be and is typically done using hand calculations, but you have it input into a computer; is that right?
A Yes.
Q Okay. Or a spreadsheet. Okay.
And do you recall that Mr. Chandler was asked to use what he believed were the most conservative numbers and perform his factor of safety calculations to determine an acceptable slope?
A That's what I recall.
Q Okay. And what slope, based on your experience being there and looking at this, do you recall Mr. Chandler coming up with as the steepest slope that would be acceptable using his conservative values?

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A 11.4-to-1.
Q That means 11.4 units horizontally to 1 vertically; is that correct?
A Yes, sir.
Q Are you aware, sir, of any landfill in Texas that uses 11.4-to-1 slopes?
A For the above -- no. Not for abovegrade or sidewall.
Q Based on your experience, what is the typical sidewall slope angle that's used in a landfill?
A The typical slope that I see for the belowgrade slopes that have liners on them, three-to-one. Typically, the three-to-one is -- has become standard because it is stable and at that slope we can effectively construct clay liners.
Q In your experience, what is the typical slope of -- final slopes, aboveground slopes?
A Four-to-one.
Q Do you know what the excavation slopes at the TDSL Landfill in Creedmoor are?
A I believe -- I looked at the permit. I believe they're half-to-one.
Q Do you know what the side slopes -- the aboveground slopes are -- to TDSL Landfill in Creedmoor are, sir?

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A I don't recall.
Q Do you believe that Mr. Gregory or any other landfill operator in Texas would be happy with 11.4-to-1 final grade slope?
MR. RENBARGER: Objection. It's asking him to speculate on what Mr. Gregory would be happy about. He's not even a party that's here.
MR. CARLSON: I'll withdraw the question.
Q (BY MR. CARLSON) In your opinion, sir, is it a prudent practice -- would it be a prudent practice from a business standpoint to have 11.4-to-1 sidewall slopes?
A It would be inefficient.
Q And why is that, sir?
A You would not be able to put much waste over a lined area. And so it -- you have to -- for the cost of the liner, it would be really hard to get enough waste over to pay for it.
Q Would that ultimately result in having to have more landfills instead of less in Texas if we used 11.4-to-1 side slopes?
MR. RENBARGER: Objection; assumes facts not in evidence.
JUDGE NEWCHURCH: Is there a response?
MR. CARLSON: I don't think it does. I'm just asking a general question.

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MR. RENBARGER: Well, it assumes that there's no excavation or anything else.
JUDGE NEWCHURCH: I can't agree. Your objection is overruled.
Do you remember the question?
THE WITNESS: No.
JUDGE NEWCHURCH: Mr. Carlson, do you want to try again?
Mr. Carlson, do you remember the question?
MR. CARLSON: I'm going to -- I kind of do.
Q (BY MR. CARLSON) Let me give you a few -- a hypothetical here, okay? Let's say we have a landfill here with three-to-one excavation slopes. Okay?
A Okay.
Q It doesn't matter what the size of it is.
A Okay.
Q And we have 11.4-to-1 side slopes abovegrade. Okay?
A Okay.
Q Is that a very efficient landfill design?
A No.
Q And why is that, sir?
A Because you would not be putting as much waste in an -- over the side -- over an area.
Q Okay. If that was the standard in Texas and we

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have the same waste disposal rates in the state, would the landfills fill up quicker?
A Well, if you had the -- I mean, yeah, if we had the exact same area and less height, then we would have less capacity.
Q It would fill up quicker, right?
A Yeah.
Q And eventually you would have to close that and find another spot to put waste; is that correct?
A Yes.
Q Earlier this morning at the start of day, Mr. Renbarger asked you a number of hypotheticals. Do you recall being asked a series of hypotheticals?
A Yes.
Q Okay. Did any of the hypotheticals that he asked you to consider in your answers, did any of those square with any of -- with your understanding of the facts surrounding the Sunset Farms Landfill, sir?
A Not particularly.
Q Do you have the TCEQ 2002 rules in front of you, sir?
A No.
Q Is there not even a book there?
A No.

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MR. CARLSON: May I approach, Your Honor?
JUDGE NEWCHURCH: Yes, sir.
Q (BY MR. CARLSON) Mr. Adams, I've opened the book to 330.305. It's called Unstable Areas. Do you have that open there?
A Yes.
Q Do you recall being asked some questions by Mr. Renbarger this morning about this particular section?
A Yes.
Q And your understanding of this particular section?
A Yes.
Q Is it your understanding that existing waste at a facility that's the subject of a potential expansion, is that considered by the professional community as part of the unstable locations area?
A Not to my understanding.
Q What is your understanding of TCEQ's position? Does the TCEQ require applicants to consider existing waste when they make an unstable areas demonstration?
A Not to my knowledge.
MR. CARLSON: Judge, if we could go off the record, I would like to check my notes.
JUDGE NEWCHURCH: Off the record.

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(Off the record).
Q (BY MR. CARLSON) Mr. Adams, were you here this morning for Mr. Snyder's testimony?
A I think I've been here all day. I think it was yesterday that I heard his.
Q It's a long time.
A Yeah, that's true.
Q Let me be a little more exact. Were you here at all points during his testimony? Were you here while there was active questioning and answers going on?
A Yesterday -- I believe I -- I believe he might have testified the day before, and I wasn't here.
Q Okay. As far as yesterday, you were here when he was being questioned; is that the case?
A Yes.
Q Do you recall the questions and answers about the boring plan that was done in 2004?
A Yes, sir.
Q And did you have any reason to disagree with any of Mr. Snyder's answers to the questions that were posed to him?
A No.
Q Do you recall the question and answer about the total number of borings that were done at the site versus the 18 that were done in 2004?

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A Yes, I do.
Q I'm going to ask you some questions from a geotechnical perspective. Do you believe based on all 85 borings that had been done at this site and the samples that came from those borings, that this site has been -- the soils it cited are well-characterized from a geotechnical perspective?
A Yes.
Q Okay. Let's carve out the eight borings that were done in 2004 that were done using the wash-rotary method, okay?
A Yes.
Q That gets us to 77 borings. And I would like to ask you the same question: Do you believe based on those borings and any samples that were obtained and tested from those borings that the soils at the site are well-characterized from a geotechnical standpoint?
A Yes, I do.
Q And let's carve out the other 10 that were done in 2004 to get back to the original 67 that was done by Raba-Kistner and perhaps others.
Do you believe that the site is well-characterized in terms of soils and soil properties?
A Yes, I do.

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Q You were asked some questions about the pre-Subtitle D area and the liner system in that area; do you recall that?
A Yes.
Q Did you examine or have you looked at SLERs and correspondence pertaining to SLERs over the course of your work at the facility?
A Yes.
Q Okay. Could you -- what is a SLER?
A It is a report on a liner construction. It's a Soil Liner Evaluation Report officially is what it's called. But it's a report that's sent to the State that certifies that this liner was properly constructed.
Q Do you know when the first cell was constructed or roughly when the first cell was constructed at Sunset Farms?
A I think it was in the early '80s.
Q Okay. At that time, was there some -- was it either a requirement that an operator prepare and send SLERs to either TCEQ or its predecessor?
A That's my understanding. Now, that predates me a little bit.
Q Put another way: Is it your understanding -- do you have an understanding whether since 1992 there's been some requirement that an operator provide some sort

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of verification about how a liner has been constructed at a particular site?
A Yes, sir. That's my understanding.
Q Okay. And you've reviewed SLERs or similar documents and correspondence pertaining to those; is that correct?
A Yes.
Q What is your understanding regarding how the pre-Subtitle D area of this landfill was constructed in terms of the construction of the liner itself?
A My understanding is that it has a minimum of three feet of compacted clay liner that would have been put in and compacted under the moisture control.
Q Okay. Based on your understanding of this site and the soils at this site, do you believe that would be an impermeable -- or how would you characterize the permeability of that particular water system?
A It was a low permeability barrier.
Q Do you recall Mr. Blackburn asking you some questions about infiltration?
A Yes.
Q Do you recall talking a little bit about water balance?
A Yes.
Q What is water balance?

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A It's an accounting of trying to determine how much water may reach, say, the bottom of a landfill by calculating how much potentially could go into it and what happens to it along the way.
Q What can happen to the water along the way?
A Well, as water falls from the top, naturally some of it can run off. Some portion of it will be in the upper part of the soil matrix, and it may be taken out later by evapotranspiration. Some of it will go down through the waste. And if the waste -- it can be, the waste, as I say, at fill capacity. That's the capacity of the waste to absorb and hold on to water. So some of it will be held by the waste. Some of it will continue down. Like that -- you know, as gas is generated, some of it may be used up, and eventually some part of it may make it to the bottom.
Q Do you have any understanding whether water can be consumed using -- through some sort of bioreactive process in a landfill?
A Yes. I understand that -- you know, that process does require water.
Q And water is burned up as a process -- as a part of that process?
A Yeah, I mean, gas carries water. That's why we have gas condensate. There's moisture in the gas.

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Q Mr. Blackburn also posed a hypothetical in which he had ground -- or a water level inside the landfill above the ground level outside the landfill. Do you remember that question?
A Yes.
Q Or that hypothetical?
A Right.
Q Have you seen anything personally at Sunset Farms that would indicate that there's anything close to that happening at this site?
A No. I've not seen anything.
Q Just a last couple of questions.
How long have you been working at and around the Sunset Farms site?
A Since, I believe, around 2004.
Q Have you personally -- you've been out to the site before; is that correct?
A Yes. I've been to the site on several occasions.
Q Have you been out there when any of the last cells have been constructed?
A Yes. I went out when the -- I think the last cell, the one -- when it was being constructed, I went out and looked at the excavation and talked to the contractor.

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Q So you've personally seen the soils -- you've actually seen the soils that are at least underneath a portion of -- or --
A Yes. In 2000 and --
Q Let me finish my question; sorry. Make it easier for our court reporter.
Have you actually physically seen the soils in an excavated condition out there, sir?
A Yes, I have.
Q Have you seen anything out there personally that would lead you to conclude that the soils at this site are -- would be in any respect incompatible with use as a liner or other landfill-related materials?
A No.
Q Okay. Is this -- how would you characterize the soils at this site in terms of their use for MSW landfill construction purposes?
A They're very good soils for those purposes. They have the material properties that we look for to build liners and covers, and they work relatively well for all of the needs that we have. That's why I assume we have so many landfills that are sited in that formation.
MR. CARLSON: Pass the witness.
JUDGE NEWCHURCH: Who seeks

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cross-examination?
MR. MORSE: Your Honor, could I have one second off the record to clarify something before I --
JUDGE NEWCHURCH: Off the record.
(Off the record)
JUDGE NEWCHURCH: Back on the record. Mr. Morse?
MR. MORSE: No questions, Your Honor.
JUDGE NEWCHURCH: Anyone else?
MS. MANN: I have a few questions.
JUDGE NEWCHURCH: Ms. Mann?
RECROSS-EXAMINATION
BY MS. MANN:
Q Hi. Mr. Carlson asked you about what could happen to the water as it moves through the landfill. I think we were really talking about over the pre-Subtitle D area, but this question would go to both, any areas within the landfill.
As the water infiltrates the landfill and maybe it gets taken up by the waste in the landfill, will that also lead to increase of leachate production generally or --
A Well, more water in would increase leachate production. If you increase the amount of water coming in, you would have --

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Q Okay. So some of the water that comes in -- some of the rain that falls in the landfill will either run off or be absorbed by some of the soil or be absorbed by some of the waste, thereby creating more leachate, potentially?
A Well, if it's being absorbed by the waste, it's not leachate in the fact that it's not freed water.
Q Right. And does additional water lead to additional decomposition of the waste within the landfill?
A That's my understanding. I mean, I'm not an expert on decomposition, but my understanding is more water accelerates decomposition.
MS. MANN: No further questions.
JUDGE NEWCHURCH: Anyone else?
(No response)
JUDGE NEWCHURCH: Thank you, Mr. Adams. You're excused.
MR. RENBARGER: I believe I -- excuse me. I thought we were --
JUDGE NEWCHURCH: Oh, I was asking if anyone else had cross-examination. Do you?
MR. RENBARGER: Oh, no. I may have a question with his redirect.
JUDGE NEWCHURCH: That's what I'm asking.

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MR. RENBARGER: That's what I was --
JUDGE NEWCHURCH: So you do?
MR. RENBARGER: Okay. I do. Yes, sir.
JUDGE NEWCHURCH: Okay. Go ahead.
MR. RENBARGER: Thank you.
JUDGE NEWCHURCH: Sorry, Mr. Adams. Trying to get you through.
THE WITNESS: Yeah, it's way too soon.
(Discussion off the record)
RECROSS-EXAMINATION
BY MR. RENBARGER:
Q It won't take me just a moment, Mr. Adams.
A Okay.
Q A moment ago in response to some of Mr. Carlson's questions, I believe you were talking about a worst-case analysis, right?
A Yes.
Q And I believe you indicated that in attempting to define a worst-case analysis for purposes of your evaluations of slope stability, that you would keep factoring in any number of different variables until you finally found a case where the factor of safety was less than one, right?
A Sometimes I do that. I said what I'm looking for to present is a factor of safety of what's the

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lowest factor of safety. But often just as a sensitivity analysis --
Q Yes, sir.
A -- I will change certain variables and adjust them to see, okay, where does the factor of safety drop to one, do I feel, in this layer. And it helps me -- it helps me to know which layers are critical.
Q I understand. And I guess my question is this: Did you perform that type of analysis with the Sunset Farms Landfill to determine what are the variables I need to plug in to this equation for it to come up with a factor of safety of less than one?
A Of less than one?
Q Yes, sir.
A Specifically, I don't remember. I probably did because, as a matter of practice, I generally do that.
Q But as you sit here today you don't recall that; is that your testimony?
A I don't recall what the numbers would be if I did it.
Q Could I refer you to TJFA Exhibit 14, please.
A Okay. I have it.
Q If we look down under Footnote 1 to TJFA Exhibit 14, that's the Table 2.4, and Footnote 1, I believe Mr. Carlson questioned you on this, about "the

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uncertainty of the strength measurements is smallest when the soil conditions are uniform and high quality strength test data provide a consistent, complete, and logical picture of strength characteristics."

Do you see that?

A Yes.

Q Okay. Relative to that, I guess, definition or footnote, if you will, what are high quality strength test data? What do those consist of?

A Well, it would -- it could be unconfined compressive strengths. They could be -- typically, they could be blow counts from the borings. They could be the unit weight test to give us an indication, it's strength measurements. Let's say all of these things are test data to give us indication about strengths.

Q Would you agree with me that the soil properties of the Taylor marl, particularly the weathered Taylor marl, aren't those considered to possess high plasticity?

A Yes.

Q And isn't it true that the higher the plasticity of soils, the lower the shear strengths?

A The lower the friction values. But you can have high plasticity with fields that have a very high cohesion value.

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Q I understand. But I was talking about Taylor in specific -- an unweathered Taylor that we find at the Sunset Farm Landfill facility. Those are highly plasticity soils, right?

A Yeah.

Q Let's move for a moment to BFI-6, please.

A Okay.

Q And I believe Mr. Carlson did ask you some of the questions about this, and I believe the point that he was trying to make is that a slope angle of over 11-to-1 would be far away from the norm in landfill practice today, correct?

A That's what I understood, yes, sir.

Q And that would be based on the five-degree slope angle, correct?

A Right.

Q Okay. And, again, you were present when Mr. Chandler hand-calculated these numbers that appear on BFI-6, correct?

A Yes, sir.

Q What did you understand the inputs to be for him to obtain the five-degree slope angle and then with the resulting slope ratio of the 11.43-to-1?

A I understood that to be the lowest published interface strength for a geosynthetic layer.

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Q Okay. Did you understand that to be based on a smooth geomembrane over a clay liner?

A I understood that to be the lowest. It was based on -- I believe in his prefiled, the statement was made that when you use the lowest published interface shear strength, the factor of safety is less than unity. So the question back -- when I'm saying this -- this is what I recall.

Q Yes, sir.

A That the question to him was: Okay, if you use the lowest, then what slope gives unity -- will produce unity? And that was the calculation.

Q Okay. But with respect to the actual published strengths that he used, was it your understanding that he was using it based on a smooth geomembrane interface with a clay liner?

A No. I didn't know that.

Q Okay. Would you agree with me that most landfill designs that we see today don't use smooth geomembranes on their slope surfaces?

A Yes. I would agree with that.

Q Okay. And would you also agree with me that no matter how many stability analyses that one may run, that they aren't any better than the input, right?

A Yes. That would be true.

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MR. RENBARGER: Pass the witness.

JUDGE NEWCHURCH: Mr. Blackburn?

MR. BLACKBURN: I have no questions.

JUDGE NEWCHURCH: Further direct?

MR. CARLSON: About three minutes, Your Honor, if I may approach.

JUDGE NEWCHURCH: Yes, sir.

MR. CARLSON: And I've got a document. It's a voluminous document. I don't have 11 copies of it. I do plan to introduce pages of it through another witness later on in this hearing. It's the TDSL permit application we subpoenaed the other day.

JUDGE NEWCHURCH: Okay.

MR. CARLSON: I just want to ask some questions. I am not going to offer it. I just want to ask him some questions off of it. I just can't show it to everybody. I will represent to the Judge we did -- after we got copies of the TDSL document, we scanned it and provided CD-ROMs that have the document. For the record, I'll just tell everybody I've got the supplement geoperformance design standard document.

MR. RENBARGER: If I might ask, Judge, and perhaps Mr. Carlson can respond for us, I'm not sure how that may relate to -- perhaps he can tell us -- how that may relate to the recross that we just conducted.

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MR. CARLSON: It has to do with the Table 2.4 and the uniformity of the soils at the site and the determination of the factors.

JUDGE NEWCHURCH: Okay. First of all, does anyone dispute the representation that they have received, at least on a CD-ROM, a copy of this TDSL permit?

(No response)

JUDGE NEWCHURCH: Okay. In the absence of a record of a dispute, I'll assume the representation is correct.

MR. RENBARGER: Judge, the only thing I can point out along that line would be that we did receive a number of e-mail scans from Mr. Carlson's law firm this past weekend before the hearing started. And I don't know that we have had an opportunity to review it.

JUDGE NEWCHURCH: Yeah, I --

MR. RENBARGER: Some of which those attachments would not open, so I can't represent to you whether we have it or not.

MR. CARLSON: And I'd like to correct something. Mr. Jimenez has corrected something for me. The document that I have in front of me was a document that was obtained through the subpoena -- a subpoena with the Stecher deposition subpoena.

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JUDGE NEWCHURCH: Let's go off the record.

(Discussion off the record)

MR. CARLSON: If I may approach, Judge?

JUDGE NEWCHURCH: Yes.

FURTHER REDIRECT EXAMINATION

BY MR. CARLSON:

Q Mr. Adams, do you recall being asked questions now by both myself and Mr. Renbarger about Table 2-4 from the EPA Manual that deals with factors of safety --

A Yes.

Q -- and the two footnotes that we've been discussing?

A Yes.

Q I'm going to hand you a document that's -- I'll just ask you to read what the title of it says, please.

A Supplement to Performance Standard Design Criteria and Basis, Texas Disposal Systems Landfill, Inc., Type 1 Municipal Solid Waste Disposal Facility, Travis County, Permit No. 2123.

Q And it says that it was prepared for whom or what?

A Prepared for Texas Disposal Systems Landfill, Inc, Prepared by Robert S. Kier, Ph.D. CPG.

Do you want me to read past that or is that --

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Q That's fine.

A Okay.

Q I've opened the document up to Page 24. And I would just like to ask you -- do you understand this document to relate to the TDSL site in Creedmoor in southern Travis County?

A Yes, sir.

Q And is the TDSL site located, in your opinion, in soils that are similar to the soils at the Sunset Farms site?

A Yes.

Q Okay. Would you read for the record the line beginning -- towards the end of the first full paragraph beginning with the words "The narrow"?

A "The narrow range between the percent passing the No. 200 mesh sieve, 95 to 99 percent, and between the lowest and highest plasticity index, 30 to 44, indicates that the weathered Taylor and the overlying soil are remarkably uniform, homogeneous, and isotropic."

Q Would you agree that the soils at the Sunset Farms facility are uniform, homogeneous, and isotropic?

A Yes.

Q Thank you, sir.

MR. CARLSON: I'll pass the witness.

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JUDGE NEWCHURCH: Anything more?

(No response)

JUDGE NEWCHURCH: All right. Thank you, Mr. Adams. This time you're excused.

Why don't we take our afternoon break now rather than call the next witness, and we'll be in break for 10 minutes.

(Recess: 2:53 p.m. to 3:18 p.m.)

JUDGE NEWCHURCH: Okay. Is everyone ready? Let's go back on the record.

And, Mr. Carlson, you want to call your next witness?

MR. CARLSON: Yes, Judge. Applicant calls Kevin Carel.

Mr. Carel, if you would take the oath, please.

(Witness sworn)

JUDGE NEWCHURCH: Thank you. Please have a seat. And pull that microphone close to you as you sit down, please.

KEVIN TIMOTHY CAREL,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. CARLSON:

Q Please state your full name.

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A Kevin Timothy Carel.
Q And what is your business address, Mr. Carel?
A 136 Pecan Street, Keller, Texas.
Q What is your occupation, sir?
A I am a geologist and owner of the company.
Q What did you and your company have to do -- what did you have to do with this application, Mr. Carel?
A I reviewed the Groundwater Sampling and Analysis Plan, Attachment 11, and provided comments to Mr. Mike Snyder.
Q Did you prepare prefiled testimony, Mr. Carel?
A Yes, sir.
Q And if you will look down below you, someplace there should be a binder that has copies of the Applicant's prefiled testimony. Would you look for Applicant's Exhibit KC-1, please?
A (Witness complies.)
MR. CARLSON: Judge, I might be able to help him out a little bit.
JUDGE NEWCHURCH: Yes. Please do.
Q (BY MR. CARLSON) Did you find it, Mr. Carel?
A I just found my resume.
Q That's the exhibits.
JUDGE NEWCHURCH: Off the record.

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(Discussion off the record)
JUDGE NEWCHURCH: Back on the record.
Q (BY MR. CARLSON) Mr. Carel, have you found a copy -- or the copy of Applicant's Exhibit KC-1?
A Yes, sir.
Q Could you confirm that that's a true and correct copy of your prefiled testimony, sir?
A Yes, it appears to be.
Q Do you have any changes or clarifications or revisions that you would like to make to that prefiled testimony at this point in time?
A Yes, I do.
Q Okay.
MR. CARLSON: Judge, may I approach? I, actually, think I've got the system down here this time.
JUDGE NEWCHURCH: Yes, sir.
MR. CARLSON: We've gone high tech.
(Exhibit BFI No. 7 marked)
Q (BY MR. CARLSON) Mr. Carel, what changes or corrections would you like to make at this time?
A Yes. On Page 19, Line 2, the word "two" should be "one."
Q Okay. Anything else?
A Line 14 should read: "Conclusions were for the other investigation."

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Q Could you explain the reason for those changes, sir?
A Just simply a counting error.
Q Some bad math by the lawyer you were working with on this?
A Oh, perhaps so.
Q Other than those two changes -- and are those reflected on a sheet that has redline strike-outs, sir?
A Yes.
Q Okay. And those are the only changes you have to your prefiled?
A Yes.
Q You had previously looked at Exhibit KC-2, which is your resume. Do you recall? Did you identify that as your resume?
A Yes, sir.
Q Is that a true and correct copy of your current resume?
A I just noticed that there's a class left off of it.
Q Okay. So you attended one more class since that resume was prepared and submitted; is that correct?
A Yes, I have.
Q What class is that, sir?
A I'm sorry. I don't remember the exact name of

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it, but it's a statistical analysis class that I attended, gosh, within the last year or two. I can't remember the exact date.
Q Other than that particular class or seminar, any other changes to Exhibit KC-2?
A None that I'm aware of.
Q Okay. You're not sponsoring any particular portion of the application; is that correct?
A That's correct.
Q Okay. Do you adopt your prefiled testimony, Mr. Carel, as true and correct in the same manner as if you were providing that testimony here live today?
A Yes, I do.
MR. CARLSON: With that, Judge, Applicant offers the prefiled testimony, KC-1, as well as all of the exhibits referenced and attached thereto.
JUDGE NEWCHURCH: That would be which was -- there's a separate binder with the attachments --
MR. CARLSON: Yes.
JUDGE NEWCHURCH: -- for those witnesses.
MR. CARLSON: Sure.
JUDGE NEWCHURCH: It looks like it's just his resume.
MR. CARLSON: It's just his resume. It's just so he can --

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JUDGE NEWCHURCH: Okay. So just KC-1 and 2? Any objections beyond what of the -- all of the prefiled?
MR. RENBARGER: No.
JUDGE NEWCHURCH: Okay. So KC-1 and 2 are both admitted.
(Exhibit BFI Nos. KC-1 and KC-2 admitted)
MR. CARLSON: Pass the witness.
JUDGE NEWCHURCH: Cross-examination, Mr. Terrill?
Austin?
Travis?
MR. MORSE: No, sir.
JUDGE NEWCHURCH: Ms Mann?

CROSS-EXAMINATION

BY MS. MANN:

Q Good afternoon.
A Hello.
Q You testified that Monitoring Well 30 is undergoing assessment monitoring. Do you recall that testimony?
A I do.
Q And could you explain a little bit more about why it's undergoing -- and is it still currently undergoing assessment monitoring?

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A Yes, it is.
Q And can you explain a little bit about why that's ongoing?
A Yes. Monitoring Well 30, at some point in time -- I don't remember the date -- during a specific sampling event, there was a detection of an organic compound. I believe it's called 1,1-dichloroethane. It's often referred to as 1,1-DCA. Subsequently, a -- what's called a verification resample was collected and the detection was confirmed.
That's considered a statistically significant change or a statistically significant increase. And when that's confirmed, then the well enters into assessment monitoring.
And do you want me to explain what assessment monitoring is?
Q Sure, but let me ask you another question real quick. You said it's a statistically -- what was the --
A Statistically significant change or statistically significant increase.
Q And is that an increase from baseline conditions?
A Yes. It's statistically significant over background.
Q And, yes, could you please go on and explain it a little bit -- or explain further about what the assessment monitoring is?

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A Assessment monitoring involves collecting additional samples and having those analyzed for additional compounds. The additional suite involves additional metals, additional volatile organic compounds, semivolatile organic compounds, herbicides and pesticides, a total of 213, if I remember right.
Q Okay. And so the regular -- backing up in the regular monitoring events that normally happen in each monitoring well, these are the semiannual events; is that correct?
A That's correct.
Q And if you get a statistically significant detect, you move into assessment monitoring. And what's the frequency of that monitoring?
A It's the same frequency, semiannual.
Q It's just for a bigger suite of constituents?
A Yes.
Q Okay.
A I should probably clarify that you review the -- what's called Appendix 2, the 213 or so constituents. Any new detections are added to the monitoring list. And it -- and that compound or compounds, along with the Appendix 1 compounds, the

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routine parameters, are analyzed semiannually.
Q So those become routine analyses?
A Yes.
Q Okay. On the same page of your prefiled -- I'll just refer you to Page 17 -- the question you answered is: Are there any wells at Sunset Farms that are currently undergoing assessment monitoring?
So my question is: Have there been other monitoring wells at Sunset Farms in the past that have undergone assessment monitoring? Underwent, undergone, whatever the correct past tense of "undergo" is.
A Yes.
Not that I'm aware of.
Q Okay. Monitoring wells are generally downgradient from some potential pollution source, correct?
A There are two different types. There are upgradient or background wells, and there are downgradient or also called point-of-compliance wells.
Q And what kind of well is this monitoring well?
A I believe MW-30 is considered a point-of-compliance well.
Q And --
A I'm not certain about that, but I believe that it is.

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Q Okay. So then would you know whether or not MW-30 is downgradient of any particular portion of the landfill? In other words, I'm curious to know whether or not it's downgradient from the pre-Subtitle D area or the post-Subtitle D area or --
A You know, to be honest with you, I'm not that familiar with the pre-Subtitle D/post-Subtitle D. That's not really what I get into, so I couldn't answer that specifically anyway.
Q Okay. In your testimony you discuss the groundwater protection standards. And you say that the groundwater protection standards, the maximum concentration of the constituent allowed in the groundwater under the regulations.
Do you have -- do you know how those are developed -- how those standards are developed?
A Well, I don't know specifically. The EPA has developed what's called maximum contaminant levels. We use those for the groundwater protection standard, and I don't know specifically how they're developed. There's some toxicology involved in them.
Q Are these related somehow to drinking water standards?
A Yes. The maximum contaminant levels are the primary drinking water standards. When there's not a

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MCL, we refer to the -- a table in the TCEQ risk reduction rules. Not all of the parameters have MCLs.
Q Okay. So I understand -- and I'm speaking of Monitoring Well 30. There was a significantly -- statistically significant detect of 1,1-dichloroethylene which prompted assessment monitoring, but nothing went beyond that because the maximum concentration of that constituent was below the prospective GWPS; is that correct? In other words, there was no remediation or further investigation required; is that correct?
A That's correct.
To be specific, it's 1,1-dichloroethane not -ethylene.
Q Thank you.
A And, yes, there's no corrective action required at this point.
Q How long does that assessment monitoring continue? Is it indefinite?
A I'm reluctant to recite the rules, but it's something to the effect of two -- at least two events where there are no more statistically significant increases.
Q And that's increases over baseline, not increases from the detect level, correct?
A Well, in this case, they're one in the same,

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but that's correct. Statistically significant over background.
MS. MANN: I have no further questions.
JUDGE NEWCHURCH: The Executive Director?
MR. SHEPHERD: The ED passes.
JUDGE NEWCHURCH: Let's see. For TJFA? One day I'll get that straight.
MR. RENBARGER: So will I, Judge.
CROSS-EXAMINATION
BY MR. RENBARGER:
Q Good afternoon, Mr. Carel.
A Good afternoon.
Q My name is Bob Renbarger. I'm an attorney from TJFA. And I do have some questions for you.
I understand from your direct testimony that you reviewed and assisted Mr. Snyder in the preparation of the Groundwater Sampling Analysis Plan included in the application; is that correct?
A I reviewed it, yes.
Q Okay. In your review of the Groundwater Sampling and Analysis Plan, did you make a comparison of that plan to the one currently at place at the BFI facility?
A I don't recall.
Q Are you familiar with the existing Groundwater

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Sampling and Analysis Plan at BFI's facility?
A I'm familiar with it in general terms, not specific. No, I don't know that I can recite specifics.
Q But it is a fact, isn't it, since 1999 that you or your company have been performing groundwater monitoring services for the BFI Sunset Farms Landfill facility, correct?
A That's correct. We do statistical analysis and prepare the groundwater monitoring reports.
Q Do you recall as a result of your review of the Groundwater Sampling and Analysis Plan proposed in this application if you made any suggested changes?
A Yes, I believe we did.
Q When you say "we," are you referring to yourself or your corporation, your company?
A My company.
Q Could you identify, please, some of the suggested changes that you recommended?
A One of the suggested changes was to modify the constituents being analyzed to include total metals.
Q Are you suggesting, then, that the Groundwater Sampling and Analysis Plan submitted to you for review from Mr. Snyder did not contain that parameter?
A Those parameters, yes. I believe that's the case.

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Q Is it your understanding that groundwater sampling and analysis plans are required to contain those parameters?
A To contain total metals?
Q Yes, sir.
A Yes. Total metals are in the -- they're part of Appendix 1 that are in the TCEQ regulations.
Q Are you aware of any reason why the proposed Groundwater Sampling and Analysis Plan submitted for your review did not contain total metals as the parameters?
A Yes.
Q What is that?
A Historically, the TCEQ allow facilities to sample and analyze for an alternate list of parameters. And that alternate list included other parameters I refer to as inorganic parameters. And they were analyzed on a dissolved basis.
Q Are you familiar with the rule changes for groundwater monitoring that came about as a result of the 2006 changes to the MSW rules?
A Yes, sir.
Q Okay. What changes occurred with respect to groundwater monitoring in the 2006 MSW rule changes?
A There were numerous changes. I can't recite

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all of them to you.
Q Were any of the rule changes of the 2006 MSW rules incorporated into the Groundwater Sampling and Analysis Plan submitted as a part of this application?
A I think the total metals were, yes.
Q Can you think of anything else?
A Not that I'm aware of.
Q When you were referring to the total metals, are we talking about filtered versus unfiltered testing?
A That's correct. Total is the same as unfiltered.
Q Thank you.
And I understand from your questioning from the Public Interest Counsel that, to your knowledge, there's only been one occasion since you've been involved -- I guess that's since 1999 -- where a well at the BFI Sunset Farms Landfill has undergone or been brought into assessment monitoring, correct?
A Yes. MW-30 is the only one I can recall.
Q You do recall statistically significant detections, if you will, in other groundwater monitoring wells over the course of your reviews at that facility, have you not?
A Yes.
Q Do you recall any detections of any organic

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compounds in former Monitoring Well 9?
A Sir, if I remember right, MW-9 was plugged and abandoned prior to 1999 and replaced with another monitor well. I've not done any work on MW-9.
Q So you have no knowledge of that; is that your testimony?
A Well, I believe -- I understand that MW-9 had organic compounds in the past. I just want to clarify that it was prior to our work on the facility.
Q Is it your understanding, then, that MW-9 is in close proximity -- or was in close proximity to existing Monitoring Well 30?
A I'm not really certain the distance MW-9 was from where MW-30 is today.
Q Have you heard that the detections at MW-9 -- or detection MW-9, prior to its plugging, was also for the compound 1,1-DCA?
A Sir, I know that it had some organic compounds or an organic compound detected. I wasn't specifically familiar with the fact that it was 1,1-DCA.
Q And you are aware, I'm assuming, that MW-30 is currently located on the southernmost boundary of the point of compliance between the BFI and the Waste Management Landfill facilities, correct?
A That's correct.

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Q Mr. Carel, what's an alternative source determination?
MR. CARLSON: Demonstration.
MR. RENBARGER: Demonstration.
Q (BY MR. RENBARGER) Demonstration.
A An alternate source demonstration -- also, if I could refer to it as ASD.
Q Please do. It would help me.
A They are a report that are allowed by the federal and state rules that are allowed to demonstrate when a constituent has statistical exceedance that is due to a cause other than the landfill.
Q In the course of your work with BFI since 1999, have you ever submitted an ASD for any exceedances of constituents detected at the BFI facility?
A Yes, we have.
Q Approximately how many times?
A I don't have a count.
Q Would you estimate it greater than 10?
A I don't really know.
Q You have no estimates in mind? We're not talking about over 50, are we?
A No. It would be --
Q Fewer than that?
A Less than 50, yeah.

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Q Fewer than 10?
A Sir, I really don't know how many. I would say on the order of 10, perhaps, but I'm just speculating. I really don't know. I know that we've submitted several.
Q Okay. Are you aware of any of the ASDs that you submitted to the TCEQ for a statistically significant exceedance that was ever turned down or denied?
A No, none have been turned down or denied.
Q So 100 percent of those that you have submitted have been accepted; is that correct?
A To date, yes.
Q What happens when an ASD is accepted or approved?
A The well continues in detection monitoring.
Q Do you recall any instances where you submitted an ASD which was approved, and subsequent to that that same well had the same or similar type of detection?
A If I understand your questions right, yes.
Q How many occasions has that happened to your recollection?
A Oh, I couldn't tell you how many times.
Q I guess my point is this, is: Once you get approval of an ASD, is that forever and ever for that

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same compound?
A No. They -- TCEQ requires that you re-evaluate that data and resubmit a new ASD each time there is statistical exceedance.
Q And what happens if an ASD is denied?
A I would presume the well would go into assessment monitoring.
Q But your testimony is that has not been the case, at least in your experience, correct?
A That's correct.
Q In discussing the exceedance at MW-30, I believe you identified the compound 1,1-DCA, correct?
A That's correct.
Q Are there any other compounds that have been detected at MW-30 that are also a part of the assessment monitoring?
A Yes, sir.
Q What compound or compounds were those?
A A compound known as tetrachloroethylene, also known as perchloroethylene or PCE has been detected, I believe, two times.
Q And was that as a result -- was it detected during assessment monitoring or was it detected during detection monitoring?
A It was detected while the well was in

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assessment monitoring.
Q Okay. Is a common name or name for the compound you just described perc or PCE?
A Yes. Some people refer to it as perc, and I just referred to it earlier as PCE, yes.
Q Is the compound PCE associated in any way with dry-cleaning solvents?
A My understanding is that it is, yes.
Q Now, I also understood from your testimony in response to the office of Public Interest Counsel's questioning that currently there's not any ongoing investigation as to the sources or causes of these detections in MW-30, correct?
A Yes, sir.
Q And if I understand it correctly, the basis for this lack of any kind of continuing investigation is that it's simply not required unless the concentration of these compounds exceed the groundwater protection standard, right?
A Specifically, statistically exceed groundwater protection standards.
Q So should one conclude that as long as these concentrations remain below the groundwater protection standards, that BFI is not going to undertake any further investigation?

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A You would have to ask BFI that.
Q You certainly received no marching orders to look into it further, have you?
A I have not received any direction from BFI, no.
Q Reading your prefiled testimony, Mr. Carel, I believe in there you advance a theory about what one of the possible causes for the exceedances at MW-30 is, correct?
A Yes, sir.
Q And what is your theory?
A I believe that the false organic compounds detected in MW-30 are sourced by landfill gas migration.
Q In your testimony, I believe you identified about six other landfills where you've had detections of the same or similar compounds that have actually been evaluated, correct?
A That's correct.
Q And I guess you just amended that one page of the testimony. But I understood your earlier testimony to indicate that of these six, that four of those have been actually associated with the presence of landfill gas in those monitoring wells, right?
A That's correct.
Q And all four of those have been placed in remediation, right?

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A It's hard for me to keep all of those straight, but my memory is that, no, only two of them have moved into assessment monitoring -- I'm sorry, corrective action. I apologize.

Q Okay. And I'll try to make a distinction at the moment at least between the corrective action and just some type of remedial action, but haven't at least four of the six of the post-landfill facilities, if you will, undertaken some form or measures to try to address the landfill gas?

A You know, to be honest, I always struggle with this. We work with a lot of landfills. And I'm sorry, I don't really recall the number that have entered into corrective action. I'm sure that I've testified to a certain number. I don't remember what it is.

Maybe I should look at it?

Q Oh, we'll see here. And I'm going to try to paraphrase your testimony, Mr. Carel. So please forgive me if I make a mistake, and correct me.

It was my understanding that of these six landfills -- well, two may have been in corrective action. At least four had at least undertaken to try to address the landfill gas issue with either extraction well pumping of gas from those areas or some other form of soil vapor extraction.

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MR. CARLSON: Mr. Renbarger, could you give him a page number that you're looking at?

MR. RENBARGER: I'm searching while I'm trying to talk.

MR. CARLSON: Okay.

MR. RENBARGER: Yes, I'll certainly try to do that.

A I believe my testimony is that they were investigated. Page 19, Row 15, 16.

Q (BY MR. RENBARGER) Okay. I think, moving along -- and, again, to the extent that this corrects my previous representation, please take it as such.

On Page 20 toward the bottom of the page, you were talking -- you were talking about some of the measures that had been undertaken to address these issues. And at least three have installed landfill gas collection and control systems since the detections. I believe that's your testimony on Lines 20 and 21.

A That appears correct, yes.

Q Mr. Carel, are you aware that BFI currently has a landfill gas collection and control system operating in its landfill?

A Yes, I believe that's true.

Q Have you investigated whether this landfill gas collection and control system is effective in the

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vicinity of Monitoring Well 30?

A No, I have not.

Q So I also assume that you've not investigated then if the landfill gas collection system existing at the BFI facility could actually be utilized to reduce the possibility of any landfill gas entering Monitoring Well 30.

A I haven't investigated anything with respect to the landfill gas, sir, no.

Q Well, the fact remains, doesn't it, then, Mr. Carel, that with respect to assessment --

A I'm sorry, sir. I haven't investigated anything with respect to the landfill gas collection system.

Q Have you investigated anything else in that regard?

A I did review some of the data for MW-16 in preparation for today -- I'm sorry, MW-30. These numbers are difficult for me. I apologize.

Q Not a problem.

For purposes of assessment monitoring, Mr. Carel, it really doesn't matter whether an exceedance is caused by the presence of landfill gas or caused by a release from the landfill, does it? If you have an exceedance, you have an exceedance. And the

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rule doesn't really address what the cause is. It's just that you have a statistically significant increase at that well, correct?

A Well, the rule does not differentiate between different types of releases from a landfill, if that's your question.

Q That is my question.

Did you on behalf of BFI attempt to get an ASD for the 1,1-DCA detection at Monitoring Well 30?

A I don't believe we did, no.

Q Would that even be possible in your estimation?

A I don't believe so, no, sir.

Q Why is that?

A Well, 1,1-DCA is an organic compound. I don't believe that it occurs naturally. And for that reason, we would -- and based on our experience with other facilities, we would assume that it was perhaps from the landfill, and we would not submit an alternate source of demonstration.

Q And as I understand it, you have not conducted any kind of analysis of the landfill gas or any landfill gas that might be present in MW-30, correct?

A No, sir. We haven't performed any analyses on any landfill gases at Sunset Farms.

Q Okay. Well, Mr. Carel, if one wanted to

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determine if landfill gas was causing exceedances of 1,1-DCA at MW-30, wouldn't it be a pretty simple matter to do an analysis of the landfill gas?
A It's not difficult to collect a sample and have it analyzed.
Q Mr. Carel, are you familiar with some issues related to the Applied Materials facility, immediately across Giles Lane from the BFI facility, as it relates to groundwater?
A Yes, I am.
Q Okay. When did you first become aware of any issue related to groundwater at the neighboring Applied Materials facility?
A Well, as I think you know, I received a portion of a groundwater monitoring report sometime in 2003, if I remember right.
Q Where did you -- from what source did that report find its way to you?
A Mr. Randy Bodnar.
Q Who is Mr. Randy Bodnar?
A Mr. Randy Bodnar was -- I believe his title was regional engineer for BFI Allied Waste.
Q Did you discuss that information with Mr. Bodnar?
A By "that information," I'm sorry?

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Q The information that he sent to you related to Applied Materials.
A We had a conversation, yes, sir.
Q As a result of the conversation, were you asked to look into that further?
A Mr. Bodnar asked me to perform some work, yes.
Q Would you please give us an idea of what the scope of that work was?
A To be very honest with you, it happened a number of years ago, and I don't remember specifics about our conversation at all, but I know that I prepared a map that illustrated Sunset Farms, Austin Community Landfill, and Applied Materials.
MR. RENBARGER: May I approach the witness, Judge?
JUDGE NEWCHURCH: Yes, sir.
Q (BY MR. RENBARGER) Mr. Carel, I just handed you a document that has previously been introduced into evidence in this proceeding as TJFA-14. Do you see that?
A Yes, I do.
Q 14 does -- it consists of two pages of the exhibit, correct?
JUDGE NEWCHURCH: Did you say 14?
MR. CARLSON: I'm confused too.

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MR. BLACKBURN: I am too.
MR. RENBARGER: I must have the wrong number written down here.
MR. BLACKBURN: I have 12.
MR. RENBARGER: Maybe it is 12. Let's see. Let's double-check.
THE WITNESS: My copy says 14.
Q (BY MR. RENBARGER) I wrote that on there, thinking that it was 14.
In any event, if you will look at the lower right-hand corner of the pages there, there's a Bates stamp down there with APP 19698, and the subsequent page, 19699. Is that accurate with what you have in front of you?
A Yes.
Q Okay. Well, let's get the exhibit number correct here before we proceed. It is TJFA-12. Excuse me. You may want to make that notation on the document that I just handed you if you've got a pen.
JUDGE NEWCHURCH: Why don't -- off the record, please.
(Discussion off the record)
JUDGE NEWCHURCH: Back on the record.
Q (BY MR. RENBARGER) I apologize, Mr. Carel. That was my clerical error creating that confusion.

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In any event, before we went off the record, I had handed you a two-page document which has been correctly identified as TJFA-12. You have that in front of you, correct?
A I do.
Q Is TJFA-12, is that representative of the map you referenced in your earlier testimony that you may have prepared?
A Yes, it is.
Q And if we look at Page 19698 of TJFA-12, there appears to be some groundwater contours on that map, correct?
A That's correct.
Q What is the source document, or where was the information provided to come up with the contours that exist on Page 19698?
A If my memory recalls correctly, we used some groundwater elevations for a March 2002 sampling event at Sunset Farms. We used groundwater elevations for a sampling event that I believe is three or four months later at Allied Materials. I believe that was July of 2002. And we used groundwater elevations for an event that I believe was a couple of months after that still. I believe there's September -- I'm uncertain of that, but I believe there's September of 2002 for Austin

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Community.
Q So in order to develop the contours that appear on Page 19698, are you saying that you took all of that data and extrapolated that data into the contour lines that appear on this map?
A Yes.
Q On Page 19698 in the right-hand column, there are a number of handwritten notes. Are you familiar with those?
A Generally.
Q Is that your handwriting?
A I believe that it is.
Q Let's just go through some of these if we can, please. At the top of the page, it's got "WMI," and then below that, "3-12-02 No VOCs."
What does that denote, from your memory?
A I don't remember writing this, but what I believe that that means is that in a March of '02 sampling event there were no volatile organic compounds detected in any of the wells at Waste Management or Austin Community Landfill.
Q Okay. The next notation indicates that the drawing shows locations of numerous monitoring wells, boring, geoprobes, bulk liquids disposal, and suspect industrial waste management.

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Does that refer to -- well, let me ask you this: What does that refer to, that notation?
A Again, I don't remember specifically writing this and what I was looking at when I wrote it, but I believe it refers to a drawing that I was looking at that we used to generate this drawing.
Q On or about the time that you generated the drawing, was there any specific concerns about any kinds of industrial waste disposal let's just say in the vicinity of this map?
A Well, I understand that there is alleged -- I'm sorry. Could you repeat the question?
Q On or about the time that you completed this map and made the handwritten notations in the right-hand column, was there an active concern about industrial waste disposal at one or more of these facilities depicted on the map?
MR. CARLSON: Objection; form. It's confusing. I'm unclear about whose concern he is talking about.
JUDGE NEWCHURCH: Did you want to clarify?
MR. RENBARGER: Excuse me?
JUDGE NEWCHURCH: Did you want to clarify?
MR. RENBARGER: Yes, I do. Thank you, Judge.

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Q (BY MR. RENBARGER) As I understand it that -- based on your conversation with Mr. -- I can't pronounce his name -- Bodnar, that you undertook to look into some concerns about groundwater quality at the Applied Materials site. And in the course of doing so, you actually went about -- or got groundwater elevations from Applied Materials, Sunset Farms, and the Austin Community Landfill facilities, correct?
A Well, sir, I don't know that I could say Mr. Bodnar was concerned about it, if that's your question.
Q Did anyone express any concerns to you during that time period about industrial waste deposition at the Austin Community Landfill?
A I don't recall anyone being concerned about it, no.
Q Let's just skip over to Page 19699 for a moment, please.
On Page 19699 of the exhibit in the upper right-hand corner under "Legend," there are three dark rectangular figures side by side. Do you see that?
A Yes, I do.
Q And what are the words to the right-hand side of those three figures?
A "Bulk Liquid Disposal Areas."

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Q And just below that, do you see the words "Suspected Industrial Waste Disposal Areas" that's by the next little symbol?
A I do.
Q Are those also reflected on the map to the left of those symbols?
A Yes, they are.
Q And based on the location of those same symbols from the legend, does it appear that the bulk liquid disposal areas identified in the legend are also placed within the Austin Community Landfill property?
A That's true.
Q Similarly, the suspected industrial waste disposal area, is it also located on the Austin Community Landfill property?
A Yes.
Q Why are those -- why are those figures actually on this map?
A They were placed on the map to locate their location on the landfill.
Q And how did one get the information to know where to place those on the map?
A I don't recall exactly. We got a drawing of -- we got a drawing that -- that had these facilities, if you will, on them. We scaled it down and put it on this

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drawing.
Q Someone else provided you with the information, then, correct?
A I believe I had stated I don't remember how we got them. I really don't remember. I think we may have gotten them from files at the TCEQ. I'm not certain.
Q Was the fact that there were suspected bulk liquid disposal areas and suspected industrial waste disposal areas on the ACL Landfill property adjacent to BFI and across the street from Applied Materials, was that part of your investigation for purposes of determining the fate and transport of any materials potentially released from that landfill?
A We didn't determine any fate and transport, no.
Q Were you ever provided any information to indicate any kind of detections of semivolatile organic compounds in any of the monitoring wells at Applied Materials?
A We were given a portion of the groundwater monitoring report I referred to earlier.
Q And that report indicated that there had been detections of semivolatiles at Applied Materials?
A Yes. But to be honest with you, sir, I don't remember being -- I don't remember even reading that at the time. We used the report, from my memory, just for

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the water level information.
Q Why would you be concerned about just the groundwater contours of these three facilities in the absence of some concern about contamination at Applied Materials?
A I wasn't concerned about it.
Q Do you have any reason to know or understand why someone asked you to look into this further?
A I believe that Mr. Bodnar asked us to look into it in response to a document written by Dr. Robert Kier around that time frame.
Q And have you ever read the document you just referenced from Dr. Kier?
A I have read at least a portion of it.
Q Was there anything in the document that you read that was authored by Dr. Kier that would suggest any concerns about contamination flowing from the Austin Community Landfill towards the Applied Materials property?
A Yes. If I remember right, that document theorized that migration.
Q Did Mr. Bodnar ever communicate to you any concern about that?
A Sir, I don't think that I can characterize it as concern, no.

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Q Did he ever communicate to you about it in any form or fashion?
A I don't -- I really don't remember our conversation, any specifics about it.
Q Going back to Page 19698, if you will, Mr. Carel. Are you with me now?
A I am.
Q Okay. Towards the bottom of the right-hand column, there is a No. 1, and if I read the handwriting correctly, it says: "Southern corner MW-26 & 27 are downgradient of liquids ponds, no impacts yet."
What does that mean?
A Well, sir, based upon the contours that we drew at the time -- which again were taken from monitoring events as much as six months apart, so the accuracy of this is in question. The -- at least based on those contours, though, the Wells 26 and 27 appear to be potentially downgradient of that bulk liquids pond or industrial waste disposal area, if you will. That was my understanding of this map at the time.
I would like to clarify that I don't believe the map is accurate, and I would not contour it the same way today.
Q I understand. If for no other reason, the groundwater elevations would have changed from then

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until now, correct?
A That's one thing.
Q And if I understand your note under Item 1 on the right-hand column of Page 19698, "No impacts yet," should one infer that that means that there have been no measurable detections at Monitoring Wells 26 and 27 of BFI's property?
A I'm sorry. Did you say no measurable detections?
Q It says "No impacts yet," I believe is your note, on the right-hand column on Page 19698. Do you see that?
A I do.
Q Should one infer from that comment "no impacts yet" that it means that there have been no detections of any kinds of compounds or concerns in Monitor Wells 26 and 27 on the BFI property?
A I think that it means that there are no detections or organic compounds.
Q Correct.
Skipping back over to Page 19699 -- and you may have answered this previously, but I just wanted to make sure I understood your answer if you did. If you look at the map at 19699, at each of the monitoring wells or piezometers there appears to be some numbers.

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Do you see those?
A I do.
Q What do those numbers represent?
A The handwritten numbers?
Q Yes, sir.
A I believe that the handwritten numbers correspond to the groundwater elevations that were measured on the dates -- the various sampling dates or various dates of groundwater measurement.
Q The same dates that you said out at the very beginning of this conversation, right?
A Yes, March of '02, July '02, and September of '02, if I remember right.
Q Where did you obtain the information for the elevations of groundwater for the Applied Materials wells?
A I believe that we obtained them from the groundwater -- the excerpt of the groundwater monitoring report that we received.
Q When you say "received," is this a public document?
A I don't know if it's public or not.
Q But you didn't go to the TCEQ to see if it was filed of record there; is that right?
A I did not.

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Q And you don't know the source of how that document came into your hands?
A Oh, if I recall, Mr. Randy Bodnar faxed it to me.
Q And you don't recall any conversation with Mr. Bodnar, do you, where he indicated how he obtained that information?
A No. I don't remember how he obtained it at all.
Q Let's assume, just for the sake of discussion -- so this is a hypothetical, correct?
Let's assume for the sake of discussion that the contours reflected on Exhibit TJFA-12 are accurate. And let's assume that there was a release from either the grounds -- the bulk liquid disposal areas or suspected industrial waste disposal areas on the ACL property as reflected on the map. We can assume all of those things. Would it also not follow that any pollution or contamination of the groundwater would tend to track towards the Applied Materials facility?
A Again, it's hypothetical.
Q It's hypothetical.
A And I told you prior that I don't believe the map is accurate.
Q I understood your prior comment. I was asking

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for the hypothetical answer.
A And so, hypothetically, if it were correct and if they leaked, are those the conditions?
Q Yes, sir.
A That it would migrate to Applied Materials?
Q Towards the Applied Materials property.
A Based on groundwater flow inferred from this, it would migrate north -- northeasterly in the direction of Applied Materials.
Q Thank you.
MR. RENBARGER: May I approach, Judge?
JUDGE NEWCHURCH: Yes, sir.
(Exhibit TJFA No. 16 marked)
Q (BY MR. RENBARGER) Mr. Carel, I just handed you a document consisting of two pages that should be marked as TJFA Exhibit 16. Do you have that in front of you, sir?
A I have the two pages you gave me. They are not marked with the exhibit number.
Q Okay. I believe the court reporter has designated that as TJFA-16, and it should consist of Pages 31154 and 32102. Is that what you have in front of you?
A Yes, sir.
Q Now, the two maps comprising this exhibit were

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created by the Carel Corporation to depict groundwater contours at the BFI facility, correct?
A That's correct, sir.
Q Have you seen these maps before?
A I believe that I have. Yes.
Q Okay. Let's start with the map that appears on Page 31154. And could you please identify the date of this map from the right-hand column?
A Well, it's blurred. My copy is not a good quality, but it appears to be September 25th, and I believe that's 2002.
Q All right. I'll just refer to it going forward as the 2002 map, okay, so you understand which map we're referring to.
The 2002 map that you've just identified reflects groundwater contours of BFI's facility based on the elevations of the various monitoring wells at the perimeter of the facility, right?
A It represents elevations of the monitoring wells at the perimeter, yes.
Q And so from those perimeter water measurements, if you will, of the wells, you have extrapolated across the landfill, the contour lines, correct?
A We have.
Q Was the 2002 map created as a result of a

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sampling event at BFI?
A I suspect it was, yes.
Q And your company was engaged by BFI at that time to perform groundwater services, right?
A We were, yes.
Q If you look at the left side of the 2002 map, I believe there's a contour line with a number 640 on it. Do you see that?
A There are two contour lines with 640 on it.
Q Okay. You are absolutely correct. And they're on the western side of the facility, though, right?
A That's correct.
Q And, generally speaking, they traverse from a north to a south direction, right?
A Generally speaking.
Q Now, between the two 640-foot contour lines that we've just identified, there is another line, just a single dark line. And it's got an arrow pointing two different directions, kind of superimposed on that line. Do you see that?
A I do.
Q What does that represent?
A It generally represents a groundwater divide, if you will.
Q And what is a groundwater divide?

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A Well, if I could explain, there is -- I believe you omitted -- there is a thin contour -- or a thin line that is generally midway in between the two 640 contours. That line would be intended to represent the axis of a groundwater divide where the groundwater elevation is the highest. And it would flow in either direction perpendicular to the groundwater contours.
Q Okay. And, indeed, that would be consistent with the contour lines on either side of the 640 lines, correct?
A That groundwater flow would flow perpendicular?
Q No, sir. That the groundwater would flow away from the highest point, this divide line as I believe you described it, to areas of lower elevations represented by the contour; is that correct?
A Yes. Well, yes.
Q So based on these contours and based on this line with the arrows corresponding to the divide, as you described it, we would expect groundwater flow to flow from this high point on the divide and both to the right of that and then to the left of that, depending on which way we're looking, right?
A Flow both ways?
Q Yes.
A Yes.

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Q Let's move over to the next page on 32102, please. Do you have that?
A Yes, sir, I do.
Q And if you would, please, identify what is the date for that map?
A The date drafted is May 3rd, 2007.
Q Again, looking towards the left-hand side of the map, I believe we see a 640 contour line again, correct?
A That's correct.
Q And to the right of the 640 line, there's one that appears to be designated 645 that moves kind of northerly and then becomes a dotted line, goes towards the northern -- toward the northern boundary and loops back towards the south before again becoming a solid line until it intersects with the southern boundary of the facility, right?
A That's correct.
Q And does that line designate a 645-foot contour line?
A Yes, sir.
Q Is there any reason for the line going from being a solid line to a dashed line?
A Well, yes. The meaning of dash, it means that it's inferred, that the person who prepared it is

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uncertain. But to be honest, all of the contour lines are interpolated between points and they're all inferred.
Q Kind of at the peak, if you will, the northern peak of the dashed 645-foot line, there's a large -- a large -- relatively speaking, dark circle there. Do you see that?
A I do.
Q What is the purpose of that symbol?
A I don't know for certain. I believe that that is a relic from another report that was done, alternate source demonstration, perhaps.
Q And, again, as before, we see contour lines of lesser heights moving away from the 640-foot -- 645-foot line both to the west and as well to the east, correct?
A That's correct.
Q And, once again, would that suggest to you that the groundwater would be flowing in two different directions away from the 645-foot line?
A Yes. There is an apparent groundwater divide that exists along the western side of the facility. I believe it's referred to in the permit application.
Q Now, would you agree with me, Mr. Carel, that the maps that are included in TJFA-16 would tend to support the notion that there is a ridge or mound of

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groundwater in the western portion of the BFI facility?
A I think I just referred to it as a groundwater divide.
Q Yes, sir. And is a groundwater divide anything different from, I'll call it in a layman's term, a mound, or a higher point, a peak in groundwater?
A In my opinion, it's drastically different.
Q Okay. Could you please explain that for me?
A Well, this groundwater divide is relative -- the original topography. And it -- the topography plays a role in the direction of groundwater flow. In general here, the groundwater flow generally mimics -- or the groundwater surface in the Taylor marl generally mimics the topography. And there was a higher topographic ridge that pre-existed the landfill development.
And there was a groundwater divide that existed prior to the landfill development, and that's what is illustrated -- or attempted to be illustrated by these contours that we've drawn and the different illustrations you've asked me about recently.
Q Okay.
A It has nothing to do with the mound.
Q I understand.
If there is a high point of groundwater within a landfill, wouldn't one expect that groundwater

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to move towards lower elevations over time?
A High groundwater within a landfill?
Q Yes, sir.
Groundwater will try to seek a lower level, correct?
A You know, to be honest with you, your question doesn't quite make sense.
Q I apologize. I'll try to rephrase it.
Generally speaking, groundwater will flow downhill, right?
A As illustrated here, it flows from -- perpendicular to the groundwater contours, it flows, yes, downgradient or downhill in this case, generally.
MR. RENBARGER: Move to admit TJFA-16.
JUDGE NEWCHURCH: Any objection?
MR. CARLSON: No, Your Honor.
JUDGE NEWCHURCH: 16 is admitted.
(Exhibit TJFA No. 16 admitted)
Q (BY MR. RENBARGER) Mr. Carel, is it your understanding that applicants or solid waste facility permits can actually add additional compounds for sampling in their groundwater sampling and analysis plan?
A That applicants can add additional compounds?
Q Something over and above the Appendix 1

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constituents required to be sampled.
A I believe that's allowed as an alternate list.
Q And similarly, permittees could add additional groundwater monitoring wells to exceed the minimum spacing requirements for groundwater wells, as well; would you agree?
A They could add additional wells.
Q And in designing a groundwater monitoring system, they could even add deeper wells than what commonly might be found in their system, correct?
A I'm not sure about that. I don't believe that's accurate.
Q What is inaccurate about that statement?
A Well, the purpose of the wells are to monitor the uppermost aquifer. If you add a deeper well, go to a deeper zone, it wouldn't be monitoring the -- potentially would not be monitoring the uppermost aquifer, so I don't think that would be allowable.
Q I'm not saying in lieu of a well that is monitoring the predicted groundwater level. I'm saying that in addition to, it could be screened deeper than just that expected groundwater zone, correct?
A That the same well could be screened deeper, into a deeper zone, into two zones?
Q Yes, sir.

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A I don't think that would be allowed by the rules, no. I don't think that's technically appropriate.
Q All right. Isn't it true that one could add to their groundwater monitoring system what I will call side-by-side wells with screened intervals at different wells?
A I believe that's allowable, yes.
Q And, to your knowledge, in your review of the Groundwater Sampling and Analysis Plan included in the application, is it your view that BFI has provided the minimal adequate system?
A The minimal system?
Q Yes, sir.
A No, it's not my view that it is minimal, no.
Q It exceeds the minimal system?
A Yes, sir.
Q In what way?
A The well spacing is far from minimal.
Q And when you refer to minimal with regard to well spacing, what are you referring to in terms of distances?
A Well, the new rules require 600-feet spacing.
Q Correct.
And is it your testimony that the proposed

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groundwater monitoring system in the application has well spacing less than 600 feet? Is that your testimony?
A Yes. Some of the wells are less than 600 feet by quite a bit, if I remember right.
Q What is a point of compliance?
A The point of compliance is defined in the regulations. I don't believe that I can recite it verbatim. I can attempt.
Q Please do.
A It's a vertical plane that extends down into the uppermost aquifer.
Q And for purposes of groundwater monitoring and detection, does the point of compliance at BFI completely surround this facility?
A My understanding is in the application the point of compliance -- I have to think about that a minute. I don't recall. I tend to think that the point of compliance in the application does go around the entire site. I'm a little vague on it.
Q Is the point of compliance hydraulically downgradient of the Waste Management unit boundaries at BFI's facility?
A I believe that's in the definition, hydraulically downgradient. Vertical plane,

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hydraulically downgradient.
Q Is it your understanding, also, that the groundwater monitoring system proposed for BFI's expansion has a point of compliance hydraulically downgradient surrounding its land?
A Yes. Point of compliance does extend to those areas that are hydraulically downgradient, as well as areas that can be categorized as side gradient, if you will, or perhaps even upgradient. So that would be another area where I think they exceed the standards -- the minimum standard that you referred to earlier.
Q Okay. Are you aware of whether or not the BFI facility, there are any upgradient wells?
A You're talking about the current monitoring system?
Q Yes, sir.
A I believe that MW-9 -- I'm sorry. I have to get my numbering system right -- I believe it's 19, I apologize, is designated as upgradient. There is another well, if I remember right, that exists on the south side of the site that is designated upgradient as well, but I don't -- I don't recall from memory which one that is.
Q Do you recall from your review of the BFI permit application, are there any upgradient groundwater

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wells for the proposed facility?
A Well, the wells that I referred to earlier I believe stay in, so I believe 19 stays in and the other well that is designated as upgradient currently, which I don't remember the number, I believe that it stays in as well. So they would be included in the new monitoring network for the proposed monitoring network.
Q As we sit here today, could you point me to somewhere in the application where there is a well in the BFI's proposed expansion that is designated in the application as an upgradient well?
A I don't. I don't remember specifics about the permit application. I didn't deal, per se, with Attachment 5 where I think that would be called out.
Q You did not deal with that at all, Attachment 5?
A No. My testimony is that I provided -- I reviewed and commented on Attachment 11, Groundwater Sampling and Analysis Plan, not Attachment 5.
MR. RENBARGER: Pass the witness.
JUDGE NEWCHURCH: Mr. Blackburn?
MR. CARLSON: Judge, could we take literally a two- or three-minute break before we resume?
JUDGE NEWCHURCH: Off the record.
(Recess: 4:35 p.m. to 4:38 p.m.)

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JUDGE NEWCHURCH: Back on the record. Mr. Blackburn?
MR. BLACKBURN: Thank you.
CROSS-EXAMINATION
BY MR. BLACKBURN:
Q Mr. Carel, I'm Jim Blackburn, and I represent some of the citizens that live around the site.
And I was interested in the material that was detected. I believe you said that it was 1,1,1 -- 1,1-DCA; is that right?
A Are you referring to the material detected in MW-30?
Q That's correct?
A 1,1-DCA.
Q DCA.
And did I understand you to say that PCE or perc also had been detected in MW-30?
A It had been detected, I believe, two times. It has not been detected in recent sampling events.
Q And would you agree with me that 1,1-DCA is a degradation product of perc or PCE?
A Perc or PCE has a degradation process where it degrades to other chlorinated hydrocarbons or other chlorinated compounds. I am aware of that process, but I don't remember specifically if 1,1-DCA is one of them.

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Q Would you agree with me that both perc and 1,1-DCA are hazardous materials?
A By "hazardous," they are hazardous waste?
Q Right. Classified as hazardous waste under RCRA.
A I believe that perc is a -- classified as a hazardous waste for disposal purposes. Small quantities are exempted. I don't know about 1,1-DCA.
Q So it's your testimony that hazardous waste has been detected in this landfill in the monitoring wells; is that correct?
A Well, I didn't -- I don't want to characterize it as hazardous waste detected in monitoring wells.
Q It is hazardous waste, and it has been detected in monitoring wells, correct?
MR. CARLSON: Objection, Judge.
JUDGE NEWCHURCH: What's your objection?
MR. CARLSON: He just denied that. He's asked and answered.
JUDGE NEWCHURCH: Your response, Mr. Blackburn?
MR. BLACKBURN: I don't think it was, but I think I can rephrase it.
JUDGE NEWCHURCH: Okay. Try that.
Q (BY MR. BLACKBURN) Just to be clear, 1,1-DCA

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and perchloroethylene, to your knowledge, are they listed as hazardous waste under RCRA?
A I believe I testified earlier that I didn't know if 1,1-DCA was or not. To be honest with you, I don't know about perc. I believe that it may be.
Q And they both have been detected in MW-30, correct?
A They have.
Q Now, am I correct that it is your testimony that there are potentially two sources of that material getting into the monitoring well; one of those sources being landfill gas, and another being leakage from the landfill? Would that be correct?
A That that's my testimony?
Q That's correct.
A I don't believe that that's my testimony.
Q Did you testify that it is possible that the source could be landfill gas?
A I believe that I did, yes.
Q Okay. Did you -- well, would it not be a fair interpretation that another potential source could be leakage from the landfill?
A That's clearly not my testimony, if that's what you asked me earlier.
Q Well, let me ask you now. Is that another

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potential source of the 1,1-DCA and/or perc?
A I don't believe that that's the source, hypothetically, if that's your question.
Q No, my question is: Is it possible that that is the source? Not hypothetically; in fact.
A I think in fact liquid migration is not the source.
Q And why do you say that?
A I've reviewed the data from MW-30, and I do not believe that liquid leakage is the source of the organic compounds.
Q Now, is it your testimony that it could be determined relatively easily if landfill gas was, in fact, the source?
A I believe the question was whether you could easily collect a landfill gas sample or not. And so I believe my answer was, you know, it's not hard. You could collect a landfill gas sample.
Q And then --
A That, I don't believe is the same as what you referred to a moment ago.
Q Well, I mean, if you collected the landfill gas sample, you could sample it -- or you could test it for 1,1-DCA or perc, correct?
A You could. You don't necessarily have to

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collect a landfill gas sample to make that determination that it's landfill gas.
Q How do you do that?
A Well, one way to do that is to look at additional parameters. I've reviewed what's called free carbon dioxide. Allied samples and analyzes their samples for free carbon dioxide which is above and beyond the rules.
Landfill gas, if I can take a minute to explain, is roughly half carbon dioxide and half methane. It's just kind of a rule of thumb. Landfill gas also contains low levels of organic compounds, such as 1,1-DCA and PCE. Carbon dioxide is soluble in water. And that's what makes Perrier bubble. And that's what makes soda pop bubble. It's dissolved carbon dioxide. And we can analyze for that carbon dioxide and compare it to historical levels.
And the free carbon dioxide appears to increase with the increase or the detections of the organic compounds. There's a correlation there. That indicates that -- that indicates to me that landfill gas is dissolved into the groundwater. As it's dissolved in there, the carbon dioxide levels have gone up. And the trace organic compounds -- you know, we're talking about very low levels here, on the order of a few parts per

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billion. I don't remember specific numbers. But those organic compounds partition or dissolve into the groundwater.
Q Has it been officially determined whether it's landfill gas or whether it is leakage that is the source of contamination at MW-30? Yes or no?
A When you say "officially determined," I'm --
Q Well, has TCEQ signed off on any determination?
A The TCEQ has not been presented with any direct report or evidence regarding that. They haven't signed off on anything, no.
Q Has BFI prepared a direct report?
A No, they have not. It's based on my review of the groundwater monitoring data.
Q Okay. Now, this application, as I understand it, is a request to go 75 feet higher above the area, I believe, that contributes to MW-30. Would that be fair to say?
A I don't know specifically how much higher the landfill requests go.
Q Well, MW-30 is over the sub -- or is adjacent to the Subtitle D liner system, correct?
A I believe I testified earlier I don't really know where those Subtitle D and pre-Subtitle D areas are. It's not something that I've reviewed. I believe

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that it is adjacent to Subtitle D area, but I'm not certain of that.
Q Would it be fair to say that all of your maps, both the ones on TJFA No. 12 and TJFA No. 16, show essentially a groundwater gradient to the west from the western side of the site?
A Yes.
Q Do you know whose property is to the west of BFI?
A No, I do not.
Q Do you know if citizens own that property, citizens that I represent?
A I just told you I don't know who owns the property.
Q Now, is it your testimony that every monitoring well is a compliance well as proposed under the current groundwater monitoring concept that is put forward for permitting?
A You know, I testified earlier that I'm uncertain about that. I don't really recall. I know the monitor wells ring the site. I believe that -- I just don't really recall how it's worded in the permit application.
Q Now, I think you disputed the characterization in TJFA-16, second page which is APP 032102. You

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disputed the characterization of that area within the 645 contour line as a mound. Did I understand your testimony correctly?
A That it is not a mound?
Q Right. That was your testimony, correct?
A Yes.
Q Now, would you not agree that if there are essentially compliance wells surrounding the entirety of the landfill, that that, in fact, defines a mound within the landfill?
A I described earlier what I believe the contours illustrate, and I referred to it as a groundwater divide that existed prior to landfill development that's controlled by the original topography.
Q But that original topography was scraped away, was it not?
A I believe that it is gone.
Q And there was a dewatering system that was put in place while the construction took place, correct?
A I heard earlier testimony that there is a dewatering system. I don't know any specifics about it.
Q Well, is it your testimony that there is now the ghost of the former topography that is controlling the groundwater?
A The ghost?

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Q The ghost.
In other words, the topography is gone. How can it be controlling anything?
A Well, sir, the -- let me try to explain. The topography does control groundwater flow. In a secondary fashion, the depth of weathering create the unweathered zone, the unweathered Taylor marl. Groundwater flow flows along that unweathered surface, which also generally follows topography. At least that's to my understanding.
You are correct that the landfill -- or the earth in the center of the landfill area has been excavated. When we contour the groundwater elevations that are measured around the perimeter, we assume that the groundwater flow is generally the same as predevelopment conditions. That's the basis for groundwater monitoring. That's the basis for the design of the groundwater monitoring system.
Q Do you know if the excavation is into the weathered -- I mean into the unweathered Taylor?
A My understanding, it is not into the unweathered.
Q Now, with regard to TJFA-12, the study that you did of the Allied site, where did you obtain the information about the Waste Management site? Did you

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get that from Waste Management?
A I'm sorry. Are you talking about this figure, sir, TJFA-12? Is that what you said?
Q TJFA 12, which is two different maps.
A Yes, sir. I believe I testified earlier I don't really remember where we got that. I did not get it directly from Waste Management. I believe that somehow we got it from the files at TCEQ.
Q And the location of the bulk liquid disposal areas, was that also from the files of TCEQ?
A That was from a drawing derived -- and, again, I don't remember exactly how we got that. I believe it's from the files of TCEQ.
Q And am I correct, it was your earlier interpretation that there was movement from the Waste Management site through Monitoring Wells 27 and 26, but that you now no longer believe that to be the case?
A Yes. I don't believe this map is accurate, and that's correct.
Q But at the time you drew it, that was your interpretation, correct?
A Well, sir, the purpose of the map was just a general overview. We knew that the groundwater elevations were collected from different events as much as six months apart, and it's never intended to be a

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detailed analysis. And the groundwater flow directions are just kind of generic.
Q So Note 2 where it says "Allied Materials, north wells MW-3A and 4 are downgradient from Sunset," that was just a preliminary thought?
A Yes. I think that might be accurate. Preliminary based on the data that we had, which we know has certain limitations based on the large degree of time span between the various sampling events.
Q Would you turn in the application, which would be Volume 2 of 3, to Page 000874.
Have you found APP 000874?
A Yes.
Q And is that Figure 5A.1?
A It is.
Q And does that identify the downgradient point of compliance for the landfill -- I guess the proposed site groundwater monitoring system?
A It appears to. From my understanding, the legend is correct, yes.
Q You see in the bottom left-hand side of the legend, it says: Downgradient point of compliance?
A Yes.
Q And that is, I don't know, a dot pattern? It kind of makes a little gray line. Do you see that?

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A I do.
Q And does that dot pattern, little gray line, go all the way around the site?
A It appears to, yes.
Q So that would mean that every point at the boundary is a downgradient point, correct?
A I don't know that it means that in the context of your question, that it's truly hydraulically downgradient.
Q So you think it's a material misrepresentation by the applicant?
A No. I don't mean that.
Q I didn't really think you did.
Go ahead. What exactly did you mean?
A I'm sorry. What's the question?
Q The question is: You say you don't think it really is downgradient at all points; is that what you said?
A I don't think that's exactly what I said, no.
Q This is a map that indicates point of compliance. And it says: Downgradient point of compliance. Correct?
A It does.
Q Now, that line goes all the way around the site, right?

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A It appears to, yes.
Q Do you agree that the definition of point of compliance is that it's hydraulically downgradient?
A I believe I testified earlier that I believe that hydraulically downgradient is part of the definition.
Q Okay. And if you've got a point of compliance going all the way around a site, that would mean that every point on the boundary is hydraulically downgradient from a portion of the landfill, correct?
A No. I think that there's a distinction here. I think for groundwater monitoring purposes, this is designed so that all of the wells are point-of-compliance wells.
Q Well, that would mean that they're all hydraulically downgradient by definition.
A I think that really what's intended here is all the wells are designated as point-of-compliance wells, irrespective of their hydraulic position.
Q So you're saying that it's okay to put forward a representation that something is hydraulically downgradient even if it isn't?
A I didn't say it was okay to put -- I'm sorry. Could you repeat that?
Q What I'm asking is, there's a definition of

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point of compliance in the rules. If something is being put forward as a representation of the point of compliance, that is in fact not hydraulically downgradient, isn't that a misrepresentation? That's my question.

A I don't -- I don't think that it's a misrepresentation, no, sir. I don't think it's intended to be.

Q But you also don't think that all of these wells are hydraulically downgradient. Is that your testimony?

A I testified earlier that I believe that MW-19 is considered an upgradient well, yes.

Q Where is MW-19?

A It's on the northern part of the site. I think that simply all wells are designated at point-of-compliance wells here is a more aggressive form of doing the groundwater monitoring so that the entire site is ringed with point-of-compliance wells.

The term "downgradient" is being applied as a misrepresentation. I just don't -- I think that the applicant is really being more aggressive here in terms of groundwater monitoring and protection.

Q In your opinion, should MW-19 be -- truly be designated as a background well?

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A Well, sir, I haven't testified that I did any groundwater characterization of the site. I didn't do Attachment 5, so I don't know that I should speak to that.

Q Have you made any investigation of whether the contamination detected at Monitoring Well 30 is moving off-site to the west?

A No. I've done no investigations.

MR. BLACKBURN: Pass the witness.

JUDGE NEWCHURCH: Mr. Carlson, unless you have a great deal, I'd like to finish with this witness this evening.

MR. CARLSON: Sure.

REDIRECT EXAMINATION

BY MR. CARLSON:

Q Mr. Carel, do you recall a question or two from Mr. Renbarger about the applicability of the post-March 2006 MSW rules to the Groundwater Sampling and Analysis Plan that's proposed in the permit application?

A Yes. He had some questions about that.

Q Okay. Could you clarify your understanding of how the new rules, if you will, the post-2006 and thereafter rules will apply to the proposed plan in the application?

A Yes, sir. The applicant has one year from the

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date of a determination on this pending application to incorporate the new rules into the sampling and analysis plan.

Q Is that because there was an application pending at a certain time?

A Yes. That rule applies to applications that were pending on the date -- on the effective date of the new rules, 330.1(a)(2).

Q Regarding the ASD as the alternative source demonstrations that Carel Corp. has provided for the site over the past 10 years, I believe you testified that you didn't know how many of those had been made, but it may have been approximately 10; is that correct?

A Yeah, I don't -- I have never counted them. I know that we've done several.

Q Do you have a general sense of the constituents for which these ASDs were made?

A Yeah. They're generally naturally occurring -- well, they're all naturally occurring elements. Barium, which is a ubiquitous element in groundwater monitoring, we see it in virtually all of the groundwater samples. Sulphate similarly is generally in all groundwater samples. Selenium, which is a naturally-occurring metal; and arsenic, which is a naturally-occurring metal as well.

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Q Do you do -- or does your company do groundwater monitoring for other landfills in the Taylor formation?

A Yes, we do.

Q Okay. Is what you just described consistent with what you see at other landfills in this formation?

A Yes, in general. I don't know specifically, but certainly sulphate and selenium have been detected and barium has been detected.

Q Not particularly anything unusual; is that fair to say?

A No, sir, not unusual.

Q Regarding the detections in Monitor Well 30, the 1,1-DCA and the PCE, could you briefly give a description of your understanding of when that first detection of 1,1-DCA took place and the sequence of events to now, in terms of monitoring events, levels, and what we're currently seeing?

A Yes. I don't remember the date that the 1,1-DCA was originally detected. I testified earlier there was a verification resample collected. Then there was an assessment monitoring event that was performed. New constituents were added to the monitoring list, which I believe were barium -- total barium and nickel, if I remember right. And there are semiannual sampling

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events that have been conducted since that time, and we evaluate the data concentrations each time.
Q And I understand your testimony was that there were two detects of PCE?
A I believe that's correct. I think there were two. I believe there's one or two events since -- one or two more recent events. PCE has not been detected.
Q And with respect to the DCA, what is the trend of the detection -- detections of 1,1-DCA in the MW-30 over time?
A I don't remember exactly from the initial -- if I remember right, from the initial concentration detection, I'm sorry, the concentration went up for a few events. And since that time it has decreased. I don't remember the exact trend. I know there's an up and a down.
Q Do you know where we're at with respect to the last detection limit in MW-30 for 1,1-DCA with respect to the reporting limit? Is it at or near the reporting limit?
A You know, I don't remember the concentrations of 1,1-DCA. I know that there's small concentrations, a few parts per billion or micrograms per liter.
Q Is there anything that you've seen in terms of the groundwater monitoring data at MW-30 or any other

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monitoring well at the site that leads you to believe there's been a leakage of leachate from this landfill, sir?
A No. There's no evidence that I've seen that there's any leakage of leachate from the facility.
Q Do you have anything else to add other than some of your responses to Mr. Blackburn's questions?
A Do I have anything else to add?
Q Yeah, any other basis that you can think of to support that opinion or conclusion, sir?
A That there's no leachate?
Q That there has not been a leak of leachate from this landfill.
A I would have to think about that for a moment. Generally, the fact that -- it's kind of hard to state, but generally the fact that we don't have any statistically significant increases in any of the monitor wells that we can't explain as being naturally occurring.
Q Let me ask you this: If there's -- in your experience, if there's a leak of leachate from a landfill, do you typically see more than one constituent on any of these --
A I'm sorry.
Q -- areas?

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A Yes.
Q Have you seen that kind of trend in MW-30, multiple constituents from either of the Appendix 1 or Appendix 2 list?
A Oh, no. There were no new detections, other than total barium, I believe. And, again, barium is ubiquitous. It's in generally all -- or virtually all groundwater samples that we see.
Total nickel was detected at least once, but I don't know if it's been detected since.
Q Regarding -- could you pull TJFA-12 up, please, sir? That's the contouring.
A Yes.
Q Do you have that?
A Yes.
Q You were asked a series of questions about that. And I believe you testified that you would not contour this site or these sites today as you did back then. Could you explain the basis for that statement, please, sir?
A Well, yes. Generally, the basis -- since I'm more familiar with local geology and hydrogeology now, having reviewed to some extent the permit application, I note that when we did the original contouring, we neglected to properly consider the topography when we

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drew our groundwater contours.
And, also, there's some new data that has came to light that I reviewed that was part of -- I believe it was Dr. Kier's deposition that shows some new wells in the vicinity of the central part of the site as control. They were wells that didn't exist or certainly I didn't know about, didn't have any data for, when I drew these. That new data indicates to me that the contours I have drawn are not accurate.
Q Are you talking about some of the exhibits to Dr. Kier's deposition?
A Yes.
Q Okay. What exhibits are those? Do you recall?
A They were two drawings. I don't recall numbers. There were two maps. There was a groundwater contour map of the Austin Community Landfill, if I remember right. And there was a map of the top of the unweathered shale Taylor marl.
Q Let's talk generally about the Applied Materials site in the 2002-2003 time period. Okay?
A Yes.
Q You testified you had an opportunity to review Dr. Kier -- some material from Dr. Kier; is that correct?
A Yes. I reviewed some of his materials.

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Q And I believe you testified you had an opportunity to review at least some of the materials from a sampling event at -- from groundwater monitoring wells at the Applied Materials site; is that correct?
A I have reviewed them now, yes.
Q Okay. And the monitor -- the locations of the monitoring wells at the Applied Materials site are actually identified on TJFA-12; is that correct?
A The locations of the monitoring wells at Applied Materials are on this drawing, yes.
Q Do you recall whether any Appendix 1 constituents were identified in any of the Applied Materials wells during that 2002 sampling event?
A Well, to be clear here, you used the term "Appendix 1." And the facility ran scans and they analyze for some metals and some volatile organics and some semivolatile organic compounds. It's not necessarily the same as Appendix 1. But they had no detections of the parameters analyzed in the volatile organic compounds or the semivolatile organic compounds that are in the 8260 or 8270 list.
MR. BLACKBURN: Excuse me, Your Honor. I think we're testifying from the document that has been at least heretofore ruled to be inadmissible, which is the Allied Materials document. I just think it would be

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appropriate to go ahead and admit it into evidence and talk from it as a document. I mean, that's what we're -- I believe that's what we're testifying from.
JUDGE NEWCHURCH: Response?
MR. CARLSON: I don't think we are. There's -- Dr. Kier submitted prefiled testimony, and there's some different documents attached to Dr. Kier's -- or incorporated as a part of Dr. Kier's testimony.
MR. TERRILL: And, Your Honor, I definitely had the same objections yesterday to it that I have to it today. I didn't understand his questions to be seeking admission of that document.
MR. BLACKBURN: I'm sorry, but I did.
JUDGE NEWCHURCH: Well, if -- Mr. Carlson is putting on his redirect case; he's not offering the document. If you want to reoffer the document when you get to recross, you can have an opportunity to do that. So that's where we are right now.
MR. BLACKBURN: Thank you.
Q (BY MR. CARLSON) Let me just cut to the chase and save some time here, Mr. Carel. Based on your 2002, 2003 review of the Applied Materials material -- information, did you see any impacts suggestive of a leakage of leachate from the Sunset Farms site onto the

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Applied Materials site?
A There's no evidence of any leakage from leachate to Applied Materials, no.
Q In general, based on your understanding, these monitoring wells along the eastern border of the Sunset Farms site there along Giles Road -- Giles Lane, have you ever -- are you aware of any detections of any sort of Appendix 1 or 2 constituents?
A Well, there are detections of some Appendix 1 metals, dissolved metals. Barium, for instance, is in Appendix 1. And I believe that barium, for instance, has been detected in all wells. Again, it's ubiquitous. It's in virtually all samples that we see.
If you're asking about organic compounds, no, to my knowledge, none of the wells along the eastern side have had any detections of organic -- volatile organic compounds.
Q Regarding the designation of the point of compliance for the proposed groundwater monitoring system -- do you recall that discussion?
A I do.
Q Is the designation -- I believe your testimony was that the designation of the entire perimeter of the landfill as a point of compliance is more aggressive than the rules require. What is the basis for that

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statement, sir?
A Well, my view of it, potentially the area in the vicinity of MW-19, for instance, could be not designated as point of compliance. If there's a statistically significant increase in that well, then it -- well, under the new rules, it is an issue, but it wouldn't be designated as point of compliance.
The applicant has made a more conservative application by including that area into the point of compliance. Does that make sense?
Q Well, let me ask you this: Does the inclusion of the entire perimeter monitoring system as -- or designation as point of compliance, does that potentially lead to enhanced reporting and potentially remedial measures?
A Yes. That's what I mean. That's my view of it, that it's more conservative. It's enhanced, yes.
Q From a protection of the public and the public's property perspective, is that better than having a smaller point of compliance?
A That's what I tried to explain earlier, yes.
MR. CARLSON: I'll pass the witness, Judge.
JUDGE NEWCHURCH: Who has cross-examination?
MR. RENBARGER: Yes, I have just a couple

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of questions. Thank you.
JUDGE NEWCHURCH: Okay.
RECROSS-EXAMINATION
BY MR. RENBARGER:
Q Mr. Carel, in response to the questioning by Mr. Carlson, I think he was trying to establish a kind of history and time, if you will, of the first detection of 1,1-DCA in Monitoring Well 30, and then what has transpired since then. Do you recall that line of testimony?
A I do.
Q Okay. And you don't recall initially when that first detection occurred, correct?
A I can't tell you the date, no, sir.
Q Do you know how many different monitoring events have transpired since that time, how many semiannual monitoring events have transpired?
A No, because I don't know the initial date. I wouldn't know the number of subsequent events, either, no.
Q But it was your company taking the samples, though, correct?
A No. We don't collect the groundwater samples.
Q You do not? You just analyze them; is that right?

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A I testified earlier that we do the statistical analysis and prepare the groundwater monitoring report.
Q And 1,1-DCA is an organic compound; is that correct?
A That's correct.
Q And I believe, in response to a question from Mr. Carlson, you had indicated that initially it was your thought that the concentrations of 1,1-DCA became a little more elevated in Monitoring Well 30, and then subsequent to that it kind of decreased over time. Is that your testimony?
A I believe that that's been the trend, yes.
Q Okay. Is it the nature of a volatile organic compound that it volatilizes over time?
A By definition, it's volatile, yes.
Q So if one -- if a compound were just sitting in a well and nothing was going on with it, over time one would expect that to volatilize and levels to decrease, would they not?
A I would have to think about that. I don't -- you know, in this context, if the source is landfill gas and it's a continual source, then that wouldn't be the case, I don't believe.
Q If it were not a continual source, would that change your opinion?

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A It's -- it's hard to say. It depends on the -- you know, they're volatile, yes. Would it volatilize away? Is that your question?
Q That is my question.
A I think that, perhaps, it would. I don't know. I can't answer time frames.
MR. RENBARGER: Very well. Pass the witness.
JUDGE NEWCHURCH: Did you pass the witness?
MR. RENBARGER: Yes, sir.
JUDGE NEWCHURCH: Mr. Blackburn?
MR. BLACKBURN: Yes.
Could the court reporter please hand Mr. Carel TJFA No. 10.
RECROSS-EXAMINATION
BY MR. BLACKBURN:
Q Mr. Carel, would you take a moment to look through the document that's been marked TJFA-10.
A (Witness complies.)
Q Have you had a chance to look at the document?
A I have.
Q Have you previously seen this document?
A I have seen -- yes. I've seen portions of the document, yes.
Q And when you were answering questions for

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Mr. Carlson regarding information about Appendix 1 and Appendix 2 constituents and whether they were found on the Allied facility, is this the document that you were referring to when you answered the question?
MR. CARLSON: Objection. He said "Allied." I believe he meant "Applied Materials."
MR. BLACKBURN: I did.
JUDGE NEWCHURCH: Do you want to rephrase your question?
MR. BLACKBURN: I will.
Q (BY MR. BLACKBURN) When you were answering Mr. Carlson's questions about the detection -- or absence of detection of Appendix 1 and 2 constituents on the Applied Materials property, is this the document that you were referring to as documentation that you had reviewed?
A Specifically, I -- I know that most of these pages were contained in what I reviewed, yes.
Q And you just can't be sure of every single one of them?
A That's correct.
Q Is that a correct interpretation of your testimony?
A Yeah. I can't be certain of every page. Yes, sir.

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MR. BLACKBURN: Your Honor, I move for the admission of TJFA-10. I think the only question was -- the only objection was with regard to foundation. And I'm not sure I ever understood that objection, but it appears this document is one that was relied upon by this witness in answering questions.

There's no question about the authenticity. It now seems that, essentially, a foundation sufficient for admission has been laid.

MR. TERRILL: Your Honor, that's plainly not the case. He didn't offer the document. He's not responsible for its contents. Experts can always review documents and testify about them. That's what experts do. That does not mean the underlying document comes in. For the same reasons I objected yesterday and which you've correctly sustained the objection, the document doesn't come into evidence. He's not responsible.

JUDGE NEWCHURCH: Okay. So, ultimately, to be clear, because I struggled on this yesterday. Your objection, as I understand it, is the document contains expert opinions, and we don't know who the expert is, we don't know what their qualifications are, and we don't know what method or analysis they used to reach those opinions.

MR. TERRILL: What they did -- yes. And I

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could add also, you know, what they did, what they didn't do, when they did it, how they did it, all of those sorts of things that go into forming an analysis. It's not like a bank check or something like that that's typical.

They try to get around the hearsay objection by saying it's a business record. Business record, that works for something like if you've got documents that are bank checks, things like that that are sort of -- that just speak for themselves. This goes way beyond that.

It's an analysis. And, of course, PBS&J are not here. TJFA and Northeast Neighbors are not going to call them as witnesses. They're not retained experts. We will never have a chance to see what they did and didn't do, how they performed their analysis, and what -- all of the elements that went into that report. And so I'm not saying that an expert can't review something and give some sort of testimony on it, but the underlying document doesn't come into evidence.

JUDGE NEWCHURCH: Does anyone join that objection?

MR. CARLSON: I do, and I would like to add one other part to it. I believe that Mr. Carel said that he saw something, but it was portions of a document

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and not this document. I think that also goes to yet another reason not to admit the document presently before the Board.

MR. BLACKBURN: I think it's -- excuse me.

MR. TERRILL: Just one other thing, also. To be clear here, I said lack of foundation. I also said hearsay. And I don't mean just hearsay on the business records level. I mean hearsay within hearsay. And so to overcome a hearsay within hearsay objection, you can't just use business records. You have to overcome the hearsay objection within it as well.

JUDGE NEWCHURCH: Okay.

And, Mr. Blackburn, what's your response to the objection?

MR. BLACKBURN: Well, again, I think that on the one hand, we've been getting testimony from an expert about -- and I think his testimony is he reviewed pages within this document, but not necessarily the whole document. We're getting testimony from this expert about conclusions he made based on this document or based upon evidence or data that is contained in this document. That's come in. That's not objectionable.

This is an authentic business record of the document from which he is testifying. I think it's absolutely appropriate to enter it into evidence, and

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the question becomes how is it used. If nothing else, the source document for the testimony, which has been authenticated, is in the record as evidence, and I think that's where it belongs.

JUDGE NEWCHURCH: So that last part sounded like you're making a limited offer just to show what the witness was referring to.

MR. BLACKBURN: And that it's an authentic document and that it has been relied upon not only by this expert, but by others. Now, how they interpret it is up to the individual expert, and they can be cross-examined on it, but I think the base document should come into evidence.

MR. CARLSON: That doesn't make it admissible, Judge.

MR. BLACKBURN: It makes it admissible. Certainly, it does.

MR. TERRILL: And, Your Honor, I'll just refer back to what happened yesterday. There was this entire line of questioning that all was predicated on the idea -- the truth of the matter that was asserted within the document. And then Mr. Renbarger pulled back and offered it for limited purpose. That's sort of the same thing that's happening here.

There's not a limited purpose for which the

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document can be offered. It's either offered for its truth or not. And that is different from the witness testifying about expert opinions.

MR. BLACKBURN: The witness is testifying as if it is truth, from the document. Its conclusion about Appendix 1 and Appendix 2 constituents comes directly from the document.

JUDGE NEWCHURCH: Okay. I think this is what you're referring to. Texas Rule of Evidence 703 says: The facts or data in a particular case upon which an expert bases an opinion or an inference may be best preceded by blah, blah, blah, blah, blah...if of a type reasonably relied on.

And 705 talks about an expert may testify in terms of opinion or inference and give the expert's reasons therefore without prior disclosure of the underlying facts. An expert may in any event disclose on direct examination or be required to disclose on cross-examination the underlying facts or data.

Is that what you're referring to?

MR. BLACKBURN: Right. That, and the fact that this is the underlying document. And it is appropriately authenticated. So it's not in question as to whether it's an authentic document. He has testified that some of these pages were pages that he reviewed and

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go to the basis of his opinion, and I think it's appropriate for it to be introduced into evidence as such.

JUDGE NEWCHURCH: I didn't hear that. What I heard was he reviewed the document and he didn't base his opinion on it. If fact, he refuted what purports to be contained in the document.

MR. BLACKBURN: I think he testified there were no Appendix 1 and Appendix 2 constituents, and you can get to -- that information is directly gleanable from the document because it doesn't have any.

JUDGE NEWCHURCH: I don't see how this is somehow supporting Mr. Carel's opinion.

Did I pronounce your name properly?

THE WITNESS: Carel.

JUDGE NEWCHURCH: Carel.

I don't see this as supporting or in any way providing a basis for his opinion. What I heard was, assuming that this might come into evidence somewhere else at some other time, he's refuting it. So I cannot agree that it comes in under that rule.

With regard to the limited offer, it would put in context a little bit better what exactly it was he was refuting. But as I indicated yesterday, I am very reluctant to allow wide-open limited offerings

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without a very specific purpose because it tends to confuse the record. And a document which was admitted for a limited purpose often is argued about as if it was admitted for all purposes. So I think it would -- it would be damaging to the record, unless it's otherwise shown later in the hearing that it should come in for all purposes.

So I'm going to sustain the objection, and TJFA is not admitted.

MR. BLACKBURN: I have a couple of other questions.

JUDGE NEWCHURCH: Go ahead.

Q (BY MR. BLACKBURN) You identified in testimony that there were no Appendix 1 and Appendix 2 constituents detected at Applied Materials. Did I hear that correctly?

A Sir, Mr. Carlson also used the term Appendix 1. I tried to clarify. Appendix 1 is a certain group of metals and organic compounds. Appendix 2 is another group. My recollection here is they ran specific scans, an 8260 scan and an 8270 scan. I tried to clarify that earlier, that there were no compounds detected on the 8270 or 8260 list.

Q And have you provided copies of those reports that you reviewed that showed that there was no

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Appendix 1 or Appendix 2 findings on those two scans?

A And you keep using the term Appendix 1 and Appendix 2.

Q I'm sorry. I thought that was your testimony.

A No. I just took a moment to clarify. My testimony is 8260 and 8270.

Q Okay. I'm sorry. I thought those were synonymous.

How did you come up with the information that there were no 8270 -- and what was the other one?

A 8260.

Q -- 8260 constituents --

A Detected.

Q -- detected?

How did you come up with that conclusion?

A Review of the analytical results for Applied Materials, the July '02 event.

Q Okay. And is that material in front of you in TJFA-10?

A At least some of that material is in front of me.

Q So the material that you reviewed to determine that there were no 8260 or 8270 constituents is in TJFA-10, correct?

A Yes.

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Q So that is the information that you relied upon, correct?
A I guess so, yes.
MR. BLACKBURN: So, Your Honor, again I offer TJFA-10. I thought that I understood your prior ruling to be he did not -- he used other information to refute 8260 and 8270 constituents. And, in fact, he used this report.
MR. CARLSON: Judge, that was an interesting exercise, but it was a moot exercise, going back to Rule 703 and 705. And I'll cite you at least one case, and I'll be happy to provide you with others. State v. Resolution Trust Corp., 827 S.W.2d 106, Austin Court of Appeals, '82.
Rule 703 provides that expert opinions may be based on facts or data not admissible in evidence if they are of a type reasonably relied upon by experts in the witness' field in drawing conclusions or inferences upon the subject.
The rule goes beyond eliminating the need to introduce otherwise inadmissible underlying data. Expert opinion may now be predicated solely on inadmissible hearsay.
JUDGE NEWCHURCH: So you're arguing even if the basis of his opinion, it's inadmissible?

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MR. RENBARGER: And it's strictly an admissibility issue. And it's not admissible, Judge.
JUDGE NEWCHURCH: Mr. Blackburn, you're going to need to get a witness if you want this in.
MR. BLACKBURN: I hear you. I'm through for the day.
JUDGE NEWCHURCH: Objection sustained.
Is there any further direct?
MR. CARLSON: No, Your Honor.
JUDGE NEWCHURCH: Then, Mr. Carel, thank you for your service. You're excused.
Let's go off the record and talk about tomorrow.
(Recess: 5:38 p.m. to 5:40 p.m.)
JUDGE NEWCHURCH: We're going to recess now, and the parties should be prepared tomorrow for cross-examination of Witnesses Stutz, Mehevec, and Lewis. And we will recess until 9:00 a.m. tomorrow morning.
Thank you.
(Proceedings recessed at 5:40 p.m.)