STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

TransCanada Keystone Pipeline, LP, 30-Inch Oil Pipeline/ Cavalier to Sargent Counties Siting Application	: : : :	**Case No. PU-06-421**

TRANSCRIPT OF

CONTINUED HEARING

(VOLUME IV)

Taken At
State Capitol
Bismarck, North Dakota
November 27 & 28, 2007

BEFORE THE HON. AL WAHL
-- ADMINISTRATIVE LAW JUDGE --

A P P E A R A N C E S

COMMISSIONERS PRESENT:

COMMISSIONER SUSAN E. WEFALD, President
COMMISSIONER TONY CLARK
COMMISSIONER KEVIN CRAMER

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C O N T E N T S

(The following proceedings were had and made of record herein, commencing at 8:06 a.m., Wednesday, the 28th day of November, 2007:)

JUDGE WAHL: The record will show that it is a little after eight o'clock a.m. on November 28, 2007. This is day two of the further hearing of an application of TransCanada Keystone Pipeline for a waiver of time procedures and schedules and consolidated applications for a certificate of corridor compatibility and route permit for the Keystone Pipeline. This is the North Dakota Public Service Commission Case No. PU-06-41.

The record will further show that I am Al Wahl, the administrative law judge, designated by the Office of Administrative Hearings to act as the hearing officer for the conduct of this hearing.

The record will show that the commissioners are all present, Commission President Susan Wefald, Commissioner Tony Clark, and Commissioner Kevin Cramer.

TransCanada Keystone is present by counsel. The intervenor, City of Fargo, is present by counsel. All other intervenors are present by counsel, and the Commission is represented by its chief counsel and its staff for the further

hearing.

Before proceeding with this further hearing, I'll ask the Commissioners for any comments and directions. Commission President Susan Wefald.

COMMISSIONER WEFALD: Good morning. Looking forward to another good day of testimony.

JUDGE WAHL: Commissioner Clark.

COMMISSIONER CLARK: Just welcome. Good morning.

JUDGE WAHL: And Commissioner Cramer.

COMMISSIONER CRAMER: Good morning. Welcome, everyone.

JUDGE WAHL: Counsel, are there any preliminary matters?

MR. JOHNSON: Just one housekeeping, Your Honor.

JUDGE WAHL: Mr. Johnson.

MR. JOHNSON: Again, a housekeeping matter. If you recall during the testimony yesterday -- I won't even go over there and get it -- we offered and it was received, Exhibit 13, with the understanding that the large format would be replaced with an 8-and-a-half-by-11. I've presented that to Judge Wahl and copies to counsel

and to the Commissioners and just wanted to make a record that we had done that replacement.

JUDGE WAHL: The exhibit has been received. Any further preliminary matters? Mr. Kelsch?

MR. KELSCH: No, Your Honor.

JUDGE WAHL: Ms. Linderman?

MS. LINDERMAN: No.

JUDGE WAHL: Mr. Binek?

MR. BINEK: No.

JUDGE WAHL: All right. Mr. Kelsch, when you're ready.

MR. KELSCH: I would call as a rebuttal witness Heidi Tillquist.

JUDGE WAHL: Ms. Tillquist, I have personal knowledge that you are informed regarding perjury.

(Witness sworn.)

JUDGE WAHL: Mr. Kelsch.

MR. KELSCH: Thank you, Your Honor.

HEIDI TILLQUIST,

having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELSCH:

Q. Ms. Tillquist, could you please state your name for the record?

A. Heidi Tillquist.

Q. And you testified in Bismarck here in September; right?

A. I did.

Q. And at that hearing I believe your resume was admitted as Exhibit T19; is that right?

A. That's correct.

Q. Could you briefly give, I guess, a very brief description of your experience in the pipeline business?

A. I've got 17 years of experience as a risk assessor and an environmental toxicologist. Worked on a number of pipelines, both refined, crude oil, and natural gas liquids and natural gas pipelines, and I've authored texts, including a report on the effects of crude oil in freshwater environments.

Q. Is your area of expertise in risk analysis for crude oil pipelines?

A. Yes.

Q. Now yesterday you were here for the testimony of Mr. Starke?

A. Yes, I was.

Q. Now, have -- have you had a chance to go out and view the area where the Keystone Pipeline proposed route crosses Mr. Starke's property?

A. Yes, I did.

Q. And when did you do that?

A. November 15th of this year, 2007.

Q. Okay. And Mr. Starke's testimony was basically that if there would be a leak in the pipeline on his property, the land generally sloped towards the Sheyenne River; is that correct?

A. That's correct.

Q. Now, what from your viewing of the property what -- what did you -- I guess, what did you notice about that?

A. His property -- well, this picture --

Q. Okay. Yeah. Why don't I show you -- I guess it's been marked as Keystone -- or TransCanada 38. I'm showing you a hard copy and then is that -- what does this picture represent?

A. This is a picture that I took on November 15th. This is looking west. It's about a half-mile of -- it's south of I-94 looking directly across Mr. Starke's property.

Q. Where are you -- did you take this

picture?

A. Yeah. I took this picture, and I am on the -- it's kind of an elevated roadbed. So I'm on top of the road.

Q. That would be a north/south roadbed?

A. Correct.

Q. And so does this represent Mr. Starke's property as it appeared in November when you were out there?

A. Yes.

MR. KELSCH: Okay. Your Honor, I would move to admit Exhibit T38.

JUDGE WAHL: Mr. Johnson.

MR. JOHNSON: This will be Mr. Dingess's witness.

JUDGE WAHL: Mr. Dingess.

MR. DINGESS: Just a question to get the orientation. Is the -- then the horizon is looking to the west?

THE WITNESS: Correct.

MR. DINGESS: Thank you.

MR. KELSCH: Ms. Tillquist, on here can you see the --

JUDGE WAHL: Wait a minute, wait a minute.

MR. KELSCH: I'm sorry.

JUDGE WAHL: You're doing great, Mr. Kelsch. Ms. Linderman?

MS. LINDERMAN: No objection.

JUDGE WAHL: Mr. Binek?

MR. BINEK: No objection.

JUDGE WAHL: Exhibit T38 is received.

Q. (MR. KELSCH CONTINUING) Ms. Tillquist, can you see on Exhibit T38 where the Sheyenne River -- or could you tell us where the Sheyenne River would be located on this picture?

A. The Sheyenne River is basically -- it's going to be right along the horizon. It's about two-and-a-half, three miles away. So this is looking towards Valley City as it drops off into --

Q. And where would the Keystone -- where is the Keystone Pipeline route? Would that be on this picture, as well?

A. That would be coming across. Excuse me if I zap anybody with this. That would be right through here.

Q. And that would be just not too far from this fence --

A. Correct.

Q. -- in the foreground? Approximately how many miles from the Keystone route to the river?

A. I haven't measured exactly, but I'd guess it to be around two-and-a-half, three miles.

Q. Now, do you have an opinion as to whether a leak in the pipeline could get to the Sheyenne River on the Starke property?

A. Yeah. Having looked at this spot, it's extremely flat. I actually stopped here because we were -- there's an intermittent drainage that was listed here. Part of the reason I went to the entire area was to look and field verify these intermittent streams, whether they could be viable stream channels, so I stopped here specifically. You can see there's just a little tiny swale right there, and that was considered an intermittent stream channel.

MR. DINGESS: I'm sorry. Could you show that again?

THE WITNESS: Sure. That light spot, it's right there. That's the stream channel. Looking at this it's -- it's extremely flat. Based on my experience and looking at places like Bemidji, oil does not -- would not be able to move from this location across a flat surface and get to the Sheyenne River.

Q. (MR. KELSCH CONTINUING) Now did you have

the opportunity to view any other, I guess, portions of the route in the Lake Ashtabula, Sheyenne River area?

A. I did.

Q. Where did you -- where did you go?

A. I went roughly as far as like -- basically from Cooperstown to the north all the way to just above the Sheyenne River crossing, basically the Little Yellowstone Park. Everybody's probably familiar with that.

Q. Now in your testimony at the last hearing in September you testified about risk analysis to the Sheyenne River and Lake Ashtabula. When did you first become aware of the City of Fargo's concerns about potential risk impact to their water supply?

A. Could you rephrase that? I'm sorry.

Q. When or how did you first become aware that Fargo had a concern about potential risk from the Keystone Pipeline to their water supply?

A. I was forwarded a letter from the mayor expressing his concerns.

Q. Okay. Once you received that, did you -- what did you do?

A. Once we received that, we immediately

began looking to see if we could potentially impact their water supply. What we had already done was we had already looked at potential effects to water supplies in Lake Ashtabula and on the Sheyenne River more -- closer to the pipeline, so -- and we'd already presented that information when we testified last time, but basically I said, okay, if -- if Fargo has a concern, can we take this analysis and extrapolate and what would it do to the City of Fargo?

Q. Did you prepare a risk analysis looking at that potential risk to Fargo?

A. I did.

Q. I guess I would show you what's been marked as Exhibit T39. Is T39 the -- your analysis of the risk to Fargo?

A. Yes, it is.

Q. Now, could you briefly summarize what your conclusions were as far as the risk -- the chance or likelihood of a spill getting into Lake Ashtabula or Sheyenne River?

A. We looked at a number -- if you remember from my testimony before, we talked about a number of different potential pathways for oil to get to Lake Ashtabula and the Sheyenne River. All but

flowing stream channels were eliminated as viable transport mechanisms. Based on --

Q. Why was that, just briefly?

A. Okay. Basically, crude oil would not have the ability to flow overland sufficient distance, like we saw on Mr. Starke's property. The terrain is flat until it reaches actually the stream channel itself. So the crude oil would not reach the river via overland flow. Subsurface flow, crude oil and its dissolved constituents do not move that far, so that was eliminated as a viable exposure route. Dry stream channels, again the transport of crude oil would be limited. You'd have adherence and penetration into soils so that the crude oil does not go that far. So those were eliminated as exposure routes.

The -- so that left us with flowing water. Now, flowing water can facilitate the movement of crude oil. So what we did then is we looked at the Sheyenne River, Lake Ashtabula area and identified viable stream channels where if a spill occurred, a crude oil spill could potentially get into the stream channel and be transported down towards the lake. Now, it would take a large spill because it has to get out of the trench and then have

sufficient volume then to get into the stream channel. The stream channel would have to be flowing if it's an intermittent stream channel, and then it would have to have sufficient volume to move on down the stream.

Q. Now, you said this is flat. Mr. Starke testified yesterday that I think there was a 90-some-foot elevation difference from the highest point on his land to I think it was the river -- average flow of the river over that two-and-a-half, maybe three miles. Is that -- do you consider that flat?

A. I'll answer that with two different things. First of all, if you took just those numbers, the 97 feet over three miles, it's about a half percent grade, so that's flat. But more to the point is that that elevation change doesn't happen until you hit the stream channel, the Sheyenne River itself. So you've got basically a flat terrace for two-and-a-half, three miles, and then it drops right into the Sheyenne.

Q. A good portion of that 97 feet or 90-some feet would be from the river bank down to the river flow -- the river?

A. Yes.

Q. Okay. We were talking about the risk analysis that you did before. What did you do when -- to apply that to the City of Fargo? Did you look at the City of Fargo's intake structure, water system?

A. Yes. So what we did was we took our analysis because, again, we'd already evaluated risk to Lake Ashtabula and to the Sheyenne River. So taking that information, we just kind of supplemented and looked at where the City of Fargo would take their water out and how -- how a potential spill could possibly affect that.

Q. Do you know how far the Baldhill Dam is in river miles to the Fargo intake?

A. 236 miles.

Q. Now, there was some testimony yesterday that the crossing of the Sheyenne River is south of the Baldhill Dam by a ways. Do you know how far it is from the crossing of the Sheyenne River to the intake of the -- of Fargo?

A. 209 miles.

Q. Okay. Thank you. So you checked -- you checked that distance. What did you do next in your analysis to assess the risk to Fargo's water supply?

A. Do we want to go through those --

Q. Did you -- yeah. I'll show you -- I'll give you both 42 and 43, but we'd look at T42 first. I don't think we're quite ready to offer the other one yet. In reviewing your risk analysis for Fargo, did you look at the -- I guess the risk of the oil getting into Lake Ashtabula and then getting to Fargo as one potential?

A. That was one potential way it could get there.

Q. Is that Exhibit T42?

A. Yes, it is.

Q. Okay. Could you basically describe your risk analysis as going through Lake Ashtabula?

A. Well, what T42 is is basically a bullet point list of what's in this analysis. So it's just an easier way to kind of step through it for everybody. In Lake Ashtabula, as we talked in our previous testimony, a pipeline release would have to occur along 1.4 miles of pipeline that could intersect with these intermittent streams.

Q. Ms. Tillquist, I hate to interrupt, but you were saying 2.8 miles and now we're at 1.4. Why?

A. Okay. The 1.4 miles comes from the

streams -- the intermittent streams that could actually flow into Lake Ashtabula. There's another 1.4 miles that's associated downstream that could get into the Sheyenne River.

Q. Okay. Thank you.

A. So again using the -- the exhibits we submitted previously with exhibit -- I think it's T23, which was the maps, and then the table, which was T24, which is the table that shows these intermittent stream crossings and things, so if we had that 1.4 miles of intermittent streams, you can calculate an occurrence frequency of a spill occurring along those segments, and we estimate that to be no more than once every 13,000 years.

In this area the intermittent streams are the only -- again to reemphasize there, they're the only potentially exposure routes. It's not the overland flow, it's' not subsurface. They have to be flowing streams, so those intermittent streams would have to be flowing at the time of occurrence, and intermittent streams by definition are only flowing 50 percent or less of the time.

If a spill were to occur, in order for it to get it to Lake Ashtabula, it would have to be a large spill, because again, it has to get out of

the pipeline trench and then you have surface and then move towards the stream and then be capable of moving downstream in sufficient volumes, and again, there will be adherence along vegetation as it goes downstream. The volume then would be reduced as it's in transit. And if we look at this table from T24, the -- the shortest -- the closest viable stream to Baldhill Dam is 15 miles upstream. So -- and that -- the shortest transit time -- or transit distance is 1.6 miles.

Any spill then that would reach Lake Ashtabula -- if it got into Lake Ashtabula, what would happen is that oil would again be floating along the surface. Oil spreads at a rate between 600 and a thousand feet per minute. So assuming, to be conservative, that it spread the fastest rate, a thousand feet, to go that 15 miles from that nearest stream to the Baldhill Dam would take three days.

From a practical standpoint that provides more than ample time for emergency response teams to detect -- detect, because it's going to have to be a large spill again, contain and clean up the spill within Lake Ashtabula. Again, the oil would be floating along the surface facilitating the

cleanup. I would note that the Baldhill Dam -- the release from there is a bottom release reservoir, so you've got the oil floating on the surface, you've got the water coming out from the bottom. City of Fargo would be noticed if there was a spill, and that basically comes out of the emergency response plan procedures.

Q. Would other -- other communities, I assume, would --

A. And other communities, yes.

Q. -- would be also --

A. Communities all along the way, those would all be listed within the emergency response plan for an event such as this.

Q. I assume the Department of Health would also be notified?

A. Yes. And if there's a visible sheen on the water, EPA gets notified.

Q. Okay.

A. So in the unlikely event that the spill happens, it's large enough, it gets downstream, the stream is flowing, gets into Lake Ashtabula, again, there's ample time to clean up, but --

Q. Ms. Tillquist, just for a layperson, you said that the crude oil is floating on the surface.

Would the crude oil actually get over the dam or get under the intake at the bottom of the dam to actually get out into the Sheyenne River?

A. The crude oil would be floating, so it would not be capable of going down and getting through the subsurface outlet. That said, though, crude oil -- as it's floating, there are components within the crude oil that will start to dissolve into -- into the water column. The ones we are primarily concerned with are the BTEX compounds, which is benzene, toluene, ethyl benzene, and xylenes. Sorry. I lost my track here.

Q. So those are the things that could get down into the water and then potentially get out of the dam and into the Sheyenne River?

A. Yes. So those are the compounds we worry about. So they could get into the water column. Now those are all -- the rate at which this happens is -- there's going to be evaporation occurring at the same time, and evaporation -- when you look at a crude oil spill, evaporation is a much more important process for the fate of the crude oil spill. It will -- it accounts for a lot of the loss of crude oil. Just a lot of the lighter weight components dissipate. So that will be

happening much more quickly and much more efficiently than this dissolution process.

So while the crude oil has got out on to the lake, you know, there will be containment. This BTEX could only be happening where the crude oil is in contact with the water and you would have localized effects of that BTEX.

Q. Now the BTEX -- are they the lighter components you talked about that are more apt to evaporate?

A. They are more apt to volatilize.

Q. Now assuming that some of those BTEX compounds did get out of the dam into the Sheyenne River, could they get to travel the 236 miles to Fargo?

A. That was actually -- you know, we wanted to look at that. So we -- so the transit distances for any of these residual BTEX that actually got out, dissoluted into the water and then managed to get through the Baldhill Dam would have to travel 236 miles to reach Fargo. We heard yesterday different estimates but basically 9 to 14 days at normal flow, and what I'd like to do is provide -- or talk about a -- an EIS where a risk assessment was done. It was the Longhorn Pipeline, which is

in Texas. They looked at a crude oil and gasoline spill into the Colorado and -- well, Colorado River and Onion Creek. They did a model that was developed by the Army Corps of Engineers. This was an EIS that was put together by the EPA.

In this model what they show -- well, let me back up. The crude oil that they looked at in this was comparable in many ways to the crude oil Keystone would have as far as BTEX concentrations. The BTEX in this crude oil was -- I'm sorry. It wasn't BTEX. The benzene concentration was .14 percent. In our crude oil it would be .15 percent as a maximum. So fairly comparable. It's a good surrogate to look at just as an example of what might happen.

So what they did in this analysis was they looked at -- this model accounts for benzene evaporating as well as its movement downstream. So they calculate the -- the front of that and what the concentrations are. What they found was that at river flows that would be comparable to the Sheyenne River, which was, you know, looking at the average flows in the Sheyenne River, it's around 200 CFS. The flow on the Colorado River they had an example at 200 CFS. The benzene concentration

by the time it reached 120 miles downstream, which was their end point of their study, was below the maximum contaminant level. So that's five parts per billion. So we could assume that, you know -- so if it's 120 miles, it was below MCL, the maximum contaminant level. Here we have to go 236 miles, so we'll --

Q. Now in that Longhorn study was that figuring just the BTEX components getting into the river or was it actual crude oil getting into the river?

A. It's the crude oil, itself, and then it's the dissolution and the movement and the evaporation that's associated with that crude oil.

Q. Do you recall how many barrels of crude oil?

A. Oh, barrels? It was 2,000 barrels actually entering the river.

Q. And then from that study does that -- applying it to this case, in your opinion, is there a chance to the BTEX components to reach Fargo from Lake Ashtabula?

A. Well, I guess I would add, too, that the study did not even try to account for any containment or cleanup. This is assuming that

whole 2,000 barrels was available the entire distance. So, again, the chance of BTEX ever reaching Fargo is highly improbable or nonexistent, I would say. I mean, you'd have to again -- just to reiterate again, I mean, you'd have to have a large spill, it has to happen into these intermediate tributaries that have to be flowing, it has to go into Lake Ashtabula, it has to get all the way down Baldhill Dam, the BTEX has got to get out in sufficient quantities to get downstream 236 miles to reach Fargo at sufficient concentrations, and I -- I don't see it happening.

Q. Now, one of the things that Fargo was concerned about and we heard the testimony yesterday was that the Sheyenne River is an alternate -- or their alternate source of water, the Red River is their main source, but if there's a Thirties-type drought or if the Red River for some reason wasn't available for them, I guess mostly because of a potential drought, does that impact -- if that scenario happened, does that impact your risk analysis of the BTEX or getting down there from Lake Ashtabula?

A. Yes, it would. During a drought the risk would be further reduced because it's likely that

those intermittent streams, which are the viable transport routes, would not likely be flowing during a drought, but assuming they were from a localized single storm event or something, even if it got in again to Lake Ashtabula and then down in to Sheyenne River, now the Sheyenne River during a drought is going to have a reduced velocity, has less stream flow, so it takes longer. Reduced stream flow, because it takes longer, you're going to increase your transit time, which means you have even more time for that benzene to dissipate from the water column. So -- and again, there's always cleanup.

Q. So if it's a smaller volume in the river, wouldn't that make the concentration greater of BTEX or --

A. The BTEX concentration is going to -- it's a rate constant and it's an amount how it can spread across -- constant from the oil into the water. It's actually -- the more overriding principle is how long it's going to take to get downstream.

Q. So the more time you have, the better?

A. Yeah.

MR. KELSCH: I would move to admit T42.

JUDGE WAHL: Mr. Dingess?
MR. DINGESS: No objection.
JUDGE WAHL: Ms. Linderman?
MS. LINDERMAN: No objection.
JUDGE WAHL: Mr. Binek?
MR. BINEK: No objection.
JUDGE WAHL: T42 is received.
MR. KELSCH: Thank you, Your Honor.

Q. (MR. KELSCH CONTINUING) Ms. Tillquist, did you do the same analysis that you did in T42 for the risk of a spill getting into the Sheyenne River?

A. Yes, I did.

Q. And is that the T43?

A. Yes, it is.

Q. Okay. I guess could you take us through your analysis for the Sheyenne River?

A. All right. Again, the pipeline would have to have a release along 1.4 miles of intermittent or perennial streams. Those are the only potential routes. Now, I'll point out that the -- because this is kind of confusing to people -- the frequency is actually lower here, and just to clarify, that's because there's perennial stream reaches so there is -- because there is water

flowing there constantly, you have a higher -- if a spill occurred, there's a chance that it could get into the water as opposed to an intermittent stream where you don't have the water flowing half the time. So it's just increased probabilities, so your frequency actually drops down.

All right. For those intermittent streams that would be in that 1.4 miles, again, they would have to be flowing. That again occurs less than 50 percent of the time. The spill would have to be large in order for it, again, to get out of the trench, get into the stream, and then maintain sufficient volume to get into -- there's a typo there. That should be the Sheyenne River instead of Lake Ashtabula.

COMMISSIONER WEFALD: Instead of Lake Ashtabula.

THE WITNESS: Oops, am I supposed to write on this?

JUDGE WAHL: Why don't you go ahead and -- why don't you do that, please, and we'll just show that for the record as the exhibit as corrected, please.

MR. KELSCH: Thank you, Your Honor.

THE WITNESS: Again, the volume's going to

be reduced during transit. Emergency response would have the ability to detect the spill because it's large, containment, cleanup. Again, the oil's going to be floating along the surface, which would facilitate cleanup. The city would be notified via the emergency response procedures. The transit distance again -- so again, the crude oil would be contained. Any of the dissolved constituents that came out and were mobilized -- they would have to travel 209 miles from the spill location, the Sheyenne River crossing, to get to Fargo, and what I did is I interpolated -- if we said 9 to 12 days -- or 9 to 14 days based on 236 miles, that equates to 8 to 12 days at normal flow for 209 miles. Then we go through the same discussion about the Longhorn model and how it showed that there was -- the BTEX concentrations dissipate and the BTEX concentrations would be below the maximum contaminant level before they reached Fargo.

Q. Ms. Tillquist, are you familiar with a spill in Coffeyville?

A. Yes, I am.

Q. And perhaps you could just give the general facts concerning that spill.

A. Coffeyville is in Kansas. There was a

flood event that a refinery spill -- they didn't get a valve shut down in time and they released -- I think the grand total eventually turned out to be 1700 barrels. That -- and this -- I'm sorry. This occurred -- I think it was just last summer. There was a visible sheen on the water 26 miles downstream. There was photographs of that. There was a number of water treatment plants located further downstream. The closest one was 100 miles downstream.

EPA underwent a lot of testing of that water. There was ten sampling locations downstream because, again, there was a number of water treatment plants. In no case did they detect -- the samples that they took were -- they were no different than the water samples before the spill, and they continually monitored it to see if that pulse event came through, and it was -- they never found any sign of contamination.

So, again, it reemphasizes that a spill can occur and dissipate before it reaches a water treatment plant 100 miles downstream, or in Fargo's case, 236 miles downstream.

Q. Now that was in a flood situation?

A. Yes. So that would actually be -- it's

kind of a little bit counterintuitive. It actually seems like it would be worse -- or, you know, because it would dilute it -- I'm sorry -- but it's actually worse because the transit time would be increased so you get it there faster.

Q. Does that support your conclusion about the risk to Fargo in this case?

A. Yes. It definitely supports -- you know, here's an actual event that occurred and they were unable to even detect anything downstream 100 miles. So, yeah, it's -- and it was crude oil, as well. I'm sorry. I'm not sure if I mentioned that.

Q. Thank you. Now as we talked about with Lake Ashtabula's risk, does the -- a drought factor into the risk from the Sheyenne River or affect the risk from the Sheyenne, as well?

A. Yeah. For the very same reasons we talked about before. So a drought would actually reduce risk again because you've got the intermittent streams that are not likely to be flowing, and then the flow in the Sheyenne River would be reduced slowing the velocity and therefore increasing the transport time and thereby allowing the BTEX compounds to dissipate.

Q. Do you have an opinion concerning the potential risk of a leak that got into the Sheyenne River or effect on the City of Fargo's water supply?

A. We don't anticipate any effects to the City of Fargo's water supply.

MR. KELSCH: I would move to admit T43.

JUDGE WAHL: Mr. Dingess.

MR. DINGESS: May I ask a couple of questions, Your Honor?

JUDGE WAHL: You may.

MR. DINGESS: Thank you. Ms. Tillquist, you had a correction here, I believe, from Lake Ashtabula to the Sheyenne River on Exhibit T43 --

THE WITNESS: Correct.

MR. DINGESS: -- is that correct? What was that? Just pulling something from one document, using the Word program, pasting it onto another?

THE WITNESS: Yeah. We were sitting there and we were trying to -- what we were trying to do is have the same flow so everybody could kind of follow it, so we were trying to follow the same format so everybody would understand it clearly.

MR. DINGESS: So it really wasn't an

independent analysis made of the Sheyenne. It was cut and paste from another document?

THE WITNESS: No. This was an analysis -- we had an analysis for Lake Ashtabula and Sheyenne River. It was one combined one. What we're doing is we're splitting it in two separate sections because Lake Ashtabula is a little bit different in the way it would handle -- the way we could set up containment and things as opposed to the Sheyenne River, which was a flowing river system. So I wanted to talk about it as two separate systems. It was all part of a single analysis that was done.

MR. DINGESS: Thank you. I would not object to the exhibit.

JUDGE WAHL: Ms. Linderman?

MS. LINDERMAN: No objection.

JUDGE WAHL: Mr. Binek?

MR. BINEK: I have no objection, but I do have a question, if you could repeat again what the correction was.

THE WITNESS: I'm sorry. Let's see. On the T43, third bullet down, it says, and "maintain volume to reach." Instead of Lake Ashtabula it should be Sheyenne River.

MR. BINEK: Thank you.

JUDGE WAHL: Exhibit T43 as corrected to strike Lake Ashtabula in the third bullet and substitute Sheyenne River is received.

MR. KELSCH: Thank you, Your Honor.

Q. (MR. KELSCH CONTINUING) Ms. Tillquist, so you did an independent analysis for the risks for both Lake Ashtabula and Sheyenne River?

A. Yes.

Q. And when did you prepare these T42 and T43?

A. About 10 or 11 last night. They're simply talking points to help everybody understand what this analysis, T39, basically talks about.

Q. And when did you actually do these risk analyses, the actual work?

A. That again started right after we got that letter from the -- well, let me backtrack. The initial analysis on Lake Ashtabula and the Sheyenne River were done months and months ago. To take it and then look at the City of Fargo, we did that as soon as we started hearing from the mayor of Fargo.

Q. Okay. Thank you. Then I guess moving back to T39, basically T39 has the same information as -- maybe a little bit more detail as T42 and T43; is that correct?

A. That is correct.

Q. Now, did -- in part of your, I guess, review of risks to the City of Fargo's water supply, did you find that there are other petroleum pipelines that either cross the Sheyenne River or Lake Ashtabula or the Red River?

A. Yes. We did look at that and, yes, we did find that there are multiple pipelines that cross Lake Ashtabula, Sheyenne River, and the Red River.

Q. Okay. Are those contained in Table 1 on page four of T39?

A. Yes, it is.

Q. Did you also obtain --

COMMISSIONER WEFALD: Do we have T39?

JUDGE WAHL: Yes, you do.

THE WITNESS: That's the report, the analysis. It's page four of that.

COMMISSIONER WEFALD: Thank you.

Q. (MR. KELSCH CONTINUING) Did you also obtain a map showing the location of, I guess, these pipelines?

A. Yes, I did.

Q. I would show you what's been marked as T44, and I believe that can go up on the screen, as well. What does T44 show, Ms. Tillquist?

A. This is a map of eastern North Dakota showing -- and I've got to point to it on the screen, so again, if I hit somebody -- this is the Sheyenne River coming down around. This is Fargo, this is Lake Ashtabula area, and these -- oh, let me back up. This is the Keystone Pipeline coming down.

Q. The blue line would be the Keystone Pipeline?

A. Yeah, it is blue. Yes. And then the other lines are different pipelines that come in across. I don't know if you want me to walk through these. This is --

Q. The Cenex one, is that the one that there was some testimony yesterday about crossing underneath Lake Ashtabula?

A. Yes.

Q. And I think there was some mention about the Magellan line. Does that cross the Red River?

A. Yes. There's actually two Magellan lines. This is this one here and this one here, and they actually come across here. So there's two Magellan lines and --

Q. Does that south -- I guess it would be southerly east/west Magellan line, does that cross

the Red River south of the Fargo -- Fargo's intake on the Red River?

A. Yeah. There's actually three --

Q. Or upriver, I guess we should say.

A. Yeah. It's upstream of the intake. So the Red River is along here, here's the pipelines, and the intake is up in here.

Q. So how many of them -- how many pipelines cross upstream of the Fargo's intake on the Red River?

A. In that immediate area there's three. There's also another one that's a crude oil pipeline portal.

MR. KELSCH: I would move to admit T44.

JUDGE WAHL: Mr. Dingess.

MR. DINGESS: No objection to T44, sir.

JUDGE WAHL: Ms. Linderman?

MS. LINDERMAN: No objection.

JUDGE WAHL: Mr. Binek?

MR. BINEK: No objection.

JUDGE WAHL: T44 is received.

Q. (MR. KELSCH CONTINUING) What -- do you have any other conclusions that you haven't already given on T39 -- that you haven't given as to -- in T42 and T43?

A. I guess the only thing I would pull out, too, is just basically saying that the presence of those existing pipelines and just as evidence that the existing -- that pipelines can coexist with water supplies without adversely affecting them. Some of these pipelines have been around for decades without adverse effects, and some of these pipelines are carrying materials that contain a higher BTEX concentration. So, you know, all those factors combined, I think it's -- again, it reemphasizes that these pipelines can coexist with water supplies.

MR. KELSCH: I would move to admit T39.

JUDGE WAHL: Mr. Dingess?

MR. DINGESS: If I can have a moment, Your Honor. I'll just ask on cross-examination. I'll consent to the admission.

JUDGE WAHL: Ms. Linderman?

MS. LINDERMAN: No objection.

JUDGE WAHL: Mr. Binek?

MR. BINEK: No objection.

JUDGE WAHL: T39 is received.

Q. (MR. KELSCH CONTINUING) Ms. Tillquist, can you clarify or is there a distinction between risk -- we're talking a lot about risk -- and

consequence?

A. Well, it depends on how you want to define things, but if you want to talk about frequency of an event --

Q. Or consequence to the City of Fargo. Risk to the City of Fargo, consequence to the City of Fargo, or in this are they the same?

A. Well, you've got a risk -- a certain risk, a certain probability that an event could happen, and then you've got the consequence of what would happen, what could happen, and I guess --

Q. If -- and maybe I could follow it up with a question that may help. Have there been any studies or examples that you're aware of where BTEX would actually get into a river system and come by the intake -- or, you know, be passing a public water intake system and then what can happen or what could be the consequence of that?

A. If you're talking about a front of the -- well, I'm not sure if I'm going down the right road.

Q. Well, if there's a plume in the river, say, for example. I understand your analysis that it wouldn't get that far, but say there was a plume in the Sheyenne River or the Red River that was

bypassing -- what would happen -- what would be the consequence to the Fargo water supply system?

A. Well, again, going back to the Longhorn analysis, what they did --

MR. DINGESS: Excuse me, Your Honor, I would like to object here. We don't have a foundation here that Ms. Tillquist is learned in the treatment operations of the Fargo water supply system, that she has experience in the design and operation of water -- municipal water treatment plants. I believe she testified that she's a risk assessor, a pipeline specialist, and toxicologist, and we don't think that there's proper foundation been laid for this line of questioning. If they have other expertise in this area, that should be brought forward first.

JUDGE WAHL: Mr. Kelsch.

MR. KELSCH: Your Honor, we're not talking about the treatment of this water. There was testimony yesterday concerning the ability of Fargo to -- upon receiving notice of a spill, to shut down their water intakes, and this questioning of this witness is just to talk about what could happen or the consequence to wait for that plume to go by the river.

JUDGE WAHL: I agree. The objection is overruled.

THE WITNESS: Okay. So what would happen is if the BTEX actually -- well, it was moving downstream and there was a measurable quantity of it, what you would see is you see a moving front. So you'd have a leading edge and then it peaks and then it drops off. What the -- again, this Longhorn model did was they looked at this crude oil, they looked at the benzene concentrations and not only how it dissipated, but they looked at that moving front, and at 120 miles downstream what they found was that this -- no. I'm sorry. And this was for gasoline because the gasoline had higher concentration. What they found was that plume, that pulse event that comes through, was a 15- to 20-hour event. So it's not like it was taking days to get past a certain point. It would come by at a peak event and then it moved on. And that's very typical. That's kind of standard knowledge within the environmental risk assessment.

Q. (MR. KELSCH CONTINUING) And they would determine -- how would they determine that it's -- when it got there and then when it got by?

A. In practice what you would do is if an

event occurred, you would have -- again, everybody would be notified, you know, Keystone would be notifying all the downstream water users, Department of Health would be notified, and again, if a visible sheen is on the water, EPA is going to be involved. So you're going to have a plethora of people out there onsite monitoring this event.

What they will be doing, just like they did in Coffeyville, is they're going to be sampling water at certain intervals trying to see where that BTEX front is, and so what they would do is they would monitor its progress, and so -- specifically now talking about the City of Fargo, they'd be tracking that front as it came down, and if -- hypothetically, let's say, it did get there, what would happen is then as it approached Fargo, they would say, okay, it's getting close enough now, let's shut it down -- shut down the water intake. They would shut the intakes down; that plume would pass; they're still monitoring so they know, okay, it's starting to dissipate; and it wouldn't -- well, again, so they would -- as they're pulling the samples, they would say, okay, the water is now back to its original condition; it's safe to open up the intakes.

Q. Okay. Thank you. Now yesterday you were here in court what Mr. Koland was testifying, and he wasn't, I guess, 100 percent sure on whether in the Red River Valley water system draft EIS and supplemental draft EIS whether the Cenex Pipeline that crossed Lake Ashtabula was mentioned. Are you familiar with the Red River Valley water system EIS and draft EIS?

A. Yes, I am.

Q. Have you looked at that to see whether the Cenex Pipeline or any other of these other pipelines on Exhibit T44 are -- were mentioned?

A. I did look at that. These are voluminous materials, so what I did is I did word searches in the document. In the PDF version you can go through and search, so what I did is I looked for a number of key terms.

Q. What key terms did you look for?

A. Cenex, Keystone, pipe, pipelines, fuel, crude, oil -- oil didn't work so well, because I kept picking up things like soil and things like that.

MS. LINDERMAN: Could I -- I have a quick question. Is any part of the EIS going to be entered into evidence as an exhibit, and if not, I

would kind of object to this as being hearsay and bringing in documentation that's not being offered into evidence.

JUDGE WAHL: The objection is overruled.

MR. KELSCH: You may continue.

THE WITNESS: Gasoline, a variety of terms.

Q. (MR. KELSCH CONTINUING) From those searches did you find any reference to any of these pipelines in there?

A. I did not.

Q. Now, how many pipelines have you done risk analyses for?

A. I have done risk assessments -- this type of risk assessment on --

Q. For actually routing of pipelines, I guess I'm talking about.

A. Well, I've done these risk assessments on seven pipelines.

Q. And --

A. And that equates to about 4,000 miles.

Q. Okay. What's happened with those other pipelines? Have they been approved by the regulatory agencies?

A. Yes. They -- well, I'll say the seventh

one that I'm working on right now is Keystone, so the other six have been approved.

Q. I'd like to show you another exhibit, 45, T45. Ms. Tillquist, yesterday you were here when Mr. Deutschman testified on likelihood of spill in the 91 miles adjacent to Lake Ashtabula. I think it's also in -- referenced in Fargo Exhibit 12-3. Now, did you take Mr. Deutschman's risk analysis or estimate of likelihood of spill, I guess I should say, and apply it to those 2.8 miles that -- of pipeline that could -- where the leak could actually get to the Sheyenne River or Lake Ashtabula?

A. Yes. What we did was assuming just for the sake of argument that Mr. Deutschman's numbers were valid -- and I -- honestly, I could not follow his assessment. I didn't think there was -- I didn't have sufficient information to make a determination of how he did that. I couldn't follow it.

Q. Let's -- why don't we talk about that for a minute. Mr. -- and I'll probably get this wrong because I always do, but Mr. Deutschman talked about or used the stochastic method; is that right?

A. That's my understanding, yes.

Q. Okay. What method did you use for your risk -- or likelihood of spill evaluation?

A. It would probably be classified as a deterministic model.

Q. What -- in your opinion is using the deterministic model a valid method for assessing risk for crude oil pipelines?

A. Yes, it is.

Q. And in the other six pipeline evaluations that you've done -- risk assessment evaluations that you've done, what system did you use?

A. In all those cases we used a deterministic assessment, and that was also reviewed by other federal agencies, BLM, Fish & Wildlife Service, Forest Service, and included the Office of Pipeline Safety, or PHMSA as it's known now.

Q. And, again, talking about crude oil pipelines, which method is state of the art, the stochastic or the determinative?

A. The state of the practice I would say is --

Q. State of practice, I guess.

A. -- this deterministic-type modeling.

Q. Now -- and as I understood from Mr. Deutschman, he was using the DNV information. I

think that's in I-1, I believe, the DNV report.

A. The DNV report, that's my understanding.

Q. Which you used, as well.

A. Yes.

Q. So the base information supposedly was the same.

A. Yes.

Q. It's just the different modeling.

A. That's my understanding, yes.

Q. In your opinion, which is more accurate as far as assessing the likelihood of a spill?

A. I don't have -- I don't think I can answer that because I don't think I have enough information about his assessment. I don't understand it, so it's -- I don't understand where he came up with the numbers. There's some underlying probability curves, how they're shaped, and I think there was some confusion on some points. So it's difficult to understand exactly if the stochastic model that was used is appropriate, but I would say the deterministic model, based on my experience, is valid and has been used previously and been approved.

Q. Now, what's the purpose of the T45 then?

A. What we did was we said, okay, let's --

let's assume for the sake of discussion that we use the City of Fargo's numbers, how does that equate to our assessment.

Q. And could you just kind of walk through what -- what this shows?

A. Okay. So the City of Fargo -- they talked about in that 91-mile segment in the Sheyenne River/Lake Ashtabula area to be .023 annually, so Exhibit F12-3. If you go back to the assessment that we did before looking at again what is a viable transport route, 91 miles is not -- not that entire length is capable of a spill reaching the river. Rather, again, not to beat a dead horse here, but it only comes down to these stream channels and if they are flowing that a spill could be transported -- a large spill could be transported that distance to reach the river. So if you combine all of those -- and again, this is -- is it F -- F24 is the table -- what you find is the total --

Q. It would be T24?

A. T24. Okay. T24, the total miles of stream channels -- the pipeline segments that could get into those stream channels is 2.8 miles. So instead of 91 miles we're looking at 2.8 miles. So

taking Fargo's numbers of .23 spills per year, what I'm going to do is, first of all, get it to spills per mile per year. So you divide it by 91, and then you end up with this very small number, .000253 spills per mile per year. You take that number and you multiply it then by this 2.8 miles, and that gives you the spills per year in this -- that could affect the Sheyenne area, and that number is .000708 spills per year. To make this a little bit easier to understand, we convert it into an occurrence frequency so we can -- it has some -- we can relate to it. So you invert that number, and then that would be comparable to one spill every 1,412 years that would be capable of reaching Lake Ashtabula.

MR. KELSCH: I would move to admit T45.

JUDGE WAHL: Mr. Dingess?

MR. DINGESS: No objection.

JUDGE WAHL: Ms. Linderman?

MS. LINDERMAN: No objection.

JUDGE WAHL: Mr. Binek?

MR. BINEK: No objection.

JUDGE WAHL: Exhibit T45 is received.

Q. (MR. KELSCH CONTINUING) Ms. Tillquist, now as I understand, the City of Fargo's spill

likelihood, that's talking about any size spill would be once every 1,412 years putting -- applying it to the 2.8 miles; is that right?

A. That is correct.

Q. So I'm guessing there's some spills -- I think your testimony was that it would have to be a large spill to actually get there.

A. So again -- yeah. So large spills are a smaller fraction of the total number of spills, so, again, you would take the frequency of a large spill, you know, and multiply the frequency times this, and basically what it's going to make is that number instead of 1400 years, it's going to become even larger because it would require a large spill of sufficient volume that could even get out of the trench and into the streams and downstream.

Q. Now, I think there was a question yesterday and maybe from one of the commissioners about what's an acceptable risk, and these numbers get awful big. What -- in your experience on these other pipelines that you've worked on, what -- assuming there were some potential risks to various other water supplies or whatever else, what were the risks in those cases, if you can recall?

A. Looking at some of the other risk

assessments that we did that were approved, some of the risk ranges were one spill every 344 years, one spill every 833 years. Again, those were all pipes that were approved. They're actually in operation. One of them actually is built in, I would say, very mountainous conditions and it's over a water supply. So these are known risks and they were deemed acceptable risks.

Q. Deemed acceptable by whom?

A. Federal agencies, the -- again, going back to BLM, Forest Service, and then through the NEPA process, basically Fish & Wildlife Service and a number of other federal agencies.

Q. Now, when you're talking about that one every 344 or one every 830-some years, is that based on a per-mile basis or --

A. Yeah, that's a per-mile basis. So to make this number that we talked about just a second ago, this 1400 years, again, that was for 2.8 miles. So if we want to have an equal comparison, we want to compare it on a per-mile basis, so the City of Fargo's number would result in a -- an event of 1 in 4,000 years. Keystone's numbers that we've talked about previously, our risk is one in no more than 9,000 years. So, again, acceptable risks.

Q. So where you've got the 1 in 9,000, you were looking at your T24, the once every 5400 years for the whole 2.8 miles and then dividing that by 2.8 miles?

A. That would be one way of calculating that, I believe. I take that back because we did -- that was the -- the 5400 years is based on intermittent stream, so this is based on the overall spill probability.

Q. Okay. Okay. In your experience and opinion is the -- does the Keystone provide a risk to -- or does it cause a risk to the City of Fargo's water supply?

A. I do not believe so. The chance of a spill again is so remote. The events that would have to occur are -- to get that to happen are -- you know, there would have to be a series of very unlikely events. Again, we've got containment, cleanup, and then, again, ample time to control that material, and then you've got the long transport distance before it even reaches Fargo, and assuming -- you know, even then, the City of Fargo then would be able to shut down their intakes while the plume passed.

MR. KELSCH: I have no further questions,

Your Honor.

JUDGE WAHL: Mr. Dingess.

MR. DINGESS: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. DINGESS:

Q. Ms. Tillquist, how long have you been working on this Keystone Pipeline project?

A. Three, maybe four years. Three years.

Q. And does that -- is that three or four years in North Dakota alone?

A. No. The project goes over a multitude of states and we were -- yeah. So it's over North Dakota and the other states.

Q. And how many other states?

A. Eight states.

Q. And any Canadian provinces?

A. We're not involved with that.

Q. Okay. So you've been working on this -- are you doing a similar sort of analysis in all eight states?

A. We are working on that, yes.

Q. And does this occupy a significant period -- a significant amount of your professional time?

A. Absolutely. And personal time.

Q. All of it?
A. Yes.
Q. So this is pretty much all you've been working on for the last three years?
A. No. I wouldn't say completely. There's been a couple other projects that I've worked on, but this is -- especially the last year or so it's been almost exclusively.
Q. Almost exclusively. Thank you. Regarding the picture that you've shown of Mr. Starke's property, T38, do you have other pictures along the Sheyenne River?
A. Yes, I do.
Q. Okay. Do you have any pictures that are closer to the Sheyenne River of coulees, of areas of these intermittent streams?
A. Yes. I actually went and I looked at a lot of these -- if you -- looked at the stream channels to see if they were viable transport channels. So, yeah, as I went through -- basically I was field-verifying whether they were or were not viable channels.
Q. Do you have any with you today?
A. They are here, yes.
Q. Can you perhaps show them to us at a

break?

MR. KELSCH: I think that's beyond the scope of the direct examination.

MR. DINGESS: Well, we'd be interested in looking to see about the fall and see if there's a depiction that shows steeper slopes.

THE WITNESS: I can tell you that the vast majority of this whole, entire area is very similar to what you see in that picture. There are -- with the exception of a few spots -- and those again, we located on these maps -- there are those areas that have stream channels that have the potential. Again, looking at those, they're not -- we've worked on a lot steeper areas. There is some slope to them. What happens in a lot of these is they come along -- they tend to be small channels. A lot of times they're grass-covered. They dump into intermediate wetlands. They kind of pool along before they finally reach the Sheyenne River or Lake Ashtabula.

Q. Do you have pictures of those specific places?

A. Yes, I do.

Q. Okay. Could you share shows with the Commission then?

MR. KELSCH: Your Honor, I guess I would object to this.

JUDGE WAHL: Yeah. Here's how this works, I think, for me, is, Mr. Dingess, you will need at some point -- I really don't want to hear that now, but at a recess we can excuse the Commission and you can make a motion to compel the production of those documents, and we'll wrestle with that then --

MR. DINGESS: Well, let's continue --

JUDGE WAHL: -- and then we'll decide how we would handle that, if we would handle that, but let's do the examination now and deal with that later.

MR. DINGESS: Okay. We'll proceed and decide if we need to do that later. Thank you.

Q. (MR. DINGESS CONTINUING) Ms. Tillquist, the pipeline corridor, I believe, has been reduced from -- in these administrative proceedings from six miles to one mile?

A. I believe that is correct.

Q. Okay. Fargo has a concern that that may have been done to reduce the focus on areas such as the Sheyenne, Lake Ashtabula where they would be encompassed within a larger corridor. What if the

corridor was widened, how would that change your -- your work that you've done here and the conclusions that you've drawn?

A. I was not -- well, the corridor width really does not affect my analysis at all. I'm not looking at a specific corridor width when I'm doing my risk analysis.

Q. So if a source is considered to be a drinking water source and it lies outside the corridor width, it's not considered by you?

A. I'm sorry. Say that again.

Q. I said if a source of water might be -- if a water body might be considered a drinking water source and it happens to lie outside of a corridor width, will you consider it in your work?

A. I would differentiate my work as different than the routing work. I'm talking specifically about looking at water quality effects. The routing, you know, looking at a corridor and buffers and all those things was a different process.

Q. Okay. I guess I'll take that answer. You said that you started to investigate Fargo's water rights after you received a letter from Fargo's mayor?

A. I never evaluated Fargo's water rights. I started looking at water quality concerns.

Q. So you don't know what water rights Fargo has?

A. For my analysis it didn't matter if -- a water right or not. I was looking at the water quality that might be going past the City of Fargo and their intakes.

Q. Does the State of North Dakota recognize the Sheyenne River and Lake Ashtabula as a drinking water source?

A. Does the State of North Dakota? Well, I think the City of Fargo recognizes is as a back-up water source.

Q. No. My question is: Does the State of North Dakota recognize the Sheyenne River or Lake Ashtabula as a drinking water source?

A. It would be a back-up water source.

Q. Is it recognized as a drinking water source?

A. I couldn't speak for what North Dakota -- to my knowledge.

Q. Thank you. But part of your work here is risk assessment; correct?

A. Yes.

Q. Okay. And you spoke a little bit about intermittent stream channels. I believe you said that intermittent stream channels can have water up to 50 percent of the time?

A. That is the definition of an intermittent stream channel.

Q. And that's the definition you work with?

A. Yes.

Q. Okay. You spoke a bit about volatilization of components, that is oil components, and does that -- when you are in a water stream, does that -- is that dependent upon travel time of that stream reaching from point A to point B?

A. Yes. The volatilization of a compound, such as BTEX -- it occurs at a rate, and so the longer time you have, the more that can evaporate.

Q. I see. And I think you stated that when you were considering travel times in the Sheyenne River, you were using the -- an average flow of 200 CFS?

A. That was a value based off of USGS. What we looked at for transit times was -- initially we looked at a much shorter time, it was five days, but based on yesterday's testimony they're saying

on average flow it was 9 to 14 days.

Q. Okay. And so if the river was flowing more, say 5, 6,000 CFS, which is the capacity of the stream, it would cut that travel time down?

A. Yes.

Q. And if during the Red River -- operations of the Red River Valley water supply project, which I believe you heard yesterday would be a source of water supply to the City of Fargo, that there would be increased flows in the Sheyenne River?

A. Yes.

Q. Shorter travel times?

A. If water's coming down the Sheyenne at an elevated rate, yes.

Q. What is the composition of the contents of the TransCanada Pipeline going to be?

MR. KELSCH: Objection. Beyond the scope of direct examination of this witness.

MR. DINGESS: I believe the witness, Your Honor, said that she was --

JUDGE WAHL: No, I don't think it is. The objection is overruled.

THE WITNESS: Keystone Pipeline would carry crude oil. Crude oil is -- it encompasses a vast array of different types of materials, just

like there's a variety of different types of gasoline. So crude oil is made up of a number of compounds, hundreds and hundreds of compounds. The information -- basically, it's diluted bitumen from the Alberta tar sands, the oil sands, and then there's synthetic crudes. That would be the primary things that would be transported along this pipeline.

Q. (MR. DINGESS CONTINUING) Okay. So it would contain these lighter and volatile elements that you've -- or volatile compounds you spoke of, as well as heavier components?

A. Yes. The BTEX content of the highest BTEX content in those that we -- those were less than one percent of the total volume.

Q. Are there going to be specific mixes of crude oil that will be allowed in this pipeline?

A. I'll speak to what I know. There are certain tariffs that set limits on what can and can't be transported, and my understanding is they're basically based on the hydraulics of the pipe.

Q. So within -- so would these tariffs then control and place a limitation on high ends, low ends of these components that'll go into this mix?

A. You're getting -- the tariffs are beyond my real expertise.

Q. Okay. Will the heavy components of this oil be considered a dense material?

A. Crude oil is composed of light weights and -- well, again, it's a range of hydrocarbons, so it would have high ends and low ends -- or light weights and heavy weights.

Q. Okay. So what specific gravity? Ten, less or more?

A. The API gravity, I believe, is -- I want to say 19 -- I could probably look it up. I think I -- I think it was given to you guys in discovery. It will float. The API gravity of western crude select, which is representative of a diluted bitumen that would be transported, is 19.03. The synthetic crude is 32.48. That means that those crude oils are lighter than water so they would float.

Q. Okay. So that would be a specific gravity greater than ten?

A. Mm-hmm.

JUDGE WAHL: Your answer is yes?

THE WITNESS: Yes. I'm sorry. I do that.

JUDGE WAHL: That's all right. Everybody

does it.

Q. (MR. DINGESS CONTINUING) Let's turn a bit to the Texas study that you referred to. I believe it's T39. Excuse me.

JUDGE WAHL: Mr. Dingess, this appears to me to be a transition, so it also would seem to me to be a good time to break. Let's be in recess until 9:40.

(Recess taken.)

JUDGE WAHL: Back on the record, Mr. Dingess, when you're ready.

MR. DINGESS: Thank you, Your Honor.

Q. (MR. DINGESS CONTINUING) Ms. Tillquist, I'd like to ask you some questions about the -- what I'll generically refer to as the Texas study so that we're sure we're talking about the same thing. Would that be the Technical Memorandum Surface-Water Spill Modeling for the Longhorn Partners Pipeline prepared in July 1999, R.J. Brandes Company, Austin, Texas?

A. Yes, it is.

Q. And that's what you relied on -- or that's what you spoke about in your previous testimony?

A. That's what I was speaking about earlier. Yes.

Q. Okay. And you used this as a basis for your testimony concerning your assessment here regarding the Sheyenne River?

A. Yes and no. It was -- I had my original assessment, which we had talked about in previous testimony. What this was looking at was strictly benzene transport down river within the Sheyenne River.

Q. Okay. But you drew conclusions from this report?

A. That and other sources, yeah.

Q. Okay. And I'm wondering about some things regarding that report. Do you have that report available with you at the stand?

A. I do.

Q. On page seven of the report, in the middle of the page there's a paragraph that begins, "The model is most effective."

A. Yes.

Q. Could you read that, please?

A. The model is most effective with substances that have specific gravities less than or equal to one, light liquids. Dense liquids, specific gravity greater than one, are poorly modeled because they tend to sink, have reduced

evaporative losses and interact with bottom sediments. No dense liquids were modeled in this study.

Q. And I believe you said the Keystone Pipeline that's at issue here has specific gravities that can be greater than ten -- or the contents can be greater than ten?

A. You're confusing types of specific gravity. The specific gravity they're referring to here is different than API gravity. It's a different scale. The specific gravity in this scale -- when you talk about a specific gravity of one being water, the Keystone Pipeline actually has a value less than one.

Q. Will you convert these two different gravities?

A. I cannot off the top of my head.

Q. Okay. So we don't know then if we have a dense liquid or not; is that correct?

A. No. We do. The specific gravity based on this scale I don't have the number off my head, but I want to say it's like .8 something, so it's lighter than water.

Q. But I asked you for specific gravity earlier and --

A. Yes. And I provided you -- there's different ways of measuring specific gravity. The API is a different measure -- it's like Fahrenheit and Celsius. They both measure temperature, but they use different scales.

Q. But you gave me the API scale; correct?

A. Correct.

Q. Okay. Did you actually run a model to predict the concentrations in Fargo of the volatiles that you were discussing?

A. No, we did not. What we tried to do was this model uses -- we tried to use some of the information in here, the regression equation. There were some errors in it. We contacted the modeler, and it was -- we did not -- we aren't able to use it. So the model -- that's the regression equation that was derived out of the fundamental model. The fundamental model requires many more different parameter inputs, so to do that would take quite a bit of time. So we did not have the opportunity to run this model.

Q. Okay. Are the conditions different on the Sheyenne than they would be in this Colorado River?

A. They would be different. It's -- let me explain. The -- what they did in this study is

they evaluated a number of range of flows. So what we were trying to do is looking at the Colorado River when it's flow was in a -- the flow was comparable to that of the Sheyenne under average flow.

Q. Would you turn to page 25 of the report, the Texas report?

A. Mm-hmm.

Q. Look at the paragraph in the middle of the page.

A. Mm-hmm.

Q. In the last sentence of that paragraph isn't it true that it states that the equations generally fit the Colorado River well but need to be adjusted for use in other locations?

A. Absolutely. And again, I would just come back that we were using this as -- because we couldn't go through a very complicated model, we're using this as a tool to try to explain what would happen and again validating it with other examples.

Q. In the last two weeks or so?

A. Yeah.

Q. Thank you. I believe you talked about the Coffeyville spill; is that correct?

A. Yes.

Q. And is the City of Tulsa located downstream from Coffeyville?

A. I would have to go back and look at -- I'm not sure.

Q. Then do you know if the City of Tulsa had to switch to alternate supplies or did switch to alternate water supplies as a result of the Coffeyville spill?

A. The information that I had from the EPA was that the closest water supply was 100 miles downstream. They tested there and there was no exceedances of water quality standards. It was the same as they were before, so if Tulsa -- I'm presuming then would have to be located further downstream if they are on that -- that stream -- then they wouldn't have seen anything.

Q. But Tulsa did switch to alternate water supplies as a result of the Coffeyville spill. Are you aware of that?

A. I am not aware of that.

Q. Okay. Now we talked a little bit about your Exhibit T44.

A. Can you tell me which one that is?

Q. This is the --

A. Oh, okay.

Q. -- map that has the Cenex and Magellan Pipeline in eastern North Dakota.

A. Mm-hmm.

Q. What are the sizes of each of those lines?

A. That is provided in T39. There's Table 1, I believe it is, and that provides the pipeline diameter of each of those pipes.

Q. Okay. And so the pipeline diameter of the Cenex line is?

A. Eight inches.

Q. And the pipeline diameter of the Magellan?

A. Again, there's two. One is eight inches and one is six inches.

Q. Okay. And what is the pipeline diameter of the Keystone Pipeline?

A. 30.

Q. 30. And can you work out the volume difference between an eight-inch pipeline per linear foot and a 30-inch pipeline per linear foot?

A. Not off the top of my head.

Q. Would you believe it's 14 times?

A. I have no -- no way of affirming or refuting that.

Q. Wouldn't it be the formula pi R squared times the length of the pipeline?

A. That sounds pretty reasonable, but I don't -- I'm not an engineer that does pipeline volumetric analysis.

Q. Would a 30-inch pipeline be substantially larger in volume than an 8-inch pipeline?

A. I would say so, yeah.

Q. And what pressures do these pipelines operate under?

A. I believe Keystone would operate at maximum operating pressure of 1440. I believe most of these pipelines are also high-pressure pipelines.

Q. Don't you have a chart there you can check?

A. I do not.

Q. And what are the contents of these pipelines? What are they carrying?

A. Of these other pipelines?

Q. Yes.

A. Refined petroleum products, natural gas liquids, crude oil.

Q. Okay. All right. And these pipelines are already in existence?

A. Correct.

Q. And they -- do they present some risk to

spill or to rupture in their present location?

A. Pipelines -- there is a potential. It's a small potential for any pipeline to break, so --

Q. And so if you have one pipeline, you have a small potential; correct?

A. Yes.

Q. If you have two pipelines, then you have perhaps a greater potential?

A. Perhaps, yeah.

Q. And with a third or additional pipelines is the potential for a spill increasing?

A. Yes, it is. But they're also in -- well, never mind.

Q. Now, I believe you talked a bit about risk and consequences of a spill to the City of Fargo, and you said it would -- you estimated it would be a 15- to 20-hour event?

A. That was based on the Longhorn, as you're referring to it, the Texas study.

Q. Okay. And would it be possible for the event to be longer in duration?

A. I would -- my opinion is that there would never be a BTEX front that would come past the City of Fargo at all.

Q. So you're saying no danger at all to the

City of Fargo?

A. I do not see the potential for BTEX to get downstream in sufficient quantities to exceed the maximum contaminant level at Fargo.

Q. What about the heavier elements?

A. No.

Q. They'll never reach there?

A. No. No. Do you want me to expand on that?

Q. I'll take your answer as it is. You stated that you had -- that you were having trouble with Mr. Deutschman, understanding his work.

A. Yes.

Q. And you said that you used a deterministic model?

A. Yes.

Q. Or deterministic approach. Excuse me.

A. That's what -- yeah.

Q. Keystone followed a deterministic approach.

A. Yeah.

Q. And that's to generate a single number?

A. Yes.

Q. Okay. And you disagree with what Mr. Deutschman stated, that it is better to assess risk

through a -- a range?

A. I think there is times where a stochastic model is appropriate and there's times where a deterministic model is appropriate. It depends on the information you have, the underlying data. I think if you try to apply a stochastic model, when you don't understand -- you don't have the basis, the knowledge of the underlying probability curves, it leads -- basically it's kind of an illusion of technique -- and I'm not saying he did this, but I'm just saying you're applying -- you're applying some uncertainty, your lack of knowledge to the curves, so you have an illusion that you're actually creating something that's very sophisticated when in reality you may not have the information to support that.

Q. Is there anything in his testimony that indicated that yesterday?

A. I think there was some confusion on some parts that I indicated that again maybe there was some misunderstandings that I don't think he quite understood what was being done.

Q. Confusion on your part or his part?

A. I believe talking to a number of people, including DNV that were listening in, there was --

it was the conclusion of people that it was his misunderstanding of some of the information that was in the DNV report that led to some misapplications.

Q. What specific misapplication of information?

A. My understanding -- and again, this is talking to the DNV experts -- is that there is a -- there's a leak-detection curve in there and that was being used to look at response times, and the way it was being applied was incorrect.

Q. And how was it incorrectly applied?

A. You know, this is just getting further and further beyond my expertise because this is really DNV's analysis, and I don't feel comfortable being able to respond clearly and concisely. I --

Q. But you said basically you don't trust his work.

A. No. I said I don't understand what he did.

Q. You don't understand the work, but you don't know why you don't understand it.

A. I'm saying that a number of us sat down last night and we tried to understand the premises for how he had done his analysis, and he was saying

he had difficulty replicating the DNV assessment and that there was a number of things that he was trying to figure out. We were trying to do the same thing with his assessment in a few hours, trying to understand what he had done and how he got the numbers. I would not be able to replicate what he had done. I don't understand how he got there. It's not saying that it was wrong or right. I'm just saying I don't understand it, how he got those numbers.

Q. Okay. Well, perhaps we might recall him again to clarify for your sake. I believe you used the term "risk acceptability."

A. We talked about what an acceptable risk might be.

Q. Yes.

A. Okay.

Q. And would that not be dependent upon what is acceptable in the eyes of a decisionmaker?

A. Absolutely.

Q. Okay. And would the folks that perhaps were on a municipal water supply system have a different view of risk compared with those that might operate a conveyance that could pollute that system?

A. You lost me in the last part of your statement. The --

Q. Okay. I will restate that. Would -- those who operate a municipal water supply system might have a different level of acceptability regarding a risk than those who would operate a conveyance system that might pollute the water system?

MR. KELSCH: Your Honor, I would object to that. That's calling for speculation on the part of this witness.

JUDGE WAHL: I think it's a fair question for an expert witness who evaluates risk, Mr. Kelsch.

THE WITNESS: I guess -- I'm sorry. I'm still not -- the conveyance system, are you referring to --

Q. (MR. DINGESS CONTINUING) To a pipeline perhaps carrying crude oil.

A. Okay. So are you saying that a municipal water supply, the City of Fargo, would they have maybe a different level of what would be acceptable to them as opposed to Keystone? That's what you're asking?

Q. Can you answer that question? Yes.

A. I would say yes, but let me qualify it that the risks that we talked about were not -- the acceptable risk levels were not decided by the operators. These were decided by, again, state and federal agencies that were involved in the decisionmaking and included some potential impacts for one of those to a drinking water source. So it's definitely -- a decisionmaker weighs and balances and it's their decision.

Q. And I believe you stated in the beginning of your cross-examination here that you don't know if the State of North Dakota lists the Sheyenne River and Lake Ashtabula as a drinking water source?

A. I can't confirm or deny that. Yeah.

Q. Okay. Thank you. Ms. Tillquist, harkening back to our discussion about the contents of crude oil, you said it contained a large variety of compounds?

A. Mm-hmm.

JUDGE WAHL: Your answer is yes?

THE WITNESS: Oh, sorry. Yes.

Q. (MR. DINGESS CONTINUING) And is that true of this synthetic crude that you say will be shipped in the Keystone Pipeline?

A. Yes.

Q. Are there any naphthenic acids in the synthetic crude or the crude oil that will be shipped in the pipeline?

A. Naphthenic acids, yes.

Q. So those will be refined in Illinois or in Oklahoma?

A. The naphthenic acids are basically present in the bitumen. When they are extracted, you'd have naphthenic acids in Alberta, and then the refinery, when they receive it, they would have naphthenic acids.

Q. Okay. And are they volatile like BTEX?

A. No.

MR. DINGESS: All right. Thank you. I don't think I have any further questions.

JUDGE WAHL: Ms. Linderman.

MS. LINDERMAN: Thank you.

CROSS-EXAMINATION

BY MS. LINDERMAN:

Q. If we could go back for a bit to the first part of your testimony regarding your observations of Mr. Starke's property. Did you or do you know of anybody from TransCanada who has a background in hydrology who's examined his property?

A. Actually, we -- I have worked closely with a gentleman who is a hydrologist, and he was actually the one that helped me out on looking at these stream channels and deciding what is a viable stream channel and what is not. It was -- I actually went out and field verified his work, and --

Q. And -- I'm sorry. You can finish.

A. That's all right.

Q. What kind of a survey did you do? What was the extent of the studies that you did of this portion of the land?

A. Me, personally?

Q. Either you or with the assistance of this hydrologist.

A. Specifically when we're looking at trying to find viable transport routes, my understanding -- and this was provided, I think, in -- I'm not sure if it is in this risk assessment that we provided here. What he did was looked at GIS, first of all, and identified intermittent stream channels that could be crossed by the pipeline or were in close enough proximity that if a spill occurred, that a spill might get into that stream channel. Based on that then he looked at

that -- I think it's called TerraServer and Google Earth and basically looked at these through aerial photographs zooming in on these areas trying to determine, if these were actual, viable transport channels, did they have obstructions that would prevent them from transporting a spill if it were to occur downstream.

So he did his analysis, and then, again, what I did is I went out and field verified those locations to -- looking at the site, you know, could a spill -- if it occurred at this location, could it possibly get to the Sheyenne River or Lake Ashtabula?

Q. Did you examine the characteristics of water flowing across the property at times of spring flooding or heavy rainfall?

A. I did not. I was there, again, in November, but you can tell somewhat by the land use patterns, I would suggest, that, you know, a lot of these areas are going to be farmed that were not viable. You can also look at, you know, are there permanent wetlands there that would suggest that there's water there constantly, is there a stream channel there, is there vegetation in any way -- recurring vegetation that would indicate some sort

of water presence that might be there. Certainly when you're looking over a very flat topography, the farmer -- you can still see the furrows and a lot of times the corn stalks still out there. There was not flowing water there, you know, for most of the year.

Q. Was this data examined historically over a period of years to take into account fluctuating weather patterns, use patterns, or was it limited to a shorter period of time?

A. This was based on topography and evaluation of the sites. We weren't looking at again the stream flow. There's no stream flow data for these sites because they're so small, and I will also mention to you that we were looking -- I'm not sure if I said this -- at things that obstructed -- so not only the ones he saw, but a lot of places there is like elevated roads. So you'll see on your -- on a map what indicates an intermittent stream going across a road and going on downstream, and when you actually traverse this road, you might see, you know, a stream channel, but there's no culvert. So if a spill occurred and the pipeline was up here, which we found at times, so it was on this side of this drainage, it would

have to come down and it would get hung up by this road because there was no culverts to pass along the oil in many cases.

Q. Would that --

A. So we looked at a number of things like that.

Q. Would that lead to any subsurface movement of water?

A. I would say that with time I suppose that with enough water that, if the soils are permeable, that the waters would get into the soils and there could be movement of water across, but again, now you're talking about trying to move crude oil and its constituents and -- well, I'm going down that road, but --

Q. We can get into more detail about crude oil and components of crude oil moving, but I'm just trying to address the drainage patterns of the land to start with.

A. Okay.

Q. Is it the case that drainage patterns across this property or other properties along this area of the lake and the river can change with time depending on weather conditions or how it's used by landowners? And how is that taken into account in

your analysis?

A. What we did is we looked at the conditions as they are now. Part of Keystone's ongoing requirements is they have to continually evaluate risk along their pipelines. So as land forms were to change, they would continually have to evaluate risks. So if suddenly a new area became a potential risk area because of a transport route, you know, they would be looking at that within their -- well, within their risk management process.

Q. In general, Mr. Starke's property maybe in particular, by generally the land along Lake Ashtabula, where does the water from that land drain ultimately?

A. The land surrounding -- if I'm understanding your question --

Q. Along the pipeline corridor, I'm sorry. That's what I meant to specifically ask.

A. It depends. Portions of the pipeline route through this area, there are some parts where it drains into isolated wetlands. They don't really drain -- there's no drainage leading to one way or the other. There's others that would lead into the Maple River drainage and there's some that

would lead into the Sheyenne.

Q. Okay. So some of them lead into the Sheyenne. With the wetlands in terms of hydrology are you able to speak to whether there's any subsurface flow or interaction or hydraulic interconnection between those?

A. Between the wetland -- so you're saying wetland groundwater flow and then getting back into a watershed, say, the Sheyenne or the Maple?

Q. Correct.

A. I would presume that would be true with time. It depends, I would suppose, on the soil conductivity and, you know, things like that. So I can't answer that for certain.

Q. Okay. I think in your testimony when you were discussing the risk associated with the spill, you focused mostly on a large volume spill. If we could, I'd like to focus on a smaller leak, maybe a pinhole leak that would go undetected.

A. Okay.

Q. And to clarify, maybe a first question I should ask, this pipeline is underground at this point when it's passing by the lake?

A. Absolutely.

Q. Okay. If there is some kind of a pinhole

leak, this would be oil leaking into the soil underneath the surface?

A. Correct.

Q. What would prevent this oil getting into subsurface waters and remaining there for some period of time?

MR. KELSCH: Your Honor, I'm going to object to this line of questioning. The limited scope of the purpose of this hearing is for the impact of Keystone on Fargo and Fargo's water supply, not potential oil getting into the ground and staying there.

MS. LINDERMAN: I'm getting there in the context of subsurface waters and how this land drains, Your Honor.

JUDGE WAHL: Overruled. You may proceed.

THE WITNESS: Could you restate the question?

Q. (MS. LINDERMAN CONTINUING) Possibly. If this underground pipeline -- if there's some kind of a pinhole leak that's slowly leaking into the soil, is there a potential for that to stay there some time and possibly interact with subsurface waters?

A. Yes.

Q. And would the volatile compounds that you've discussed, the BTEX compounds -- would those dissolve into the subsurface waters the same as they would into surface waters?

A. Yes. We actually talked about this -- the subsurface transport as a mechanism, so we actually did evaluate this exposure route for this entire area.

Q. When you're discussing a slow leak that's underground, wouldn't it be the case that there's a significantly longer period of time that that could go undetected?

A. For a pinhole leak I think there -- yes.

Q. I think maybe in previous testimony exhibits offered by TransCanada -- I don't know if it was you in particular, so maybe you can't speak to this -- a period of 90 days was suggested for a very small leak?

A. Yeah. Again, this is -- this is not my -- I think Brian Thomas has previously testified that, you know, something that would be 90 days would have to be just a pinhole-type leak because -- for it to be not detected for that long.

Q. So these contaminants could potentially get into subsurface waters and travel some distance

even if there weren't an oil spill flowing over the surface?

A. I've testified previously on the subsurface transport of crude oil and its dissolved constituents and --

Q. How does that relate to your previous testimony that you don't believe there is a very great likelihood of any of these contaminants reaching the lake, reaching Baldhill Dam and then the Sheyenne River?

A. From subsurface transport from pinhole leak?

Q. Assuming the maximum detection period of 90 days.

A. Let me give you an example of a spill where a large volume of material got into Bemidji. This was an oil spill -- crude oil spill. That oil is actually in -- in the soil. It was there for a while, and what happens is the dissolved constituents -- well, the constituents -- the lightweight constituents, the BTEX compounds, can dissolve out of the oil and those will begin migrating in the direction of the groundwater movement, but again, then you start running into natural attenuation which limits the dispersal of

these lightweight compounds.

Q. Have you studied as part your risk analysis on this topic in particular the rate and volume of subsurface water movement in times of heavy spring floods or spring runoff, heavy rainfall?

A. No, I have not looked in this area. No.

Q. Given the potential for contamination from a subsurface leak, do you think that would be an appropriate component of risk analysis?

A. What we looked at for subsurface transport was we looked through the literature and looked at the movement of groundwater -- sorry, BTEX compounds in groundwater. Now I'm scratching my head. I believe it was an EPA study that looked at 500 BTEX contamination sites and found that the mobility of BTEX compounds was largely limited to 200 feet, 250 feet, somewhere in there. We'd have to go back to my testimony before, but we're talking hundreds of feet of movement, not miles and miles from a pipeline to, say, Sheyenne. So we eliminated that -- as a risk assessor we eliminated that as a viable exposure route.

Q. Over what kind of a time period are you talking about?

A. In the case of Bemidji it's moved, boy, I want to say 100 yards in 20 years.

Q. Is that at all a product of soil type and water flow in the area?

A. Yeah. They actually have very permeable water -- or very permeable soils in that area, so it's a function both of groundwater -- soil types, the rate of groundwater movement, the volume of the contamination that's there, and then the time and the presence of these -- these bacteria that act in natural attenuation. So, again, by looking at 500 different sites with this EPA study, that covers a wide gamut of different environmental types.

Q. Have -- I mean, I'm still trying to understand why this -- just a basic hydrological study examining this risk wasn't done in this particular geographic area given the fact that it has unique topographical features, unique soil types, unique precipitation patterns?

A. I wouldn't say that it has -- it's not a unique area for topography. It's not unique in its soil types. I think these types of areas are found throughout the United States in, you know, various -- where a lot of pipelines go across, and I think there are -- every site is unique in its

own way, but there's nothing that stands out in this area that would lead me to think that there's something drastically different at this site that would invalidate the application of a study at 500 sites or, you know -- yeah.

Q. But given the volume of water and the fact that it's a water source for a major municipality, why wouldn't it even be a small component of the specific risk analysis that you did?

A. Because there is no chance of that subsurface transport reaching the river, so it's eliminated as a viable exposure route.

Q. Did you mean to say there's no chance or there's a very small chance?

A. In my opinion, the chance of a subsurface transport of dissolved constituents from this pipeline traversing two, three miles wouldn't happen.

Q. You understand there's a difference between something being impossible and something being improbable, and I'm trying to get at --

A. I would say that the probability --

Q. -- whether you're trying to say there's a zero chance or a small chance.

A. -- is so extremely remote as to be

considered virtually negligible.

Q. How much time would it take in a risk analysis to just look at this issue given the resources that might be impacted by it?

A. I would say that it would take quite a long time because you'd probably have to go and get groundwater studies, looking at the movement, rate of movement, soil conductivity. I mean, the more sophisticated you want to make your model and try to look at this, the longer it's going to take to generate this information. I'm not sure that information is available for this specific location.

Q. How would you go about gathering it?

A. Gathering hydrological data for groundwater movements beyond --

MR. KELSCH: Again, Your Honor, I'm going to object to this line of questioning. I think she's answered the question and testified that it cannot get there, and that's the purpose of this -- of this hearing.

JUDGE WAHL: Well, but it's cross-examination and it's within the scope. But --

MS. LINDERMAN: I can move on.

JUDGE WAHL: Thank you, Ms. Linderman. The objection is overruled with that promise.

MS. LINDERMAN: Thank you very much.

Q. (MS. LINDERMAN CONTINUING) Could you talk to me a little bit about the emergency response plan and the different agencies that would be involved if there were some kind of an oil spill along the pipeline on this part of the pipeline by the lake or the Sheyenne River?

A. I will not go into detail because the emergency response plan is not my forte. Brian Thomas has already testified to the emergency response plan. In general, though, as I mentioned earlier, Keystone would be out there, Department of Health, EPA could be out there. That's as far as I'd feel comfortable to go.

Q. And what types of dangers or risks would they be addressing?

A. I think the sampling methodology that they would look at -- they'd be looking at probably water contamination, they might be looking at air quality, fire risk, but again, I mean, that's off the top of my head and I --

Q. You would anticipate that water contamination would be one of the issues that would

have to be examined in the event of an oil spill. Would this just be on the lake if the spill were near or into the lake or would it be all along the Sheyenne River?

A. Let me rephrase your question so I can -- if a spill reached the water body, then they would be testing for water quality. If it was, say, closer, adjacent, they still may be doing that, as well. If it's -- if there's no viable route to get it -- a spill -- if they spill it 20 miles away from a river and it's flat terrain, they're not going to be monitoring that water there. You have to -- when they decide what they're going to monitor, a lot of times when the other agencies get involved, it's in coordination and they look at risks, and then collectively those decisions are made of what should be sampled and how often and what they're going to be looking for.

Q. And in the event of some kind of spill that was in the vicinity of the Sheyenne River or Lake Ashtabula, do you think -- as a risk analyst would it be appropriate to notify the City of Fargo?

A. I think that it would come down to the emergency response plan and what they have in it,

and my understanding is that they would notify downstream water users given the importance of the city -- of the water to other cities, as well as Fargo, those people are going to be notified.

Q. Has it been --

A. That would be my opinion. I don't know what they have.

Q. Has it been your testimony that you think there is virtually no risk to the City of Fargo if there were the kind of spill that you discussed in your testimony?

A. Yes.

Q. So what would be the purpose of notifying them?

A. That's why I'm -- what they would probably do is proactively do it. Again, you're not going to notify -- well, no. Again, they will have a list of downstream water users that they would notify. How they choose to -- which ones they would notify, again, that's getting into the details of the emergency response plan which is beyond my -- my knowledge.

Q. I guess what I'm curious about is if these spills move only very slowly and the volatile compounds move only very slowly, isn't it a waste

of time to notify downstream communities, or is there, in fact, a level of risk that is of concern to both TransCanada and these municipalities?

A. I think -- I think -- I'm talking as a risk assessor, not as an emergency response planner. I think it's always prudent to -- if there's an event, to let people know within the vicinity. I might be -- well, I'm not going to draw an analogy.

Q. The analysis of risk to Fargo water supply that was offered as Exhibit 39, was any part of this analysis coordinated by or through the City of Fargo?

A. Let me think here. No.

Q. Did you speak to anyone with their water treatment facilities or in their water department or their public health department in coming up with this risk analysis?

A. With the City of Fargo --

Q. Yes.

A. -- no. No.

Q. And why wasn't this kind of a study done prior to November of this year?

A. When we look at -- when we look at risk, we look at the risk to these water bodies like Lake

Ashtabula and the Sheyenne River. There is other communities along the route that also use water from these sources. So when we conducted our analysis of risk for Lake Ashtabula and the Sheyenne River, we were evaluating risk in a more localized sense. We didn't extend our focus 200 miles downstream. We were concentrating more on those local communities and making sure that those were protected.

Q. Would you say that mitigation and the ability to mitigate is a function of a good risk analysis?

A. Depends on what your --

Q. Well, let me be more specific.

A. Okay.

Q. Would it be relevant to your evaluation of risk and whether risk was acceptable if you knew and were familiar with, say, the City of Fargo's capacity to respond to a catastrophic event on a pipeline?

A. I'm sorry. Say that again.

Q. Talking about acceptability of risk, is that analysis affected by your knowledge of the City of Fargo's ability to respond to a catastrophic event on a pipeline? And what would

happen in case of an emergency on their end?

A. My analysis, and strictly my analysis, is based on water quality in the immediate area and then downstream. It wasn't accounting for the water treatment, you know, facilities as far as, you know, their specific ability to treat or not treat a material coming through. Our concern was would a spill have the ability to affect water quality at those intakes.

Q. Okay. You were present, I believe, for the testimony that was offered yesterday regarding how the City of Fargo relies on water supplies from Lake Ashtabula and the Sheyenne River and sort of the order of precedence for their various water supplies, their primary supply being the Red River. Given that, if there were contamination in Lake Ashtabula in a time of drought, does that affect your analysis of the risk to the water supply for the City of Fargo if both the Sheyenne and the Red River were low because of a drought period?

A. Yeah. Basically -- well, if you would look at the ability of a drought to occur, which I heard yesterday was a one in 100-year event, and then combined that with our probability of a spill happening and actually getting into Lake Ashtabula,

the Sheyenne River, I think that was 5400 years. So you multiply that by a 100-year event, so now you're looking at the coinciding of two events as one-and-a-half-million years. So it's -- the chances of those two events co-occurring using those numbers would be very, very small.

Q. I think actually the evidence offered by Fargo was that there are periods of low flow in the Red River relatively more often than there is a 100-year drought. That's not the only time that there is problems with water supply in both the Sheyenne and the Red Rivers; isn't that correct?

A. I think that is true. Yeah.

Q. And when you're talking about a very low probability event that could occur once in so many years, I mean, there's a chance of it occurring that often, but there's also a small chance that it could occur more often than that; isn't that correct?

A. I would say it depends on the parameters that you put in to begin with, and what we did is -- again using a deterministic rather than a stochastic -- the way to effectively use a deterministic model is to make conservative assumptions so that you overestimate the risk. So

when we say a chance of a spill, we're saying no more than 5400 years because we've already incorporated a lot of assumptions to make it conservative. So using the stochastic model we've already shifted over our -- we're looking at one end of that curve.

Q. When you talk about risk acceptability and whether, I guess, maybe the risk to the City of Fargo's water supply is important or treated with importance in your analysis, is that a numerical value that you put on risk acceptability, or are you trying to get risk as small as possible?

A. Am I trying to get -- the risk is what the risk is. The -- again, I think I'm missing your question. I'm sorry.

Q. I guess I would assume that the development process for this pipeline risk analysis interacts with siting and routing and pipeline design, and when we're talking specifically here about routing, are you trying, when you do your risk analyses and then modify your project, to minimize risk are you trying to shoot for some numerical value of risk?

A. We're not shooting for a single numerical value. What we're looking for is routing, and

again, we're going to go onto the edge of my expertise again, but routing is a weighing and balancing of costs, benefits, you know, factors that -- you know, when we look at routing a pipeline near a water body, is this an acceptable distance, is this a safe distance? That's when my input is looked at, and we'll say, well, given the topography, given all these other factors that we've talked about in detail here, this seems to be a reasonable route when we look at comparing other different routing factors.

Q. When -- let's assume for the sake of this next question that you're dealing with a situation where there is a drought situation for Fargo and the Red and the Sheyenne are both low and they're having to rely on the water that's trapped behind Baldhill Dam and Lake Ashtabula. There's some kind of a spill, however unlikely that may be in your analysis, that impacts the lake. If this is impacting what has become for various reasons the primary water supply of a large municipality, does the level or severity of consequence affect your risk analysis and how does it?

A. If you're asking if there would be -- if you combined all of those events, would the

consequences -- is that what you're asking to Fargo?

Q. The fact that the primary water source for Fargo in this case would be impacted by a spill into Lake Ashtabula, does that play into your risk analysis in what you find to be an acceptable level of risk?

A. Well, again, I'm sorry, but I guess I still come back to if we're talking about an acceptable level of risk, we're talking about how do these factors interplay between the likelihood of an event, the lack of probable events to the City of Fargo, and then combining it with a drought or an event where they have to switch water supplies to the Sheyenne, again, it would be -- the risk would be low. And again, even -- to play the scenario out, even if a spill occurred and it got into Lake Ashtabula, again, we already talked about how drought would affect the flow regime and the BTEX concentration would have longer time to get out. You're also -- you know, well, it just -- I mean --

Q. I guess I wasn't talking about, you know, all of the -- the oil slick and the BTEX compounds actually traveling to Fargo. I was talking about a

set of circumstances where the lake, itself, has become a primary water supply upon which the city relies and how that kind of impact would play into a risk analysis and an analysis of risk acceptability.

A. I really don't mean to be difficult, but I'm still struggling to understand. So Lake Ashtabula to be a primary water supply, it still has to come down the Sheyenne River, so we're still talking about all the things we just talked about earlier.

Q. But if the contaminants were in the lake, itself, how would they be prevented -- and that was the water source for the city, what -- I guess I don't -- wouldn't there be some requirement that it be cleaned up or somehow mitigated before that water is released to the city?

A. Well, first of all, the -- okay. So if a spill happened and it were to be coming down and get into Lake Ashtabula, again, you'd have containment that would localize the effects of the spill into a small region. They would be testing -- you know, all these people that we talked about earlier would be out there testing water quality. Now if there was a release that

would have to go to Fargo, I mean, they're going to be looking at the water quality. They are going to be cleaning it up, they have to get it to certain water quality standards, but if it were to be released, you know, again, and if the benzene concentrations were exceeding the MCL, then, again, it has to be transported all that distance when all these environmental fate and transport mechanisms occur, and the City of Fargo would be notified, and they would have a chance to be monitoring this material as it came along so they would know if that would exceed their water quality standards.

Q. But what is their -- I guess. Okay. We can move on from that.

A. I'm sorry.

Q. If there's a possibility of mitigating even a small risk to the city by moving the pipeline several miles, do you think that is an appropriate measure for TransCanada to consider?

A. I think that there is a lot of factors that go into routing where a pipeline goes. What I concern myself about is water quality issues. There's a lot of other factors that are looked at. Would it -- would it decrease -- I mean, you're still going to be affecting some other watershed,

you're still going to have other things. So I can't compare one route versus another without -- all I'm looking at is this one. You're saying could moving it protect one -- the Sheyenne -- I'd say there's so limited places where it could get in and the chances are so improbable, but if you moved it, in certain areas then are you creating a risk for somebody else, and I don't have that information to weigh and balance and try to form that opinion.

Q. Has that analysis been done at all by TransCanada or by yourself?

A. I believe when we talked in hearings past they had looked at some route concepts. I just -- yeah. So I'm -- you'd have to look at previous testimony because I can't speak to that.

Q. Wouldn't you say it would be appropriate to do a risk analysis for each of the various scenarios and then compare them in coming up with these conclusions?

A. Risk assessment takes a while to do, and they will -- as this process evolves they will be looking at that. What we look at when we're routing is a lot of these factors, but these very detailed, specific analyses come up when we've got

specific issues and we'll be doing these things, but it's -- this level of detail can't -- isn't done when we're doing macro level routings. It's done -- it's done subsequently.

Q. I guess why not? You were -- presumably TransCanada is the one who chose the timing of this application and their schedule that they would prefer to see play out. Why can't these things be done now or previous to now?

A. What TransCanada has done is they've looked at routing based on a number of factors and considerations, including my input on general risk factors. It was my professional opinion that where they put it was satisfactory, and having gone out on a site visit, I'm even more convinced of that. So it's kind of an iterative process as we go through. It's -- it's never -- it's always being done, you know, to some level, and then, again, to address a specific issue like this, we want to make sure we handle it in detail, but we're always looking at these things at some degree or another.

Q. Is there a point at which you would anticipate a comparative analysis of different routes in this area being done?

A. I think that the alignment that Keystone

has submitted and is being looked at by the draft EIS through the Department of State, they would be the ones that would be looking at alternatives.

Q. So you're relying on the Department of State to tell you whether you need to look at alternatives?

A. No. The Department of State is required under law to look at various alternatives.

Q. And if they don't?

A. That's -- that's -- I'm --

Q. That's their business?

A. No, ma'am. It's -- the Department of State -- they go through a process and they -- one of the things they have to look at is alternatives.

Q. As the constructors of this pipeline, isn't TransCanada the one with the primary responsibility to look at all of the alternatives and all of the risks without being asked by a government agency even?

A. I think routing is -- we weigh and balance a number of different risks.

Q. Is there any intention on the part of TransCanada to have formal consultations with the City of Fargo on this particular issue?

A. Yeah. Actually, they -- they tried to

contact the City of Fargo and have meetings with them prior to these hearings to discuss this.

Q. And what is the level of discussion that you would anticipate? Is there going to be a detailed analysis conducted jointly with the City of Fargo of risk and --

MR. KELSCH: Your Honor, again, whether Keystone is going to have meetings with the City of Fargo or not I think is beyond the scope of this hearing, and certainly I would object to that line of questioning.

MS. LINDERMAN: I guess I've asked my question. I was just trying to get at what level of information they tend to gather, but I can move on from that.

JUDGE WAHL: Please.

MR. DINGESS: Your Honor, I'd also add that if we were conducting meetings, those would be in the vein of settlement discussions and probably not appropriate for these proceedings.

JUDGE WAHL: Well, I agree it's -- you're pushing the envelope of the scope of the hearing, Ms. Linderman. The objection is sustained.

Q. (MS. LINDERMAN CONTINUING) Are you at all familiar with the design requirements that

TransCanada is contemplating with regard to the pressure and thickness of the pipeline, and particularly a waiver they've received when they're operating the pipeline outside of high consequence areas from the pipeline?

A. I would say I'm aware of it peripherally.

Q. How does that play into your risk analysis in this particular portion of the pipeline?

A. The PHMSA waiver, the special permit, basically is they have to have an equal level of safety -- equal or greater in order to do this. So -- so it doesn't affect my analysis; that the -- the analysis stands as it is.

Q. Is this portion of the pipeline being treated as a high consequence area or is it subject to the waiver?

A. I can't speak to what the waiver would be as far as whether it's a high consequence area. What you have to look at is it's not -- it's whether a pipeline -- the pipeline could contribute -- could affect a high consequence area. There are high consequence areas -- and I've got to be careful here because I can't -- they're confidential where they are, and I will just say that those have been evaluated and looked at as

part of this overall assessment. And I will just say that this whole area -- there are protections for this area. I think I can say that.

MS. LINDERMAN: I think those are all the questions I have right now. Thank you very much.

JUDGE WAHL: Mr. Binek.

MR. BINEK: Thank you.

CROSS-EXAMINATION

BY MR. BINEK:

Q. First of all, I'd like to talk about a comment that -- or a figure that was being used regarding Mr. Starke's land, and I think that the -- the drop in elevation was talked about as being 97 feet. My recollection of the -- and I don't have Mr. Starke's exhibit, but my recollection is that the normal flow of the river was at like about 1207 feet -- yeah, my recollection was good -- 1207 feet, and he referred to 1400 feet being in one of the contour lines across his property. So if you subtract those, I think you come up with 193 feet.

A. You are correct.

Q. Okay. Does that -- okay. You talked about the -- the land, the slope of the land, and you were talking about the drop of 97 feet. Does a

drop of 193 feet make any difference in your evaluation of the likelihood of a spill on Mr. Starke's land reaching the Sheyenne River?

A. Having been onsite and having looked at it, no. Basically this land is exceptionally flat. It's basically, again, a terrace until it reaches that -- the river -- the Sheyenne River, itself, where it drops down quite a bit. That's where you're going to get that elevational change. The remaining topography -- it's a flat terrace.

Q. And when you talk about a flat terrace, it's not absolutely flat. There's some slope to the land generally towards the Sheyenne River, isn't there, if you look at the contour lines?

A. Very slight. Very slight.

Q. But it does slope. Generally, there's a slope towards the Sheyenne River.

A. Generally, but again, what I'm looking at is from a standpoint if a spill occurred, is there sufficient slope or terrain features that could facilitate the oil movement to the Sheyenne River, and I'll give you a comparison. This site -- having gone to Bemidji and if you look at the contours there and having been onsite, if anything, Bemidji might be a little bit more -- have a little

bit more topography, but Bemidji -- the oil was again moving, you know, 100 yards -- you know, the spray zone was a few hundred yards. It was all in a very small area, and that was 10,000 barrels spilled. You put that footprint onto Mr. Starke's land or any other -- or this area, it's so flat it's not -- it would be -- I would expect it to be similar or less than what they saw in Bemidji.

Q. I guess the point that I was trying to get at is when you talk about it being flat, you don't necessarily mean it's absolutely flat. There can be some small slope.

A. I know of very few places in the world where it's completely flat, level, uniform everywhere, but it's darn close.

Q. Okay. I just wanted some clarification there.

A. Yeah.

JUDGE WAHL: Ms. Tillquist, you're facing a different direction and you're talking past your microphone. Just move the microphone over and you'll be fine.

THE WITNESS: Okay.

Q. (MR. BINEK CONTINUING) How many intermittent streams are there along the pipeline

route that feed into Lake Ashtabula?

A. I believe there is -- the number of intermittent perennial stream channels -- let me repeat this -- that could go into Lake Ashtabula, Sheyenne River I think we'd quantified those -- if we counted up the red and blue lines on Exhibit T23 -- yeah, T23 -- if you count up the red and blue ones, I believe it's 22 intermittent and 1 perennial. Again, not all of those are viable transport channels.

Q. Okay. And when you talk about I think it's 1.4 miles -- pipeline miles that would be affected by these intermittent streams going into Lake Ashtabula, those are -- that 1.4 miles is not one segment of the pipeline. It's --

A. It's scattered.

Q. -- it's small segments of the pipeline.

A. Correct.

JUDGE WAHL: I'm sorry, Ms. Tillquist. You still --

THE WITNESS: Correct.

JUDGE WAHL: -- have to -- if you'd just take that microphone and swing it around so it's more in front of you --

COMMISSIONER CRAMER: You can just bend

it.

THE WITNESS: Or just bend it.

COMMISSIONER WEFALD: You can just turn the head.

JUDGE WAHL: There you go. Now you've got it. Thank you.

Q. (MR. BINEK CONTINUING) And how many intermittent streams along the pipeline route flow into the Sheyenne River.

A. Oh, I'm sorry. What I gave you was for both, the Sheyenne and Lake Ashtabula. I'm sorry. I misunderstood you.

Q. Okay. So what is the number for Ashtabula and what is the number for Sheyenne?

A. Let me see if I can get that for you here. Let me try again. What I'm counting -- my numbers don't quite match up because it's all done here. I think I had 14 intermittent streams that are crossed by the Keystone route that appear to drain into Lake Ashtabula.

Q. Okay. And so there would be then -- you said there were a total of 22?

A. Do you want me to double-check that because --

Q. Well, I'm just trying to figure out what

the number would be for the Sheyenne River.

A. I can't tell on some of these things because my map is so small here. 17 -- what did I tell you before on the other one?

Q. I thought it was 22.

A. 22 total and then the -- on the first one was --

Q. 14 for Ashtabula, so that would be 8 for Sheyenne, if my math is correct.

A. Yeah. I'd have to go back and look at that because I know at one point I counted them up on the bigger maps where I could actually see it a little bit better.

Q. Those are --

A. But it's ballpark.

Q. Okay. And there's no perennial stream running into Ashtabula; is that correct?

A. What's identified here are intermittent streams.

Q. Okay. You said that there are one or more perennial streams flowing into the Sheyenne River?

A. The Sheyenne River is the perennial stream, and then what we did for our analysis is we considered one intermittent stream a perennial just for the risk assessment analysis since it is close

in proximity.

Q. Okay. And is that stream that's considered perennial, does that flow into Ashtabula or the Sheyenne River?

A. The stream that is perennial is the Sheyenne.

Q. Oh. You talked about another one in close proximity, I thought.

A. Oh, the one we just now --

Q. That's considered a perennial.

A. I treated an intermittent stream that was adjacent to the Sheyenne, and it's at -- it's right at the crossing. It's milepost 169. I treated it as a perennial due to its proximity, but it is still listed as an intermittent.

Q. And does that stream flow into the Sheyenne?

A. Yes.

Q. Okay. I'm going to refer you to T44. Do any of the existing pipelines shown on that exhibit cross the -- cross the Sheyenne River south or upstream from Fargo's intake on the Sheyenne River?

A. Do any of the pipelines -- say that again. I'm sorry.

Q. The pipelines that you talked about on

T44, do any of those pipelines cross the Sheyenne River south or upstream from Fargo's intake on the Sheyenne River?

A. I lost you at the last part. Do any of these pipelines cross the Sheyenne River in close proximity to Fargo.

Q. Well, what I'm concerned about is whether they cross upstream or downstream from Fargo's intake on the Sheyenne River.

A. Oh, okay. The -- the pipeline at this Magellan Pipeline is just north of I-94. The intake for the Sheyenne River is three miles downstream basically from that location. So it's -- it's -- the intake is three miles upstream of that location so the pipeline is downstream, this Magellan Pipeline is. There are other pipelines like this Dome Pipeline that are further upstream, up in this area.

Q. Where is the Dome Pipeline? Oh, okay. I see it.

A. The lime green.

Q. Okay. Fargo's witnesses spent considerable time discussing problems that would occur if crude oil entered the treatment plant. Is it your testimony that even if there was a large

spill, crude oil is not going to reach the intake on -- Fargo's intake on the Sheyenne River? I'm talking about the crude oil that they were talking about that would coat equipment and surfaces on the intake or the pipeline or the treatment plant, itself, and my question to you is: Is it your testimony that if there is a spill, that crude oil that would coat these surfaces will not reach the Fargo's intake on the Sheyenne River?

A. That is correct.

MR. BINEK: One moment, please.

Q. (MR. BINEK CONTINUING) Mr. Schultz testified for the City of Fargo to the social, environmental and engineering categories or factors that are weighted and compared when choosing between alternatives for a route. For routing decisions he gave greatest weight social factors, next greatest weight to environmental factors. Does TransCanada agree and use this priority of weighting and choosing between route alternatives?

A. I wasn't -- I'm not sure I could speak to what routing priorities there are. I guess my expertise would be less in the routing than -- and to these things. I certainly participated in those discussions. I mean --

Q. So you don't know?

A. How they've prioritized them, I know there was a number of factors looked at, and I guess I would leave it to Mike Koski's testimony to talk about the factors that were looked at.

Q. There was some discussion about the special permit from PHMSA, and we understand that TransCanada has obtained the permit that allowed the operation of the Keystone Pipeline at 80 percent yield strength in rural areas, and you're aware of the permit?

A. Yes, I am.

Q. Under this permit could the Keystone Pipeline be designed with thinner wall pipe?

A. My understanding is that it could have thinner wall pipe, but then they have to account for that somehow, so they'd have to use -- I think it's a stronger steel in order to compensate for that, and then that I have got -- and again, speaking not as the expert, but I think there's a number of like 51 other stipulations that they have to abide by to ensure that that -- they're, again, operating at actually an equal or safer level.

Q. In the alternative could the Keystone Pipeline be operated at higher pressure for a given

pipe wall thickness?

MR. KELSCH: Your Honor, I guess I'd object. I think we're getting a little bit beyond this witness's area of expertise and certainly her testimony on direct examination.

MR. BINEK: Well, it was discussed with her on cross-examination. I'm just exploring a little bit further.

JUDGE WAHL: I agree. The objection is overruled. You may proceed, Mr. Binek.

THE WITNESS: I -- I'll make it easy. I don't know.

Q. (MR. BINEK CONTINUING) Okay. Have you considered higher pressure, thinner wall pipe in your risk analysis?

A. Again, the -- using the -- the waiver does not change the overall safety, so it doesn't change the risk assessment.

MR. BINEK: Okay. I have no further questions.

JUDGE WAHL: Questions from the Commission. Commissioner Cramer.

EXAMINATION

BY COMMISSIONER CRAMER:

Q. Ms. Tillquist, I just want to make sure

the record is very clear, and if it is already, I want to make sure I'm very clear. On the use of which gravity -- specific gravity versus American Petroleum Institute gravity numbers, if I understand it, API gravity of water is ten; is that correct?

A. Yes.

Q. And any number higher than ten means that product is lighter than water?

A. Correct.

Q. And so, I guess, I could explore further what specific gravity is, but as long as we're clear on that, I guess I don't need to necessarily do that. Specific gravity, one is ten; is that not right? The specific gravity of water is one?

A. Yes.

Q. All right. My only other question then is: Of the six previous pipelines that you've worked on, have any of them experienced leaks yet?

A. I don't -- I don't know the answer to that. Not to my knowledge.

COMMISSIONER CRAMER: All right. I have nothing further.

THE WITNESS: But I haven't researched it.

JUDGE WAHL: Commissioner Clark.

COMMISSIONER CLARK: I should ask perhaps Mr. Kelsch first. Will there be witnesses offered who are experts in the routing and pipeline design.

MR. KELSCH: Commissioner Clark, at this point this is our -- tends to be our only rebuttal witness.

COMMISSIONER CLARK: Okay. Well, then I'll ask the question and you may not have the answer to it, but we'll go from there.

EXAMINATION

BY COMMISSIONER CLARK:

Q. As I read the statute, one of the things that the Commission is charged with from the legislature is -- uses two words. One is that however it's -- when we site a project, it has to have minimal impact, and then later on it talks about the Commission siting projects that minimize the impact, and they're similar words, but to me they mean two different things. I mean, minimal seems to get to the acceptable level of risk, and I think you've talked about that quite a bit and so have Fargo witnesses, but minimize does seem to indicate that the Commission is supposed to take into consideration kind of a comparative risk where you're looking at different alternatives and you're

picking the one that minimizes over the other alternative the risk, and I guess I'll ask it maybe in a different way. I think it's been touched on here a little bit, but does it make sense to -- being that we have a number of political -- well, a political subdivision, as well as a lot of other groups, I mean, water users, folks like that saying, look, we don't oppose the project, we just want you to look at three to five miles a little further east of here.

Does that -- given the statutory obligation that the Commission has to minimize risk, doesn't it make sense to at least take a look at it, and have you been a part of any discussions where at any point has Keystone sought to even take a peek at what the route might look like three to five miles east?

A. Yeah. Actually, I'm not sure if I misspoke earlier. We did take a preliminary look at some -- now that I think about it -- a route -- I think it was a Mr. Burchill had suggested a route and we did look at that, and I believe that was just a few miles. So if I misspoke earlier, I apologize. But we did look at that, and, boy, now I'm pressing back on my memory. That route was --

so it shifted it slightly, but then you have a number of -- it significantly increased the number of intermittent -- I'm not sure if it was perennial -- but water bodies that would be crossed, including intermittent streams and wetland complexes. So you could have more problems than -- and we just didn't take it much further than that because then it would drain into the Maple River drainage. I mean, if you want to use Fargo's analysis, then do we look at somebody 2- or 300 miles down on the Maple that leads into -- you know, so the Maple leads into the Sheyenne that leads into the Red, is there somebody further downstream that could be affected?

You know, you're -- again, shifting a route may or may not reduce your risks. It may just shift them somewhere else. I think what you can look at is that Keystone as an operator -- they've done -- you know, people like Meera Kothari and Brian Thomas have talked in depth about all of the operational and design features that go into this pipeline that make it a truly modern pipeline with a lot of ways that minimize the risk both, again, from a design standpoint, and as Brian Thomas did, from an operational standpoint.

Q. Well, the reason I ask about the routing selection process is because I know earlier in one of the hearings that we had there was discussion about the Fordville aquifer, and in that case TransCanada spoke with the State Health Department, and the Health Department said, you know, we'd really prefer -- given all the safety designs and everything else that you've testified to, we'd really prefer that it would be a little bit further west in that case, and so TransCanada went ahead and made that accommodation. I mean, here you've got kind of a similar-type issue where you've got a political subdivision, you've got water users associations, folks who are involved with water resource management saying can you push it a little bit further this way, and, granted, there you ended up with a few more wetland issues by pushing it west, here you might east, and what I struggle with is, you know, in seven years on the Commission and dealt with a number of utility projects, and typically utility companies, when they run into significant opposition, they just kind of make it go away by creating some sort of accommodation. We've seen transmission lines and pipelines move themselves just a little bit for far less critical

issues, I guess you'd say, or would at least on the surface seem like far more minor issues than what Fargo is bringing to our attention here. Why -- why doesn't TransCanada just make a calculation, hey, we'll move it a little and --

A. I can't speak to TransCanada's --

COMMISSIONER CRAMER: Negotiations.

THE WITNESS: Yeah. But I will say that you're also assuming --

Q. (COMMISSIONER CLARK CONTINUING) Right. And having said that, I would direct that at a different witness, but you're on the stand.

A. But, again, you're assuming that there would be a significant impact, and that's why you would have -- you'd be wanting to move it, and I think what we've talked about repeatedly here is that the chance of these events happening are, you know, extremely remote. There's ways of dealing with it, and I don't think it would impact the resources that we're trying to protect. I mean, that's my job, is trying to protect those, and I think we're -- you know, you're assuming there's impacts.

Q. And then just one last question, a little bit different topic. On the Coffeyville, Kansas,

spill, was it a similar crude or a different crude or is that not a relevant --

A. I do not know the answer to that.

Q. Okay. Could there be -- could the composition of the crude make that comparison more or less relevant?

A. In a general sense, no. I will -- let me qualify. Crudes generally contain the same general composition, so they will all have BTEX concentrations, they will all have heavier weight compounds. Do those -- the proportions of those vary? Yes, they can. So could it affect -- could it be different? Yes. In a general sense would I expect different results? Probably not.

COMMISSIONER CLARK: That's all I have. Thanks.

JUDGE WAHL: Commissioner Wefald.

COMMISSIONER WEFALD: Yes.

EXAMINATION

BY COMMISSIONER WEFALD:

Q. Yesterday TransCanada passed out an exhibit, T40 and T41, and so my questions are going to be based on that, and I just wondered if you needed a copy of that before you.

A. That would be nice.

COMMISSIONER CRAMER: Your Honor, could we take a five-minute recess, please?

JUDGE WAHL: We may. We'll be in recess until a quarter after, till 11:15.

(Recess taken.)

JUDGE WAHL: All right. We are back on the record. And we are recording, we're on the record. Any further questions from the Commission?

COMMISSIONER WEFALD: Oh, yes. Yes.

JUDGE WAHL: Commissioner Wefald.

Q. (COMMISSIONER WEFALD CONTINUING) Did the Federal Government require Keystone to do a risk assessment for certain sections of the pipeline in North Dakota because areas in North Dakota were defined as high consequence areas?

A. A risk assessment is required for pipeline segments that could affect HCAs. That has to be done --

Q. HCAs?

A. I'm sorry. High consequence areas. -- prior to the pipeline being put into operation and then continuing afterwards. Keystone is doing this proactively. We're already looking at that as part our overall process.

Q. So was the answer --

A. The answer is yes.

Q. Yes. All right. On the bottom of Exhibit T40 --

A. Yes.

Q. -- under section 195.452, "Pipeline integrity management in high consequence areas."

A. Mm-hmm.

Q. I don't want to read all of Section A that's under there, but it starts out -- I'm going to read Section A. "Which pipelines are covered in this section? This section applies to each hazardous liquid pipeline and carbon dioxide pipeline that could affect a high consequence area, including any pipeline located in a high consequence area unless the operator effectively demonstrates by risk assessment that the pipeline could not affect the area. (Appendix C of this part provides guidance on determining if a pipeline could affect a high consequence area.)"

My question is: Did Keystone and did you specifically in your work on risk assessment -- did you follow all of the guidelines that are included in Appendix C?

A. Yes, I did.

Q. And when you did your risk assessment?

A. Mm-hmm.

Q. Would you just describe to us what are some of those guidelines?

A. Basically what the procedure we're looking at is you have to identify the -- what we call the contributing pipeline segment, so what area of the pipeline could affect a high consequence area either through directly passing through it or by -- I'm sorry -- by directly passing through it, or if there was a conduit to get to it, evaluating that route. So that whole document -- it was quite a detailed document -- was provided as a risk assessment to the Department of State, and I think it's public record. But we went through and evaluated all the HCA areas and identified contributing pipeline segments.

Q. Okay. So you followed -- but your answer was, yes, you followed all of the guidelines that the Federal Government has in place for a risk assessment for high consequence areas?

A. I -- to the best of my knowledge, and we're still -- it's still ongoing because it hasn't been finalized for the Department of -- PHMSA for submittal, so it hasn't been finalized, but we are -- yeah, the Department of Transportation.

It's an ongoing thing, but we've largely looked at that. Yes.

Q. When you prepared your risk assessment that you prepared for this Commission, did it include following all of the guidelines that are included in Appendix C?

A. We used the same analyses and, you know, I would say that they -- how do I put this carefully -- that effects to high consequence areas are one of the things that we would have had to look at as part of the broader risk -- as the risk assessment. What you're seeing is this part, but there was a bigger part that incorporated HCAs. That all was incorporated in it.

Q. Just one more time I'm going to try here. In North Dakota we have some high consequence areas.

A. Yep.

Q. All right. And when you prepared your risk assessment just on those high consequence areas that affect water resources -- on water resources -- I'm not talking about other high consequence areas -- just on water resources for municipalities or for a town or whatever, did you follow all of the guidelines that are included in

Appendix C?

A. Yes.

Q. Yes. Okay. On -- in those risk assessments, when you prepared them in the guidelines that the Federal Government has, do they allow you an ability to use a choice of models for your risk assessment or do they suggest only one model?

A. The PHMSA does not specify how an operator has to evaluate risk. It has to be -- how do I say it? It has to be an acceptable model, but they don't specify -- they don't provide any specificity on what model they have to use. They leave it to the operator to decide.

Q. What kinds of qualifications are in an acceptable model or is that for you to determine? Do they use those words "you can pick any acceptable model" or --

A. Well, I think there's industry standards as far as, you know, what -- standard practices, and that's what we've been doing. PHMSA will review, and if they find it deficient, they'll let you know.

Q. And we use many models at the Commission for different ratemaking types of proceedings, and

sometimes the Commission picks one model -- our staff may pick a model, let's put it that way -- our staff may pick a model for certain issues and a company -- let's say NSP or MDU or Otter Tail may pick a different model, and then the Commission needs to evaluate which model reflects which values because sometimes there's values attached to models -- modeling.

A. Right.

Q. Do -- would you say there's any -- what specific -- do you have any specific values that you would attach to the model that you have chosen?

A. Values to the model?

Q. When you're picking a model to choose, what are the values that you're using as you make that determination?

A. What we do is --

Q. Because I suppose your firm is responsible for making that model choice, or does the company say we want you to use this model?

A. The modeling choice -- there's, again, kind of industry practice of how this is normally done, and these are constantly evolving as we learn more and more, but a lot of it comes down to historical frequencies of failures and things like

that that's been used routinely; and, again, companies like DNV actually work to derive these statistics that are used industrywide.

Is the choice of one model versus another more appropriate? It has to be -- PHMSA has got to be the one that looks at it and says, you know, you're not adequately evaluating risk or, yes, this is acceptable, and these are -- by following industry standards, you're basically -- standard practices, you'll know you'll fall into the acceptability criteria. Does that make sense?

Q. Yes.

A. Okay.

Q. How many miles of the pipeline area in North Dakota are considered high consequence areas?

A. I believe that's -- I don't have that number. We'd have to -- I think that's part of the application or maybe there's been a data request. I don't have that information.

Q. Has that already been submitted to the Commission?

A. I can't speak knowledgeably to that. I think it has, but I'm not sure.

Q. Well, if it hasn't already been submitted to the Commission or can you just -- can the

company file a late-filed exhibit that would either share where that information can be found in the application or submit that information to the Commission?

A. Yes.

MR. KELSCH: Yes.

JUDGE WAHL: Mr. Kelsch, for the record, that will be T46, if my count is correct. T46, and the title of the exhibit will be data what?

THE WITNESS: Quantification of high consequence areas. Does that work?

JUDGE WAHL: Quantification of high consequence areas.

THE WITNESS: Correct.

JUDGE WAHL: All right.

Q. (COMMISSIONER WEFALD CONTINUING) And then I have just another question, and that relates to the only 2.8 miles of pipeline segments of these 91 miles could contribute to a leak reaching Lake Ashtabula and the Sheyenne River, and that's in Exhibit T45.

A. Correct. Okay.

Q. How many -- of that 2.8 miles how many are related to the Sheyenne River crossing?

A. .6.

Q. .6. So 2.2 are the amount of miles for 22 streambeds.

A. Intermittent.

Q. Intermittent and active streambeds?

A. The rest of them would be all intermittent.

Q. All right. And so you allowed basically one-tenth of a mile. Is that just a standard calculation? Is that an average per streambed that you cross?

A. No. There's -- I believe there's two-tenths of a mile --

Q. I'm just wondering how you came up with the 2.8 miles for the crossing of streambeds?

A. For each intermittent stream that we crossed that was a viable channel, we looked at terrain and tried to determine the width again of using terrain what segment of pipe -- if a pipe -- if the pipe were to spill, what portion of that pipe could actually result in a leak that could get into that channel.

Q. So they're different widths?

A. For those intermittent streams, because they all tend to be very small, we did look at them independently. There's one that's, I think,

three-tenths, but the rest of them were two-tenths of a mile.

Q. Two-tenths of a mile. Okay. Thank you. But that doesn't add up. It doesn't add up then. It should be more miles if it's two-tenths, because I did a little calculation and have 22 and you divide that by 2.2.

A. No. Okay. I'm sorry. The 22 is -- those were all the intermittent streams. Now this is T24. This is the table that we talked about in the first hearing in September. Those are the stream channels that are capable of actually transporting to the Sheyenne River and Lake Ashtabula. Those are the viable channels as opposed to all of the channels that are there. Again, some of these channels that are crossed are not viable transport routes because you have a roadbed that goes across. So if a spill occurred here, you know, it may enter the channel that's coming here, but if you've got the roadbed that's in the way of that channel, there's no culvert, it would end up pooling behind that roadbed and so you don't have a viable transport.

Q. Okay. So some of the -- there's not a -- the 2.8 miles of pipeline segments that you

referred to in T45 does not include a segment of -- does not cover all 22 of the -- of the --

A. Intermittent stream crossings.

Q. -- intermittent stream beds.

A. No. If you look back at T23, these were the maps that we looked at previously, the viable stream channels that we looked at are the blue stream channels. The ones that were in red are stream channels that are not viable, and those are -- both blue and red channels are actually what I came out in November and I field verified.

COMMISSIONER WEFALD: Thank you. I appreciate that.

JUDGE WAHL: Commissioner Clark.

FURTHER EXAMINATION

BY COMMISSIONER CLARK:

Q. I just have a follow-up question on this route analysis issue because I'm still trying to understand why it's preferable to kind of cling to one specific route and slug it out through litigation when it would appear that there might be some accommodation that could be made. I had mentioned that exploring the idea of a route a few miles east, and I think the main thing that you had responded with was that, well, it can put it into

other watersheds, perhaps more wetland areas, and I think you mentioned the Maple River -- specifically that it could get into the Maple River drainage system. But as I look at the maps, it would appear that even if you put it a little bit further east, you're still further from the Maple than from the Sheyenne, aren't you? I'm looking at T44.

A. I -- okay. Go ahead.

Q. And I don't have a sense of scale about how far, you know, a few miles would put the line exactly, but it's very close in some cases to the Sheyenne -- I mean, three to five miles further east pushes it towards the Maple, but does it -- it still would appear just from a cursory review that you're quite a bit further from the Maple than the Sheyenne even at that point, aren't you?

A. You know, again, I don't have a sense of scale here, either, and I think in some places you may be closer and some places further away. I guess I would go back to the fact that we did talk to the Department of Health about the location of this route and concerns about, you know, whether they were concerned about the proximity to Lake Ashtabula and the Sheyenne River. We talked about that, and they were comfortable where our route

was.

Q. To follow up on that, what unit of the Department of Health was it? Because as I understand it, the Department of Health's analysis related to subsurface water, for example, aquifers, things like that.

A. I think there was testimony presented earlier on that in September.

Q. Related to surface water?

A. Yeah. We went over this -- this analysis and then the Department of Health got up and testified about it.

Q. Were they opposed to a route that brought it closer to the Maple?

A. I think if the route is safe where it's at, there was no need to go look at another route.

Q. So there wasn't a preference that they expressed either way?

A. I -- I don't recall.

COMMISSIONER CLARK: Okay. Thanks.

JUDGE WAHL: Any further questions from the Commission? Mr. Kelsch, followup?

MR. KELSCH: Yes. Thank you, Your Honor.

REDIRECT EXAMINATION

BY MR. KELSCH:

Q. Ms. Tillquist, kind of in line with Commissioner Wefald's comments, on Exhibit T23 you talked about the red streams. Is that the why the red streams go from the pipeline and sort of end before they get to the river or does that mean that they don't actually -- they're not viable?

A. The red streams are indicative of stream channels that are not viable. The actual extent of them, how far that line goes away from the line, I don't know that they -- that the people that made this map actually were trying to say this is the location that it's no longer viable. I'm not sure that that was done.

Q. But that's the point.

A. Yeah. That's the point of it, though.

Q. Now considering Commissioner Clark's question about the route analysis, has Keystone had meetings with the Department of Health since Fargo's intervention concerning the location of the route?

A. Yes.

Q. Has the Department of Health -- are they okay with the route, where it is currently?

A. Yes.

Q. Now, the -- when you're looking at the risk to Lake Ashtabula, Sheyenne River, or particularly in this case the City of Fargo, is there any risk to Lake Ashtabula, the Sheyenne River, and the City of Fargo, in your opinion?

A. I think the chances of adverse effects to the City of Fargo's water quality are nonexistent.

Q. So, in your opinion, is the current Keystone -- is the current Keystone proposed route safe?

A. Yes.

Q. If it's safe, do -- from a routing standpoint do you then go to the next step to determine whether another route -- whether you should even consider another route?

A. My input to a routing process would be this is safe, we wouldn't need to look at a different route.

Q. Now, Commissioner Wefald had you look at Exhibits 40 and 41. You were here yesterday when one of Fargo's witnesses admitted that Lake Ashtabula and the Sheyenne River were not defined as a high consequence area under the Code of Federal Regulations?

A. Yes, I was.

Q. And do you also agree with that interpretation?

A. Yes, I do.

COMMISSIONER WEFALD: I have a question. Can I ask one question?

JUDGE WAHL: You may.

COMMISSIONER WEFALD: Does that only relate to the City of Fargo, though, that you testified in that regard, or does that relate to like, say, the City of Valley City uses that Lake Ashtabula as a main water source and so, therefore, it was a high consequence area?

JUDGE WAHL: Oh, let me see. Who is going to answer that question? Can Fargo counsel respond to that question? We really don't have anybody who can answer that question, I don't think.

MR. KELSCH: Well, since we opened this up for just Fargo --

JUDGE WAHL: I think, Commissioner, you're going to have to trust your recollection.

COMMISSIONER WEFALD: Thank you.

JUDGE WAHL: I'm sorry. You're in a bit of a situation as a juror would be. You're going to have to do your best.

MR. DINGESS: Your Honor, we --

JUDGE WAHL: No. Let's move on. This is not a good idea. Mr. Kelsch.

Q. (MR. KELSCH CONTINUING) Okay. Now, in your risk analysis you were asked a question by Mr. Dingess whether North Dakota listed Sheyenne River or Lake Ashtabula as a drinking water source and you indicated you weren't sure. I guess a couple questions. Did you -- did that impact your risk analysis on Lake Ashtabula or the Sheyenne River?

A. No, it did not.

Q. And does Keystone have a concern for water quality, whether it's been listed by a state as a drinking water source or not?

A. Yeah. That was my job, was to make sure that the water quality was protected.

Q. Now there were some questions by Mr. Dingess. He asked about the, I guess, consistency of the crude oil that will be transported in the Keystone Pipeline. Do you know, are there any current pipelines in North Dakota that transport this same type of crude oil?

A. Yes, there are.

Q. And what's that?

A. The Enbridge Pipeline.

Q. And that does cross part of North Dakota?

A. It crosses North Dakota, yeah, and it contains the exact -- the same materials, same type of crude oil.

Q. How common is this -- and I understand there's different varieties of crude oil, but is this -- the crude oil in general that Keystone will be transporting, is that common to other crude oil in other parts of the country or world?

A. The crude oils that are being transported aren't unique in any sense that -- there's variety among crude oils, but they share characteristics that -- I mean, this crude oil is comparable to many other ones, and those crudes are transported throughout the U.S. -- thousands of miles of pipe throughout the U.S.

Q. Now, going back to, I guess, one of the questions by Commissioner Clark, he'd indicated that Keystone had -- at the request of the Department of Health had moved the pipeline from an original route off of, I think, the Fordville aquifer and further to the west. Do you remember that testimony?

A. Yes, I do.

Q. And again, this may be a little

repetitive, but has the Department of Health asked you to move the pipeline, are you aware, from its current location in the Lake Ashtabula or Sheyenne River area?

A. No.

Q. Now in a question from Mr. Dingess you were talking about the BTEX compounds not being able to go the 200-some miles to Fargo, and he asked you a question about could heavier elements get to Fargo, and I think you answered no and asked to expound on that. Could you explain your reason for that?

A. The reason I would say that they wouldn't go there is the compounds that he's referring to when a spill occurs, again, the crude as a whole is lighter than water so that both light and heavyweight compounds are going to float. There would be sufficient time for emergency response to contain and clean up this material before this crude would ever move either through Lake Ashtabula and/or down the Sheyenne River 236 miles, and again, there is, you know, standards and regulations that they would have to maintain to make sure that that crude oil didn't get -- you know, they contained it. So it's not going to get

that far.

Q. One of the questions from Mr. Dingess was talking about risks from one pipeline maybe with a risk of another pipeline added on top of it may make an increased risk, at least to the City of Fargo's water system standpoint. Given your risk analysis of the impact on -- or potential impact of Keystone on Fargo's water supply, does the Keystone location increase that risk to the City of Fargo, in your opinion?

A. I would say that because of all the factors we talked about, that the risk that this poses is, again, negligible, so it doesn't -- it wouldn't add any cumulative risk to Fargo, itself.

Q. So the risk from the other pipelines on T44, it wouldn't increase that risk?

A. It would not affect the City of Fargo's water supply, so therefore -- yeah. In that term that would not increase the risk there. That's true. It would not increase the cumulative risk.

Q. Now, there was some questioning concerning when you first looked at the risk to the City of Fargo's water supply, and I think you testified that didn't happen until after Keystone received the letter from the mayor. Did you do a risk

analysis of the impact of Keystone to Lake Ashtabula and Sheyenne River before that?

A. Yes. Again, that was an assessment we'd been undertaking for quite a while, and that was actually what we presented in the September hearings.

Q. And so you were looking at -- or were you looking at the, I guess, potential impact on water quality to other municipalities maybe upstream from Fargo?

A. Yeah. We were looking at water quality impacts to municipalities that were much closer than the City of Fargo.

Q. Now, Commissioner Clark asked the question -- or was talking about the difference between potentially minimal risk or minimizing risk. In your opinion as a risk evaluator for crude oil pipelines, does the proposed Keystone route in the Sheyenne and Lake Ashtabula area -- I mean, is there a difference, I guess, between those two things given your risk analysis, if you can say?

A. I'm really sorry. I lost you.

Q. I'm sorry. The -- Commissioner Clark's question had to deal with minimizing or minimal

risks, and I guess given your risk analysis, in your opinion, is there a difference in this case looking at the impact to Fargo's water system?

A. I understand what he was suggesting, but, I guess, ultimately this doesn't pose a risk to the City of Fargo's water supply as we've been discussing.

Q. Do you know whether anybody has actually proposed a formal alternative route other than to the preferred Keystone route that is before the Commission today?

A. For this area, no, there has not been any formal route at all.

MR. KELSCH: No further questions.

JUDGE WAHL: I suggest that we jump-start on the lunch line. Let's be in recess until 12:30.

(Noon recess taken.)

JUDGE WAHL: All right. Your microphones are on, we're -- the media is connected, and we are on the record. Continuing then, Mr. Kelsch, as I recall, you had completed.

MR. KELSCH: I completed.

JUDGE WAHL: All right. Mr. Dingess.

MR. DINGESS: Thank you, Your Honor.

RECROSS-EXAMINATION

BY MR. DINGESS:

Q. Ms. Tillquist, there was some testimony on redirect about looking at some alternative -- perhaps maybe alternative might not be the correct word -- but another route regarding the pipeline near Lake Ashtabula; is that correct?

A. I've mentioned the Burchill -- suggestion that had been brought up by Mr. Burchill.

Q. Was that the subject of your company's Exhibit T12?

A. No. This was, I think, a data request response.

Q. What was the subject of T12? It seems to be talk about a rerouting or the Ashtabula reroute. I can provide you with a copy of this to refresh your recollection.

A. Please. I believe this is some information that Mike Koski spoke to in previous testimony.

Q. Okay. If you know, where it's talking about drinking water crossings, is that referring to any of these intermittent streams that lead to Lake Ashtabula?

A. I couldn't answer that for certain.

Q. Okay. All right. Thank you. You talked about the multiplication of probabilities, I believe, in some of your analysis where you had a figure that was very high and then you multiplied it and it was even higher. Do you recall that testimony?

A. Yes, I do.

Q. And the probability of an event multiplied by a 100-year flood put you in the half-million range. One-and-a-half-million years, I think it was.

A. Yeah, I think so.

Q. The probability -- or is the probability of a 100-year flood and a spill event, are they statistically co-related so that it is proper to multiply those together?

A. I would say that what we were talking about was a 100-year drought and a spill event. I can't see how a drought would impact spill frequencies, so I don't see any relationship between a 100-year drought and a spill event, so I would suggest that they would be independent.

Q. Okay. But isn't it statistically appropriate then to -- well, let me strike that. Let me go down a different line here. If you have

independent events such as the spill or a flood, would that -- would it be appropriate to multiply them together, the probabilities?

A. If they have independence -- if they are not tied together -- it's kind of like rolling two dice. So if you have a probability of -- yeah, so --

Q. So if you had a probability of a flood or -- excuse me, a spill, and some other variable like human error, would it be appropriate to multiply those together?

A. Human error related to what, sir?

Q. The operation of a pipeline facility.

A. Those -- if you're saying the human error would be related to the spill, then I don't think you would multiply those together.

Q. Okay. Would you consider them perhaps to be independent?

A. They are -- if a -- if an operator has an error and that leads to a spill, then they would not be independent.

Q. You talked about the Coffeyville situation, the spill at Coffeyville, and I believe you said that it was because a valve was left open?

A. It was a refinery, yes, and they left a

valve open. It normally takes them 12 hours to shut down.

Q. And it was left open because of a flooding event?

A. Yeah. They did not have sufficient time to close their valve apparently. That's -- again, that's what I read on their website.

Q. Okay. These are two unrelated events. Is it correct statistically to consider them together or not?

A. Well, I guess, you're asking whether the flood event -- I guess I'm seeing three different things. You're asking is the flood event related to the human error? What are you asking?

Q. Well, I'm trying to get to the likelihood of this kind of an occurrence and what kind of a number would you put on that as a risk analyzer --

A. I don't evaluate --

Q. -- prospectively, before it happened?

A. I don't evaluate -- I don't know what the -- I don't evaluate risks at refineries.

Q. If you can't do it, that's fine.

A. Yeah.

MR. DINGESS: Okay. Thank you. Those are all of my questions. Your Honor, counsel and I --

and I apologize for being late -- were discussing a submission of a possible stipulated document within a day or two to the Commission. We'd like to have just a day or two to get precise language from the State Health Department so that we could do that. We'd have leave of the Commission that if we're able to reach that accord, that we'd probably submit it to the Commission.

JUDGE WAHL: Stipulation by counsel, among the parties?

MR. KELSCH: Yes, Your Honor.

JUDGE WAHL: Including the intervenors?

MR. DINGESS: No. This would just be between TransCanada and Fargo regarding the language, although I could invite --

JUDGE WAHL: Well, I can tell you you're going to have to explain to me a little bit how you can leave out the intervenors from a stipulation. I don't -- that's not going to work. So you're --

MR. DINGESS: I would then publish it to the intervenors. What we have in mind is basically a statement concerning what the stream classifications are for Ashtabula and the Sheyenne River.

JUDGE WAHL: Mr. Kelsch?

MR. KELSCH: I have no objection to that and would stipulate to that.

JUDGE WAHL: And, Ms. Linderman, this is all news to you, I'm sure, but at least you can consider it. Fine. I will accept that as a late-filed exhibit. Whose exhibit is it to be?

MR. DINGESS: It could be ours.

JUDGE WAHL: All right. So let's call this -- my guess is Fargo -- where are we?

MR. JOHNSON: 14.

JUDGE WAHL: 14. Thank you. All right. And this is going to be in -- a very short title, Mr. Dingess.

MR. DINGESS: State stream classifications for Lake Ashtabula and Sheyenne River.

JUDGE WAHL: All right. Now let's do it this way: For the record, this will be Exhibit F14, and with the understanding that the intervenors will join. I mean, if you don't have the intervenors, you don't have an exhibit. That's what it amounts to. And there's a special problem in this case, I remind counsel, that John Capp and Janie Capp are -- have separate status as intervenors. So please note that. I think if you're going to have a stipulation, the way this

case developed you're going to have to have yourself, Mr. Kelsch, Ms. Linderman, and both John and Janie Capp.

MR. DINGESS: Your Honor, if they -- if we offer them the time to review and comment and they fail to comment, can we still submit?

JUDGE WAHL: No. Then it's no longer a stipulation, in my view. Now argue with me, if you like, but that's my view of a stipulation. That's all parties, all counsel; otherwise you have a cross-examination and a due process problem.

COMMISSIONER CRAMER: Your Honor, just for what it's worth, I intended to request a document that would verify the stream classifications myself because I've been struggling a little bit with -- you know, we have one witness's word for it. And so that is -- a late-filed exhibit, I was intending to ask for it anyway, for whatever that's worth.

JUDGE WAHL: Where would that come from, Commissioner? That's the problem.

COMMISSIONER CRAMER: Right. Quite honestly, I probably would have asked for it in an analysis by our staff.

JUDGE WAHL: Well, the stipulation will solve your problem.

COMMISSIONER CRAMER: It will.

JUDGE WAHL: So let's hope that that's forthcoming, and then, you know, Commissioner, it seems to me if the stipulation fails for some reason, I think it's within the Commission's authority even posthearing to say, look, we want this information, and then, of course, you're back to the 28-32-25 process, but so what.

COMMISSIONER CRAMER: Right.

JUDGE WAHL: Okay. So the late-filed exhibit, subject to those conditions, will be F14. Anything further, Mr. Dingess?

MR. DINGESS: Nothing, sir.

JUDGE WAHL: Ms. Linderman, anything further?

RECROSS-EXAMINATION

BY MS. LINDERMAN:

Q. I just have a couple of questions because I wanted to follow up on some things that you said in your testimony after I finished questioning you. You discussed again the intermittent streams and having to cross a roadbed maybe and being blocked from getting into the river system that way.

A. Yes.

Q. Is -- have you actually observed having

water flow on these lands or know what the historic water flow is to know that that's what would happen, that it would just pool behind these roadbeds, or is there another way for the land to drain and is that something you even studied?

A. What I looked at, when I was traversing this area, was visualizing if a spill of -- what I was -- of a thousand barrels, which roughly is -- if you think about a swimming pool that you have in your backyard, the ones that are like four-feet tall and they're little circles, it's about a thousand barrels -- actually, it's less than that, but rough idea. So while I was out there I was saying, okay, assuming this volume of crude -- but let's think of it as water -- were to spill over here where the pipeline is, could it feasibly get downstream? Now I was looking at it from, first of all, just the crude oil perspective and assuming water volume that would be transporting it down if it is -- it would take a large volume of water flowing event to cap all of these roadbeds because a lot of it -- again, you're spread out so you're going to have to -- it's not just a little restricted area in many spots. It's spread out so you're going to have to have a large volume to get

up and over as well as laterally. Does that make sense?

Q. I'm not understanding what you mean by spread out. Do you mean the width of the roadbed?

A. Okay. Let's back up. Your question was would the water over top of those roads -- do we have evidence of that or knowledge of that? Is that --

Q. Correct.

A. Okay. I do not, but it would take a -- there would be a lot of water there to do that.

Q. Okay. And then another question I had in the same vein, have you mapped any underground springs or underground channels that occur in this area?

A. No.

Q. So that would be relatively different from a spill having to flow through solid soil, wouldn't it?

A. You still have the same -- I mean, in order to have a channel or a spring, you're still having permeable soils. First of all, with a spring your contamination, if it hits that, it's going to come up and not be carried out. If it's a channel, yeah, you could have lateral transport,

but you're going to be within -- it's more permeable soils, so you still have the same physics that are occurring to this oil and its properties. So we did not look at that.

Q. I guess I was talking about underground springs and not necessarily springs that come to the surface but may be flowing under the surface. Doesn't that affect the probability numbers that you're giving in terms of the number of intermittent springs and channels that could possibly carry a spill to the waterway?

A. It is a -- it was not looked at.

Q. Would it have an effect on your analysis if you discovered there were a significant number of springs or channels like this?

A. Only if there was a significant number of them and only if they were heading in the right direction, and I'd have to probably do some more research to determine whether they have the potential to transport crude oil or its constituents large distances. Again, I would fall back just from groundwater movement in general, again, we've talked about that in detail.

Q. I just have one more question that I wanted to cover. It's a little bit different

topic. I think you had given some testimony about whether these water bodies were classified as drinking water bodies and what effect that had in your analysis in terms of water quality standards, and if you could just repeat for me how you use water quality standards generally when you're doing risk analysis. Do you use different standards if you know it's a drinking water body versus a water body that's used for other purposes and not human consumption?

A. We -- let me think for a second. When we look at water quality, I guess I'm looking at water quality from a broad-use standpoint and looking at how it would affect a stream or a reservoir or things in its entirety. When we get into specific analyses such as the City of Fargo, that's when I would get down to the specific levels of, you know, well, what would happen -- you know, if we assume all these things happened and got there, could the benzene concentration be exceeded. So you're drilling down a lot.

Q. I was just curious, I guess, what the standard is you would use for this particular water body. I mean, is your goal in alleviating risk or avoiding risk trying to maintain a water body

that's fit for human consumption?

A. What we're trying to do is minimize the risk of the pipeline to a water source. So we look at it as, I guess, basically is the pipeline route where it is sufficiently safe to protect the water quality, and that incorporates again all the -- not only the fate in transport, but it creates the emergency response as kind of a whole, and then you get down into what's an acceptable risk and, you know -- and that's what we look at.

MS. LINDERMAN: Okay. Thank you. No more questions.

JUDGE WAHL: Mr. Binek.

MR. BINEK: I have no questions.

JUDGE WAHL: Any further questions from the Commission?

COMMISSIONER WEFALD: No.

JUDGE WAHL: Commissioner Clark.

FURTHER EXAMINATION

BY COMMISSIONER CLARK:

Q. Just very briefly to follow up on a question that Mr. Kelsch had regarding the Health Department testimony and the safety of the route, and I think it gets back to the question that I'm weighing in my own mind about is it a question of

just risk -- an acceptable risk versus comparative risk, and I think Mr. Horner had said in response to a question about the safety of the line -- and I think it had to do with the Fordville aquifer -- that he said it's safe, but then he paused and but it would be safer further to the west, which implies that from a risk analysis standpoint it's safe but it's not zero and it gets closer to zero if you move it further away. Do you agree with that and -- or would that be your analysis for this Sheyenne/Ashtabula situation as well, that it's safe, but it's safer if you move it further away?

A. I think I already testified to that, that where it is is safe and, you know, moving it -- and now we're talking about Fordville rather than the Sheyenne, I understand, but I said what it was, was it was incrementally safer. It -- it was -- it wasn't like substantially different. So, I mean, yeah, it did add, you know, some element of safety, but it's an incremental change, not vastly different.

COMMISSIONER CLARK: Okay. I just wanted to clarify that. Thank you.

JUDGE WAHL: Anything further from the Commission? Commissioner Cramer.

FURTHER EXAMINATION

BY COMMISSIONER CRAMER:

Q. Well, just following along on that since we're using some scenarios from previous testimony, is it true that TransCanada -- now I'm thinking closer to Sheyenne, but it might have even been a little further south yet. There was some issue regarding -- might have been subsurface, but it might have been that there was an Oakes aquifer and another aquifer and the pipeline was moved at the request, I think, of the Health Department because it had to do with not only those two aquifers and its proximity to them but also the types of soils, gravel versus some siltier soils. So TransCanada has -- do you recall that situation, first of all?

A. Yeah. It was the Fordville aquifer, I think. It was actually --

Q. No. I was thinking one down by the Oakes aquifer, as I recall, that there was maybe even a more dramatic change as a result of work with the Health Department. Do you recall that?

A. I'm sorry. I do not.

COMMISSIONER WEFALD: It was a different issue.

COMMISSIONER CRAMER: I have nothing else.

COMMISSIONER WEFALD: Not water, I think.

JUDGE WAHL: Anything further from the Commission? Anything further -- any followup, Mr. Kelsch?

MR. KELSCH: Just one perhaps, Your Honor.

REDIRECT EXAMINATION

BY MR. KELSCH:

Q. Ms. Tillquist, do you recall -- I think it was the Hecla sands reroute. Do you recall that testimony?

A. Oh, okay.

Q. And I think that is in the southern part of the state.

A. Yes.

Q. And was that -- did Keystone, if you know, move the pipeline out of the Hecla sands area at the request of the health department?

A. To be honest, I don't recall what department it was that asked us to move, but I do know that it was a request that was made and that we moved it.

MR. KELSCH: Okay. I have no further questions.

JUDGE WAHL: Mr. Dingess, anything further.

RECROSS-EXAMINATION

BY MR. DINGESS:

Q. It just occurred to me, where is the Enbridge crude oil pipeline that you testified to about earlier? Is that in the western part of the state?

A. Pembina County, is my understanding.

MR. DINGESS: Thank you.

JUDGE WAHL: Anything further?

MR. DINGESS: Nothing. Thank you.

JUDGE WAHL: Ms. Linderman?

MS. LINDERMAN: Nothing further. Thank you.

JUDGE WAHL: Mr. Binek, anything further?

MR. BINEK: Nothing further.

JUDGE WAHL: All right. I'm assuming -- any further questions from the Commission? Thank you very much, Ms. Tillquist. Mr. Kelsch.

MR. KELSCH: Keystone would rest, Your Honor.

JUDGE WAHL: Oh, you're kidding.

MR. KELSCH: Do you want us to keep going? You were surprised we got done early yesterday.

JUDGE WAHL: I'm impressed, Mr. Kelsch. You get a gold star -- you and your people get a

gold star for knowing when to quit, I guess. All right. That's it. I don't see anything further for the hearing. We'll discuss briefing. I'm assuming --

COMMISSIONER WEFALD: We could have had an hour lunch.

JUDGE WAHL: I'm assuming -- let's do it this way: Mr. Kelsch, anything -- other than briefing, which we'll deal with off the record, anything further for the record?

MR. KELSCH: Nothing, Your Honor.

JUDGE WAHL: Mr. Dingess, anything further for the record?

MR. DINGESS: No, sir.

JUDGE WAHL: Ms. Linderman, anything further for the record?

MS. LINDERMAN: Nothing.

JUDGE WAHL: Mr. Binek, anything further for the record?

MR. BINEK: No.

JUDGE WAHL: Commissioners, closing comments. Commissioner Wefald.

COMMISSIONER WEFALD: Yes. Thank you. It's been helpful to hear the questions and the responses by the witnesses, and we'll look -- I'm

personally looking forward to any late-filed exhibits that will be filed, to take a look at those, as well, and to review the record in total so that we're ready to make a good decision on this case. Thank you.

JUDGE WAHL: Commissioner Clark.

COMMISSIONER CLARK: Just thank you for all appearing and for supplementing our record.

JUDGE WAHL: Commissioner Cramer.

COMMISSIONER CRAMER: Thank you, everyone, for appearing, for good testimony, interesting testimony, occasionally spirited testimony, and thank you to Fargo for -- for accommodating this shorter than probably is the most beneficial to you -- your time schedule. We know that you did a lot of work in a short period of time and it took a lot of people to do that, so we appreciate that a great deal. And as I said yesterday, I guess, at the meeting, the fact that we've extended the deadline for a decision indefinitely does not mean that it's open-ended forever. So we'll look forward to a reasonable schedule of the rest of this so that we can get to work and draw some conclusion. Thank you.

JUDGE WAHL: All right. For the second

and hopefully last time, the hearing for Case No. PU-06-421 is closed.

COMMISSIONER WEFALD: I have a question, though. Wouldn't you -- are they going to be filing any briefs or anything?

JUDGE WAHL: Yes, yes.

COMMISSIONER WEFALD: Are you going to do that now?

JUDGE WAHL: Yes.

COMMISSIONER WEFALD: Okay. Thank you.

JUDGE WAHL: All right. Thank you all. Counsel, stay fast, of course. I need you for a while yet.

(Concluded at 12:57 p.m., the same day.)

CERTIFICATE OF COURT REPORTER

I, Denise M. Andahl, a Registered Professional Reporter,

DO HEREBY CERTIFY that I recorded in shorthand the foregoing proceedings had and made of record at the time and place hereinbefore indicated.

I DO HEREBY FURTHER CERTIFY that the foregoing typewritten pages (Pages 585-907 and 563-582) contain an accurate transcript of my shorthand notes then and there taken.

Bismarck, North Dakota, this 4th day of December, 2007.

Denise M. Andahl

Denise M. Andahl
Registered Professional Reporter

CERTIFICATE OF COURT REPORTER

I, Stephanie A. Smith, a Registered Professional Reporter,

DO HEREBY CERTIFY that I recorded in shorthand the foregoing proceedings had and made of record at the time and place hereinbefore indicated.

I DO HEREBY FURTHER CERTIFY that the foregoing typewritten pages (Pages 908-1076) contain an accurate transcript of my shorthand notes then and there taken.

Bismarck, North Dakota, this 4th day of December, 2007.

Stephanie A. Smith
Registered Professional Reporter

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