

CONSOLIDATED HEARINGS BOARD

IN THE MATTER OF Sections 2 and 3 and 6 (3) of the Consolidated Hearings Act, 1981, S.O. 1981, c.20;

— and —

IN THE MATTER OF Section 12(2) of the Environmental Assessment Act, R.S.O. 1980, c.140;

— and —

IN THE MATTER OF Sections 30, 35 and 38 of the Environmental Protection Act, R.S.O. 1980, c.141, as amended;

— and —

IN THE MATTER OF Sections 24 and 61 (2) of the Ontario Water Resources Act, R.S.O. 1980, c.361, as amended;

— and —

IN THE MATTER OF Section 28 (3) of, and Regulation 164 under, the Conservation Authorities Act, R.S.O. 1980, c.85, as amended;

— and —

IN THE MATTER OF Section 40(12) of the Planning Act, S.O. 1983, c.1, as amended; in connection with site plan control of the sanitary landfill site;

— and —

IN THE MATTER OF Section 22(1) of the Planning Act, 1983 in connection with a referral to this Board by the Honourable Bernard Grandmaitre, Minister of Municipal Affairs, on a request by the Regional Municipality of Halton to amend the Official Plan for the Town of Milton to redesignate a parcel of land comprising Part Lots 3 and 4, Concession 2 N.S. in the Town of Milton from "Agriculture" and "Conservation and Hazard Lands" to permit the construction, operation and maintenance of a landfill site, Minister's File No. 24-OP-0208-A01;

— and —

IN THE MATTER OF Section 34(11) of the Planning Act, 1983 in connection with an appeal to this Board by the Regional Municipality of Halton for an order directing an amendment to By-law 61-85 of the Town of Milton to rezone the lands situated at Lot 3 and part of Lot 4, Concession 2 N.S., in the Town of Milton from "Agriculture" to permit a regional sanitary landfill site and ancillary uses;

— and —

IN THE MATTER OF Section 15(1) of the Planning Act, R.S.O. 1980 ch.379 in connection with a referral by the Honourable Claude F. Bennett, Minister of Housing on a request by Tremaine Britannia Citizen's Group for consideration of part of the Official Plan for the Halton Planning Area with respect to Sections 1 to 5 inclusive, 7, 9 and 10 of Part III D3 Solid Waste Management, Minister's File No. OPC-0026;

— and —

IN THE MATTER OF Section 64 of the Ontario Municipal Board Act, R.S.O. 1980, c.347 as amended in connection with an application by the Regional Municipality of Halton for an order approving:

a) the acquisition of land for the construction, operation and maintenance of a sanitary landfill site to contain 7.96 million cubic metres of waste in the Regional Municipality of Halton and to do so by one of two alternative methods as follows:

- (i) landfilling at the site referred to in Halton's Environmental Assessment as Site F in the City of Burlington;
- (ii) landfilling at the site commonly referred to in Halton's Environmental Assessment as Site D in the Town of Milton

at an estimated cost of \$12,775,000.00, and the borrowing of money by way of temporary advances not exceeding in the aggregate such estimated cost pending the sale of debentures, and

(b) the issuance of necessary debentures to a maximum of \$12,775,000.00 for a term not to exceed fifteen years;

— and —

IN THE MATTER OF Section 193(5) and Paragraph 84 of Section 210 of the Municipal Act, R.S.O. 1980, c.302, as amended;

— and —

IN THE MATTER OF Sections 6, 7 and 8 of the Expropriations Act, R.S.O. 1980, c.148;

— and —

IN THE MATTER OF an undertaking of the Regional Municipality of Halton to provide facilities for the purpose of receiving, dumping and disposing of waste as required by section 137 of the REGIONAL MUNICIPALITY OF HALTON ACT, R.S.O. 1980, c.436, as amended, by acquiring the land for, constructing, operating and maintaining a landfill to contain 7.96 million cubic metres of waste in the Regional Municipality of Halton.

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Nethercut & Co. Ltd.

Toronto, Ontario

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BEFORE: Dr. D.J. Kingham - Acting Chairman

H.H. Lancaster, Q.C. - Member

S. Tanner - Member



Nethercut & Co. Ltd.

Toronto, Ontario

Hearing conducted at The Oakville
Granary Commercial Centre, 105 Robinson
Street, Oakville, Ontario, on
Thursday, October 8th, 1987 at 10:13 a.m.

VOLUME 40

APPEARANCES:

T.R. Lederer and H.D. Hodgson	for the Regional Municipality of Halton (Proponent)
J.R. Tidball	for the Ministry of the Environment
T. Vigod J.F. Castrilli	for the West Burlington Citizens Group
D. Estrin, F.E. Leitch and H. Dahme	for the Corporation of the Town of Milton
S.R. Garrod and A. Nurvo	for the Milton Area Citizens Coalition and several affected Milton area landowners
R.B. Tuer, Q.C. E.A. Cronk and F. Perrier	for National Sewer Pipe Limited
L.F. Longo	for Azova Investments Limited
M.J. McQuaid, Q.C. and C.J. Tzekas	for the City of Burlington
C. Mansfield	for the Ministry of Natural Resources
P. Renaud	for Cumis Limited



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Toronto, Ontario

APPEARANCES (Cont'd):

1	C. Stevenson	for Framgard Holdings,
2	P. Hancock	Fosseri Investments
3		Limited, Seriphos
4		Investments Limited and
5		Topic Investments
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Per: P. McQueen



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Oakville, Ontario.
October 8th, 1987.

--- Upon commencing at 10:13 a.m.

DR. KINGHAM: Thank you, please be seated. I hope your endeavours have borne fruit and I also hope that when we adjourn today, we might again have a few minutes in Chambers, to discuss where we are at on the whole business of timing, order and so on, if that is going to be possible.

Is that a difficulty for anybody?

MR. LEDERER: We are, I think, in a position to make a few comments now. We could do it either on or off the record.

DR. KINGHAM: Would you prefer to make those comments now?

MR. LEDERER: I personally would.

DR. KINGHAM: Perhaps we should first finish with Ms Vigod's last questions of this witness in cross-examination and we will have a few minutes discussion on the issue of timing and so on before we go on to my own questions.

So, Ms Vigod, perhaps we can continue.

MR. LEDERER: I should just indicate to you as well, sir, that perhaps you want to do this before we break for the discussion that at some



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point in all of this we have been asked to produce test pit logs. Those have now been produced and Mr. Estrin indicated to me yesterday he has a few questions with respect to this material. If he be permitted to do that. Perhaps we could finish with Ms Vigod and those questions from Mr. Estrin.

DR. KINGHAM: I don't see any difficulty with that. So, Ms Vigod, please.

ALFRED A. SOBANSKI, Resumed

JAMES BEECHINOR, Resumed

CROSS-EXAMINATION BY MS VIGOD: (Continued)

Q. Mr. Sobanski, this is one last area I would like to explore with you, regarding the Burlington Report. I believe we have already established that this was a report referenced in your study and that you are somewhat familiar with it.

MR. SOBANSKI: A. Which report are we talking about now?

Q. The hydrogeological study of the Burlington landfill site, the Gartner, Lee study. Ms Cronk asked you some questions and Mr. McQuaid, it



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Sobanski, Beechinor,
cr-ex (Vigod)

is referenced as one of your reference documents.

A. Which of the many reports is this
one?

Q. H-83.

MR. LEDERER: The expansion study
or the 1984 study?

MS VIGOD: I have the excerpts
here. I am just establishing this was our
reference in your Site F Report.

DR. KINGHAM: I believe we had
agreed yesterday that if this were to be exhibited,
it would be exhibited as 217B.

MS VIGOD: That is correct.

Q. Mr. Sobanski, would you
turn to the first page in that excerpt, that is
page 20?

MR. SOBANSKI: A. Yes.

Q. If you could just confirm
under "Methodology" that Gartner, Lee installed
five boreholes in the expansion land space Phase
B and D at a depth of 11.6 to 18.3. Do you see



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Sobanski, Beechinor,
cr-ex (Vigod)

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that?

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A. Yes, I do.

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Q. If we look two sentences

6

down:

7

"The bedrock was augered except

8

in Borehole 19 in which the bedrock

9

was diamond drilled and BX core

10

was recovered."

11

Do you see that?

12

A. Yes, I do.

13

Q. My understanding is that of

14

course in your report, you drilled to a depth of
30 metres; is that correct?

15

A. Yes, in that order.

16

Q. Again, so the Gartner, Lee

17

Study did not investigate the shale to the extent
that you attempted to investigate to depth?

18

A. In this study, it would

19

appear they didn't go to that depth.

20

Q. Again, the Gartner, Lee

21

Study only examined one core. The bedrock was

22

augered in the other instances.

23

A. Yes, they would be able to

24

probably look at the bedrock from augering it.

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Sobanski, Beechinor,
cr-ex (Vigod)

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A detailed description would have to come from the core.

Q . If we look at the next page, page 30, the bottom, the last sentence on that page. You would confirm that Gartner, Lee used an estimation of five per cent for the porosity of the shale. Do you see that?

A. Yes.

Q. That is 0.05; is that correct?

A. That is correct.

Q. If we turn to page 97 in your H40 Report, which lists the porosities ...

A. Yes

Q. ... we see that you used a porosity of 0.1 for your weakly fractured shale.

A. Yes.

Q. That is the unit you are relying on as the barrier?

A. No, it is not a barrier.

Q. Well, as a very impervious layer.

A. No, it is not an impervious layer. It is a layer that is giving us the permeability contrast that gives us these gradients on-site. It is the layer that in combination



1 8809 Sobanski, Beechinor.
2 cr-ex (Vigod)

3 with the highly fractured unit gives us the
4 configuration of the watertable that we see at
5 piezometric levels.

6 Q. You would agree,
7 Mr. Sobanski, that had you used the porosity that
8 Gartner, Lee used in their study, a porosity of
9 0.05, you would have approximately then, 10 times
10 the volume of leachate going into the shale?

11 A. No, it would be twice.
12 0.1 versus 0.05.

13 Q. 0.1 versus 0.05?

14 A. At 0.05 we used 0.1.
15 The result is twice. You multiply 0.05 by 2 times
16 and you get 0.1.

17 Q. So, the flow would be twice?

18 A. Yes, that is right.

19 Q. If we read just above that
20 statement, you would have -- you see the permeability
21 of the shale used by Gartner, Lee, to translate the
22 metres per second to centimetres per second?

23 A. I am sorry, where are we now?

24 Q. Just above that, on page 30
25 that same page?

A. Yes, okay.

Q. We see a value of 5×10^{-8}



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Sobanski, Beechinor,
cr-ex (Vigod)

which would be the same as 5×10^{-6} centimetres
per second?

A. Yes, that is right.

Q. That is how you do that?

A. They are dealing again, as
you had pointed out, with shallower shale than we
were dealing with. We also went quite a bit
deeper.

Q. We are talking about --
certainly again, there is a difference.

A. There were differences in all
the units that we presented to the Board too. The
upper unit was 10^{-5} which is more permeable than
what Gartner, Lee is presenting here. Gartner,
Lee didn't attempt to resolve the hydrostratigraphy.
They have given a general number for their inter-
pretation, whereas we have become more detailed.

Q. So again, we see more
different interpretations?

A. Oh yes, by all means, they
are different interpretations, yes.

Q. If we turn now to the
conclusions, page 71 of the report, of the excerpt
217-B. If we see their conclusions, the first
conclusion where they state:



1 8811 Sobanski, Beechinor,
2 cr-ex (Vigod)

3 "The continued use proposal ...
4 is compatible with the existing
5 hydrogeological setting provided
6 the development guidelines out-
7 lined in this report are fol-
8 lowed."

9 Do you see that?

10 A. Yes, I do.

11 Q. If we turn the page to
12 their development guidelines and recommendations,
13 if we look down under that first bulleted item,
14 the third item under that:

15 "A minimum of 1.5 metres of till
16 should separate the waste from
17 the shale bedrock."

18 Do you see that?

19 A. Yes, I do.

20 Q. Is it correct that my
21 understanding of that condition was so that the
22 till would provide some attenuation capability?

23 A. I expect so, yes.

24 Q. If we in fact turn back to
25 page 51, which is also in this excerpt and again,
if we turn to the last sentence on that page, the
last two sentences:



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cr-ex (Vigod)

"The glacial till has a cation
exchange attenuation potential.
It has been calculated that a
1.5 metre thickness of till has
a capacity to attenuate cations
for about 300 years."

The last sentence page 51.

A. It says it has a capacity
to attenuate cations for about 300 -- I don't know
whether that is years or what.

Q. Annum?

A. I have no idea. It says
based on.

Q. Is that not an abbreviation
annum that you use, Mr. Sobanski?

A. If I was going to say 300
years, I would usually say 300 years, not 300 A.

Q. But you agree that that
thickness of till is based on attenuation capability,
the reason for that 1.5 minimum?

A. That is what it says here.

Q. Again, just the rest of this
sentence is based on existing leachate concentrations.

MR. LEDERER: Sir, this is beginning
to cause us some difficulty. Perhaps I should



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Sobanski, Beechinor,
cr-ex (Vigod)

1 just explain. The general problem presents itself
2 from time to time in these circumstances. What
3 you have got here is an excerpt of a report. I
4 must tell you that it is our view, and if we were
5 arguing this, we would be arguing that it is being
6 used in a way that is quite misleading. The
7 recommendations to which Ms Vigod is referring refers
8 to Phase B, which may well be on till but the report
9 in its entirety deals with other zones for waste
10 disposal as well, particularly some of which are on
11 shale.
12

13 To use the report in this way is
14 quite misleading in our view. Either we are
15 going to have that referred to fully in some fashion
16 or at the very least, the whole report should be
17 filed so that in argument those points can be brought
18 out in some fashion.

19 To do it in this way, my respectful
20 submission is that it is inappropriate because it is
21 misleading.

22 MS VIGOD: On that point, if we
23 remember that Ms Cronk was the first to raise this
24 report with the witnesses and in fact have them
25 read in various sections and did not file any of
that report, but had the witnesses read in various



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Sobanski, Beechinor,
cr-ex (Vigod)

statements which certainly we thought led to
obviously some statements that should be put in
further context.

Mr. McQuaid further put in some
excerpts from that report. I believe in turning
to the conclusions he felt it was appropriate to
put those to Mr. Sobanski to comment on. I feel
that is appropriate, given the fact that this report
has been referred to already in evidence.

MS CRONK: Mr. Chairman, I don't
understand the nature of Mr. Lederer's comments to
be an objection to the questions being put to the
witness on the report. Certainly I don't have
an objection in that regard. The nature of the
complaint is different. The questions that I
put to this panel on this report specifically dealt,
you will recall, with all phases proposed for
continued use. I didn't take them just to be in
Phase B and D. Indeed, I went back to it twice
to make sure in fact that I had done that, that
the evidence was clear before the Board that there
were four zones under consideration.

Mr. Lederer's complaint, or observa-
tion, I fully support. If we are going to have



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Sobanski, Beechinor,
cr-ex (Vigod)

part only of the conclusions put in, the full body of conclusions should be before the Board so that subsequently others can refer to them in argument.

May I just add my soto voce comment to Ms Vigod. Before Mr. Lederer got on his feet it was because we had an extract with a particular sentence referred to and the sentence isn't completed. I attribute no intention in that regard to Ms Vigod, but that is clearly improper. If you are going to refer to a specific portion, you put the whole paragraph in.

Before we go any further on it, I support Mr. Lederer's conclusion that the full report at this stage should go in or at the very least the full body of the sections of the report that Ms Vigod is referring to because the Board knows from prior evidence we are talking four areas, two of which were on shale and two of which were on till. We are now dealing with till and it is misleading.

MS VIGOD: Mr. Chairman, just on that, I do apologize. I was not going to refer to that sentence until I saw it this morning. I will certainly file that second page of the sentence.



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Sobanski, Beechinor,
cr-ex (Vigod)

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3 However, the conclusions and recommen-
4 dations are filed in full, the full three pages and
5 there is a reference on the last page for a condition
6 referring to Phase A and C. So, in that respect
7 I feel that these are the conclusions Gartner, Lee
8 came to and they are being filed in their entirety
9 for counsel to refer to.

10 With respect, I am not trying to
11 separate out the conclusions based on those phases.

12 DR. KINGHAM: Do you want to make
13 reply?

14 MR. LEDERER: I can make this easy
15 for you, sir. Mr. Estrin has just indicated to me
16 that he has copies of this report. He tells me that
17 the maps are not present, but at least we have the
18 full text of the report. If we have got the copy
19 available, it is a pretty easy matter to file them.

20 DR. KINGHAM: It is a conclusion we
21 had reached as well. If there is no impediment to
22 filing the full report and anyone can argue it in
23 whatever context they deem important.

24 MR. ESTRIN: I can do that afterwards.

25 MS VIGOD: Q. Mr. Sobanski, to
conclude that last point, on the new expanded areas
then, there was this 1.5 metres of till and on the



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Sobanski, Beechinor,
cr-ex (Vigod)

proposal there is either, as we have discussed,
70 per cent on the shale or there may be more when
the site is excavated for landfill; is that correct?

MR. SOBANSKI: A. Come back with
that, are you talking about this report and our
report together?

Q. I am saying right now, your
Site F report, we have discussed this as either 70
per cent on shale plus there may be some additional
removal of the till when the landfill is actually
placed on the site; is that correct?

A. I had made a rough estimate
it would be 70/30. I have never really calculated.
I have just made a guesstimate.

Q. We can discuss this further
then with Mr. Hiraishi, is that what you are saying?

A. Mr. Hiraishi, I don't think,
will be discussing that. I was asked to give an
estimate before, I did. I hadn't been asked to do
the calculation exactly.

Q. Certainly we have seen in
your earlier 2C report a reference to 80 per cent
of the site at that time and if you want I can find
that reference again, but I think we have referred
to it a number of times.



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Sobanski, Beechinor,
cr-ex (Vigod)

A. There is a 10 per cent
difference there. It is an eyeball estimate.
That's the best it can be.

Q. I am not quarrelling with
the 80 or 70 at this point. I am saying somewhere
in that realm there may be some additional till
excavated.

A. What I said I have done is
I have estimated 70 per cent will be on shale and
30 per cent will be on till.

MS VIGOD: Those are my questions,
Mr. Chairman.

DR. KINGHAM: Mr. Estrin, you wanted
to follow up with test pit questions. I believe
we have cleared the way for that.

FURTHER CROSS-EXAMINATION BY MR. ESTRIN:

Q. When you produced those logs,
has the Board been given copies? I am not sure.

DR. KINGHAM: No.

MR. ESTRIN: Q. Referring to this
series of sheets headed "Test Pit Log," the first
one being dated October 9th, 1985, location Site F
Burlington, test pit location shale pit.

MR. BEECHINOR: A. That's right.



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Sobanski, Beechinor,
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MR. ESTRIN: Can we have that marked
as the next exhibit? It is data produced by
Halton. Maybe it should have an H-number.

DR. KINGHAM: H-228.

--- EXHIBIT NO. H-228: Test Pit Log.

MR. ESTRIN: Q. Mr. Beechinor, what
involvement, if any, did you have with this exercise
represented by the Test Pit Log?

MR. BEECHINOR: A. If I recall, we
set up a program, I think there was interest at that
time to ascertain whether or not a backhoe could
excavate the overburden in the shale at this site.
We sent a geologist out into the field with a backhoe
to do that and log the test pits.

MR. SOBANSKI: A. One addition to
that, Mr. Estrin, at one site they hit resistance
which was at the No. 5 site in the existing small
pit on the property, down in the southwest corner.
I was present with Mr. Crysler when we went in with
a bulldozer and a ripper to see whether that hard
layer could be handled.

Q. So, the locations of the logs



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cr-ex (Estrin)

represented can be found on the last sheet, the
map, is that it?

MR. BEECHINOR: A. Yes, I believe
they are numbered with respect to the closest
drilling site. For instance, Test Pit A is near
drilling site HC-8.

Q. When it says "supervised by
S. Khan" is he or she a geologist?

A. Yes. He is a geologist.
He is not with the firm at this moment.

Q. Then what is the note at the
bottom of the first page?

A. I believe that is what
Mr. Sobanski was pointing out, at one of the test
pit locations. I think it is the first one, Test
Pit No. 5, which was conducted at the shale pit.
Originally we brought a backhoe out to that location
and had difficulty penetrating a unit at that
location. So, we brought a D-9 Dozer in with a
ripper to excavate that unit to see if we could,
in fact, do it.

Q. So, the ripper -- can you
describe it for me?

MR. SOBANSKI: A. It's on the back
of a bulldozer. It's on a hydraulic arm and on



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Sobanski, Beechinor,
cr-ex (Estrin)

the bottom of the hydraulic arm there is a ripper,
just a blade on it and what he does is, he
hydraulically puts that in and starts to run the
dozer. We actually into a greenbed which is
18 inches thick or so. It's about the thickest
we saw anywhere and it was probably hard but he
snorted a bit and he ripped through it.

Then the material crumbled right up
after.

Q. Was the purpose of this
exercise generally to help determine the usefulness
of the shale?

A. It's excavatability and its
use for cover material and how it could be handled
with the equipment.

Q. I take it that other than
that initial problem at the one hole, what was
the result?

A. We were satisfied that we
could work the material with conventional landfill
equipment.

MR. ESTRIN: Thank you very much.

MS VIGOD: Mr. Chairman, I believe,
just checking my notes, there was one undertaking
that Mr. Beechinor or Mr. Sobanski were going to get



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cr-ex (Estrin)

those field notes, if I could just see them for
one minute.

MR. BEECHINOR: Do you want to
clarify what field notes?

MS VIGOD: The field notes on the
HC-3 borehole so we could check whether the eleva-
tions were correct.

MR. BEECHINOR: I am sorry, I don't
recall that.

MS VIGOD: I specifically, yesterday,
asked you to provide those field notes after our
discussion after lunch when you came back and
changed the elevation on HC-3A and we wanted to
check whether in fact you had -- that had been
entered correctly.

MR. BEECHINOR: Are you referring to
the elevation of the piezometers in HC-3? We
can provide those field notes, yes. I am not sure
whether they are here or not but we will provide
them.

MS VIGOD: I believe the record will
show that I had asked for them and I would ask,
Mr. Chairman, that we have those.

DR. KINGHAM: As I recall, it was
the three piezometer readings that were improperly...



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3 MS VIGOD: And correlated with those
4 1, 2 and 3.

5 DR. KINGHAM: And therefore brought
6 into question in the location relative to the units.

7 MR. BEECHINOR: I don't recall actual
8 field notes, but the undertaking was to check that
9 and I did check that and they were correct, but I
10 will bring the field notes to you.

11 MR. LEDERER: Mr. Chairman, I am
12 going to ask if Mr. Beechinor might do that, or have
13 someone do that over the course of the morning.
14 My concern is that we might bring the field notes
15 and we might want to have them back.

16 DR. KINGHAM: Is anyone else able to
17 bring those?

18 MR. BEECHINOR: I will have someone
19 do that.

20 MR. LEDERER: Perhaps Mr. Beechinor
21 could make a phone call while we are discussing.

22 DR. KINGHAM: I will see if the
23 witness can have the field notes produced this morning
24 so we can complete this section of the evidence
25 today.

26 In the meantime, I would like to either
27 hear it now or in Chambers, the results of your



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discussions on ways that we can consolidate our efforts here. Have you come to conclusions, and would you like to discuss this in this forum, or would you like us to clear the room and discuss it as a matter of procedure?

MR. LEDERER: Sir, I would prefer personally if we could do that now. I think it would embarrass the parties. It would be best if we were off the record. Whether it is necessary to ask everyone else to leave, I don't feel strongly about that personally.

DR. KINGHAM: Okay, as far as the record is concerned, we have adjourned the hearing for now and we will just have a few words of information on this matter of how your timing is working.

--- DISCUSSION OFF THE RECORD

DR. KINGHAM: Thank you, please be seated.

We understand that one of the witnesses will be with us very soon.

--- DISCUSSION OFF THE RECORD



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MR. LEDERER: While Mr. Sobanski is coming along, I believe we gave Ms Vigod the field notes she wanted and I understand she is satisfied with that.

MS VIGOD: Mr. Chairman, with regard to the Burlington exhibit, my friend Mr. Estrin unfortunately did not have copies of this exhibit, but what I was proposing was to file the copy that I have, which is quite large, with the Board, and I believe the other parties have their own copies. If that is satisfactory?

DR. KINGHAM: That is the exhibit?

MS VIGOD: The Burlington Gartner, Lee Report.

DR. KINGHAM: When I saw 72 pages to conclusion, I envisioned something much smaller than that.

MS VIGOD: It does contain the maps and the drawings.

DR. KINGHAM: Then, that should be filed in place of the 217 exhibits. It was done by Gartner, Lee, is it a Burlington exhibit, is it a Halton exhibit? I am in your hands as to its origin.

MR. LEDERER: I think it is a Halton



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exhibit. It was done for Halton in their last
exhibit. It is referred to in Mr. Sobanski's report

DR. KINGHAM: Thank you very much.
This will be called Exhibit H217 and for the record,
the former 217 and 217B are replaced by this.

--- EXHIBIT NO. H217: Hydrogeological
study, Burlington Landfill
Site, continued use for M.M.
Dillon Ltd., dated March,
1984 by Gartner, Lee.

DR. KINGHAM: Mr. Sobanski,
Mr. Beechinor, you probably feel you have been asked
every question -- Mr. Lederer?

MR. LEDERER: If I could, I have to
leave and I hope the Board will accept my apologies.
I mean no disrespect. Mr. Hodgson will carry on
for me.

DR. KINGHAM: As I was saying, you
probably feel that you have answered every question
on hydrogeology in Halton that could ever be asked.
I hope you are right. There are still some
mysteries of geology that eluded us notwithstanding
the many questions and the many answers. We had
hoped that you might enlighten us a bit, either of
you, both of you, on a few remaining things.



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To start it off, I would appreciate it if you could set the spatial and temporal context of the geology in the areas. We will start, first of all, with some questions about Site D.

If you could put up one of the cross-sections of Site D, perhaps cross-section G-G would be suitable, that is Drawing 11 from your Exhibit H39, or any cross-section that is handy with regard to Site D.

DR. KINGHAM: That will be fine. That is cross-section F-F, is it?

MR. SOBANSKI: Yes, Mr. Chairman.

DR. KINGHAM: Just for our understanding of the time and space context of the geology, I think we all understand what the bedrock is and it has been there for a very long time.

We see that the bedrock is overlain on that figure by what appeared to be essentially two layers. One below what you call that silty layer and another above.

MR. SOBANSKI: Yes.

DR. KINGHAM: Can you tell us something about the formation of those areas and the extensiveness of those layers, that is to say, the lower of these two layers in the Regional Municipality of Halton?



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This is your lower till, isn't it?

MR. SOBANSKI: Certainly in the northern area, the area between Site D and our site, the other Site E, which was once considered for disposal, both units exist.

DR. KINGHAM: Maybe I can make it simpler, is that lower till unit, are we essentially looking at some old lakebed, or are we looking at some soil that has been pushed over the bedrock? How does it come to be there?

MR. SOBANSKI: This material happens to be there from glaciation itself. The tills are a mixture of textures running from probably boulders which we may not see in our holes, in our drillholes, something the size of a pumpkin perhaps down to the clay sizes. Normally, we see that in terms of gravel and down to the clay sizes. It is an admixture all ground up and mixed up by the glacier.

So, that layer, that general basic layer, both layers are formed in that manner. They probably have some slightly different source of deposition. One is a coarser grain, the one on the base is a coarser grain material. The one on the top is a finer grain. The glacier either



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3 did some more grinding to give more clay sizes, or
4 alternatively, it may have had a different source
5 of material, a slightly different source.

6 Essentially, these are deposits from
7 the ice itself.

8 DR. KINGHAM: Can you explain why
9 the boundary between the two is so very flat in
10 all of your cross-sections for those sites?

11 MR. SOBANSKI: In all likelihood, two
12 ice advances are indicated. One which deposited
13 this coarser grain material which is the lower till.
14 It may be comparable to the Wentworth till which is
15 found further to the west. It is a fairly sandy
16 till. Within that unit we have these granular
17 units that were deposited. At one time it would
18 appear that this silt layer may indicate -- well,
19 does indicate that there was a break in the glacial
20 period.

21 The ice withdrew after depositing
22 the lower units. It withdrew and then it would
23 appear that there is a thin water-laid silt deposit
24 that has been put down on top of it, possibly a
25 lake bottom, a small lake bottom. Then, a re-
advance of the ice with a clay till sheet put on
top of that, another deposition from the glacier



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3 itself. This mixture of all sorts of grain sizes,
4 this time with more clay in it. On top of that
5 we again have what they call the Peel ponding,
6 another lake deposit on top of this as the ice
7 withdrew. It is generally mapped in the area,
8 although we did not find it in our borehole logs
9 on Site D.

10 In terms of the pleistocene map that
11 was presented, that orange hatching map, indicates
12 that on top of that there was another lake deposit.

13 DR. KINGHAM: So, the lower area was
14 deposited fairly generally on that area of sites D and E. It
15 was deposited as a result of glacial action and we
16 have had a lot of discussion about the gravelly
17 units within.

18 MR. SOBANSKI: Yes.

19 DR. KINGHAM: Where you can say
20 clearly that the till is widespread and evidently
21 quite flat, what can you say about the gravelly
22 units in terms of their deposition and their spatial
23 continuity?

24 MR. SOBANSKI: They seem to be, from
25 what we see there, their continuity isn't as great
as the till itself. They appear as layers, fairly
extensive layers within the glacial till. You will



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recall from the regional section, if we can look at north-south B-B for example, this is Drawing No. 7, we can sort of see the continuity of these layers. Here we have identified them even as the thinnest of layers but we can see that they are relatively well distributed, some of them fairly extensive. Then there are breaks in them. Some places they appear as little blobs.

DR. KINGHAM: We don't find these gravelly units in the upper till at this area. The process that produced the lower till and the upper till was the same. Why do we not expect to find them in the upper till?

MR. SOBANSKI: I would think that what appears to have happened is that the lower till may in fact be several till sheets. It may be more than one ice advance. It likely is. The sand units were deposited when glacial ice withdrew from the area, deposited perhaps a braided stream or a stream deposit or a lake deposit. Then, readvanced again, laid down more till and finally a coarse grain deposit on top of that, readvanced again and reburied the sand and gravel. This is quite a thick till sequence in the lower zone. In all likelihood it represents, in fact, several advances and retreats of



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the ice sheet with these layers being laid down between the tills. When it comes back after having first of all, for example, we have till laid on the bottom. The ice withdraws and the silt unit is deposited. Then the ice comes back again and this silt unit may have been more extensive, but it now may in some places erode the silt unit away. In other places, it leaves it.

So, the lower unit appears to be a progression of advances and retreats of the same ice lobe.

DR. KINGHAM: You are quite comfortable with the continuity of the silty layer beneath and the discontinuity of the gravel units. That all makes sense.

MR. SOBANSKI: Yes, it seems to, it makes sense to us. The silt layer isn't everywhere. It is where shown. You can see in some areas, at least we have no report of it, it could be in some places that as the second sheet advanced, it eroded it away.

DR. KINGHAM: In this area you have drilled a lot of holes, a fair number of holes. How confident would you be that you would not have missed a significant geological feature in that



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area with the drilling program you had?

MR. SOBANSKI: I think we are fairly confident. We have, just to be on the safe side, we have assumed they have great continuity in any event even though we see that they are limited in extent. We assumed for conservatism that they extend from the site to the wells. That may or may not be the case. We believe that they do. The wells are at about the same depth as these units. I don't think that we have missed anything significant. We are saying that they are there in the lower unit. It is obvious they are there.

DR. KINGHAM: A lot more drilling in that area is not going to tell you more about the general configuration than what you really know.

MR. SOBANSKI: I don't think so. The important layer is the upper unit. We found nothing really in that unit. There were some sand faces in one of the holes at the bottom, but we had some discussion on that and for the most part it was a solid clayey till, without any evidence at all in our logs of any silt or sand seams that we saw.

DR. KINGHAM: Turning briefly to the question of the hydraulic connection, the question



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3 of the gravelly units and the hydraulic connections
4 between them on which we have heard a great deal of
5 evidence and your responses to many questions, it
6 leaves me with one question yet and that is, is it
7 better or worse for you to have that kind of
8 hydraulic connection for the hydraulic trap that
9 you propose to work.

10 That is to say, you prefer a hydraulic
11 connection in the gravelly units to make your trap
12 work or not, or does it not matter?

13 MR. SOBANSKI: I could make a
14 hydraulic trap without those sand and gravel units
15 there. I would prefer that the sand and gravel
16 units were not there. They are, in fact, a
17 blessing and a curse. They are a curse in that
18 failures could cause some contamination in the zones.
19 They are, and wells draw supplies from them. They
20 are a blessing in that being there we can purge them.
21 We can put wells in and capture the contaminants, so
22 it is sort of a double-edged sword, the presence of
23 these.

24 DR. KINGHAM: You are telling us that
25 one way or the other if they weren't there you
wouldn't be worried about off-site wells with
contamination through a gravelly unit. If they are there



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3 you could pump, purge or otherwise make the hydraulic
4 trap work.

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MR. SOBANSKI: If necessary.

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7 DR. KINGHAM: Without detriment to
8 the surrounding wells.

9

10 In that upper granular unit, you
11 showed us on Exhibit H-171, which I think you have
12 mounted, you did have a list of these, didn't you?

13

14 You showed us there that it was your
15 view that the groundwater movement in the unit was
16 from the northwest to the southeast.

17

MR. SOBANSKI: Yes.

18

19 DR. KINGHAM: You explained that the
20 conductivity in that unit was much faster, less of
21 a small number than the surrounding units and that
22 led me to the question that if there is groundwater
23 movement in that direction, where does it go when
24 it reaches the edge of the gravelly unit, it runs
25 into a wall.

26

27 MR. SOBANSKI: It was a question that
28 sort of intrigued me too. It is a possibility
29 that we haven't picked up the entire unit, that
30 somewhere along the south boundary it has more
31 continuity to it and in fact, goes off-site to the
32 south. We didn't pick it up in our holes, but

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3 for instance, I believe the 1984 wells, they weren't
4 continuously sampled. I suppose it is a possibility
5 that it sneaks off in that direction somehow. They
6 are located within a till that has some permeability.
7 I have never made the calculations to see whether
8 the till was capable of handling the amount of water
9 that is there. The flow rates would be relatively
10 low because the gradients are very low within that
unit in spite of the high permeability.

11 It is a possibility that there is an
12 extension to the unit to the south that we have
13 missed with our drilling. However, for conserva-
14 tism again, we have assumed that it does go off-site
15 in all directions. Additional drilling would
16 confirm whether or not the monitoring program that
17 is proposed would confirm whether or not there are
extensions through that area.

18 DR. KINGHAM: But that would not be
19 a major geological feature missed in connection with
20 my earlier question. There would be some kinds
21 of connection between wells that would not concern
22 you greatly.

23 MR. SOBANSKI: That's right, but in
24 any event, if we were to find it on the boundary
25 somewhere, it would be monitored as well. The



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general concept of landfills is that you can have some boundary impacts but you have to control them.

If the unit -- if we were to find the unit in the extent of the drilling program, it would be monitored and if it responded in a negative manner, if there were wells south of it or not, some action would be taken on it.

DR. KINGHAM: And the groundwater flow in that area and the gradients you discussed at some length with Mr. Estrin and others is of a sufficiently small value that you feel it would not negatively affect your hydraulic trap?

MR. SOBANSKI: No, actually the hydraulic trap itself has taken these potentials into account. The hydraulic trap is based on looking at the lowest water levels in the flow system and then the base of the cells are put below that, below the lowest hydraulic head.

The hydraulic head in the hydraulic trap is well below the potential within this zone. This zone in fact would start to flow upwards slightly into the trap.

DR. KINGHAM: I would like you to explain to us in larger terms than you did to Mr. McQuaid, the overall water balance in the Site D



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3 system. You recall that when we went through the
4 amount of water infiltrating and exfiltrating,
5 we talked in terms of hundreds of drops and how
6 many drops would go in various directions. Perhaps
7 you could tell us what you think the total infiltra-
8 tion of water into the landfill at Site D would be
9 and give it either on a daily, weekly, or whatever
10 seems reasonable.

11 MR. SOBANSKI: With the trap in
12 operation, Mr. Chairman, the assumption is that it is
13 12 inches per year. This would be infiltration
14 coming through the cover material. There are
15 actually two parts to it. In the operating area
16 we have assumed 18 inches per year. In the
17 finished area, 12 inches per year. So that when
18 the site is finished completely, there would be 12
19 inches of infiltration per year. It is an
20 assumption, but probably one of the better assumptions.

21 DR. KINGHAM: What I am reaching for
22 is when the site is finished you have one-third of a
23 metre of water infiltrating an area that is how
24 large, in square metres?

25 MR. SOBANSKI: It is roughly 450
metres by 1000 metres.



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DR. KINGHAM: So, if one took 450

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times 1,000 times one-third, one would wind up with

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150 times 1,000 cubic metres, or in other words,

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about 150,000 cubic metres per year of water that

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is going to go through the top of that landfill and

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get to your hydraulic trap .

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MR. SOBANSKI: That is correct.

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DR. KINGHAM: It is your belief that

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the hydraulic trap as you have designed it, or

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participated in the design of it, would intercept

all of that 150,000 cubic metres of water per year.

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MR. SOBANSKI: Yes, plus a bit of

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groundwater.

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DR. KINGHAM: Plus a bit of ground-

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water. That sounds like a big number, 150,000

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cubic metres. What does that mean to us in terms

of per day? It looks like about 410 cubic metres

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per day approximately.

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MR. SOBANSKI: Yes, that's right.

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DR. KINGHAM: Is that a lot of

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truckloads? I assume we will hear detailed

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evidence later on truckloads and leachates, but I

would like to be sure I have it.

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MR. SOBANSKI: I will check the

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number. Mr. Hiraishi will have the number a little

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more defined than this.

DR. KINGHAM: Somebody used at some stage, Mr. Sobanski, or Mr. Beechinor, some estimate of trucks' volumes.

MR. SOBANSKI: About 5,000 gallons, I believe.

It would be in the order of that based on that about 90,000 gallons per day.

DR. KINGHAM: That is the material plus a certain amount of groundwater that would have to be removed from the site on a daily basis?

MR. SOBANSKI: The groundwater is quite a bit less, but you might, on that basis, be looking at something like 18 trucks a day. Right or wrong, Mr. Hiraishi has looked at in more detail.

DR. KINGHAM: I just wanted to be sure I understood your evidence in terms of getting through the trap.

Let us finally with regard to this site, turn to Appendix 12, of H39A and in particular, pages 4/9, 6/9 and 8/9 of that Appendix.

This is the part that deals with the chemistry analyses.

MR. SOBANSKI: Appendix 11?

DR. KINGHAM: It is the one that has



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the high fluouride readings in it. It is
Appendix 11. Is that the ones that has pages
4/9, 6/9? I may have to return to that question.

MR. SOBANSKI: I think the fluourides
cover the high fluourides were on Site F in the H40A
report.

DR. KINGHAM: Let us turn then to
Site F for a while and start off, if you will, with
a cross-section like Diagram 6 of H-40 which would
be section A-A.

While Mr. Beechinor is looking for
that, there is one final question with respect to the
temporal context of the geology. Site D has been there for
a long time, is it subject to movement, earthquakes,
does it change with time very much?

MR. SOBANSKI: Not very much. All
of Ontario is slowly rising because of isostatic
adjustment. The weight of the glacier, two miles
of ice, actually pushed the land below sea level.
That has pretty well stabilized and the last I have
heard there has been some tilt to it. The
ground moves a little bit, but it is getting fairly
stable now.

In terms of earthquakes we obviously



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are getting a few, but it isn't truly an earthquake

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belt. There are no special construction pre-

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cautions taken in this part of Ontario to deal with

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earthquakes. We do get some little bumps and

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thumps that come through. There may be some

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deep sea faulting in the Niagara Peninsula area,

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somewhere in the precambrian, I believe, that give

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us some bumps through Burlington and places like

that, Hamilton.

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Overall it is a tectonically stable

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area. We don't have to worry about earthquakes

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to our knowledge.

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DR. KINGHAM: You don't anticipate cracks
or dislocations or fissures in that part of Ontario?

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MR. SOBANSKI: No, I don't. The

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other thing is that to some degree it would be self-

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healing as well with the clayey content to this

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material. The rock is another matter of course.

It already has fractures within it.

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DR. KINGHAM: Let us look at this

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cross-section A-A. This is quite a different

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geology from the cross-section we looked at at

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Site D.

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MR. SOBANSKI: Yes, it is.

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DR. KINGHAM: We again understand



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3 bedrock, the bedrock is shale. In places it is
4 exposed and in places it is not exposed. Why is
5 it exposed where it is?

6 MR. SOBANSKI: Let me just give
7 that a moment's thought.

8 Originally, there probably was a
9 layer of till put on this area. It has been
10 eroded away. We have deeply incised valleys
11 on this particular property. The shale was never
12 too far from surface. I am not sure that I know
13 exactly why it has been taken away completely. It
14 could have to do with these pressure-relief features
15 that were discussed as a possibility to explain the
16 permeability in this zone at the site. It is
17 possible, for example, that that type of feature
18 has resulted in some form of cracking that allowed
19 this area to be eroded in a different way than other
20 areas along the same general area.

21 DR. KINGHAM: Is this a more dynamic
22 condition being at the base of the Niagara
23 Escarpment than say the other sites would be, being
24 somewhat removed from the base of the Escarpment?

25 MR. SOBANSKI: It is dynamic in
the sense that because of the slope it is more subject
to erosion. The surface water can act on it in



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a different manner than a flat piece of ground.

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That may in fact, with some other explanation,

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explain why this area has the exposed shale.

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DR. KINGHAM: What about the strata
underneath?

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MR. SOBANSKI: The strata beneath
these?

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DR. KINGHAM: The strata underneath
the area where Site F would be. Are they pretty
well stablized as the strata under Site D, or are
they exposed to actions, subterranean or other?

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MR. SOBANSKI: They should be
relatively stable. It is a very old sedimentary
basin. We don't have major faults running through
the area. We don't have many tectonic distur-
bances here in this area.

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As I say, there seems to be some
deep seated earthquakes from time to
time through the peninsula, but they don't seem to
be affecting anything near surface.

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The sediments here are still
relatively thick running down ultimately to the
precambrian, we have something like 350 metres
of this formation in this area. Tectonically, it
is stable. It is not like being out in

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western Canada where we are on the San Andreas fault.

DR. KINGHAM: Thinking not only tectonically, but in terms of what is happening there. You are comfortable with the stability of what is happening in terms of the proximity of the lake, the side of the slope, and the Escarpment. You are comfortable that that bedrock has a stable formation.

MR. SOBANSKI: Oh yes, it has long been stable and people don't even know how the Niagara Escarpment really formed. It has been there for a long, long time. We can see how it has been formed down in the Niagara River, but these are very, very old sediments. We are talking sediments here that are 350 million years old.

DR KINGHAM: Putting the same question I put with regard to Site D, you have drilled a lot of holes here and others have as well.

MR. SOBANSKI: Yes.

DR. KINGHAM: Are you confident that you would not have missed a major geological feature at the site, as confident as you are, say that you would not have missed a major feature at



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Site F.

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MR. SOBANSKI: We certainly are unable to say that we have picked up every fracture or anything of that nature. We believe that we have given a reasonable, plausible description for the mechanism by which groundwater moves at the site. The fracturing obviously is a complexity that has a greater degree of complexity at Site F than it does at Site D. I don't believe that we have missed anything major. If we have, the implications of having missed it at this site are very -- the implications are not all that great if something has been missed because of the various factors that we have discussed throughout the hearing.

DR. KINGHAM: Let us go through the same kind of water balance we went through in terms of Site D. This site is about the same surficial area more or less than Site D is.

MR. SOBANSKI: I believe it is just a little smaller.

DR. KINGHAM: Therefore, it would have about the same amount of rain falling on it, I guess.

MR. SOBANSKI: Yes.



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DR. KINGHAM: At Site D, you assume 12 inches of rain per year would get into the site when it is finished. In this case you assume?

MR. SOBANSKI: The same.

DR. KINGHAM: Therefore again there are about 90,000 gallons per day getting down to the bottom of the site, assuming that the garbage is the same in both cases.

MR. SOBANSKI: That's right.

DR. KINGHAM: In this case part of that 90,000 gallons would be intercepted by your bottom drains and removed?

MR. SOBANSKI: Yes.

DR. KINGHAM: Something in the order of 95 per cent of it would not be intercepted.

MR. SOBANSKI: Yes.

DR. KINGHAM: Your view, expressed both with your model and elsewhere it was expressed that that which was not intercepted would flow into the area between Highway 403 and the CN tracks.

MR. SOBANSKI: That is what is indicated by the model. I should point out it was never really raised in questioning on it. The discharge area can be moved depending on how far the fracture zone is extended. It is one of the



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3 limitations of the model as to where the discharge
4 area occurs. I feel that the second model we
5 put before the Board is more realistic. It gives
6 us a much better fit in which case there would be
7 much less water to deal with. I am satisfied that
8 we should recognize that some leachate is going to
9 escape the bottom of the site because we cannot
10 intercept it with the type of design and it would
11 require invigilation to make sure that there are
12 not unacceptable impacts.

12 DR. KINGHAM: I recall in your
13 reponses to questions by Ms Vigod that you felt
14 that what would be finally emerging from that site
15 and finding another outlet would be about the same
16 after the landfill was in place as it is now.

16 MR. SOBANSKI: Yes.

17 DR. KINGHAM: That is to say with the
18 bottom drains in place.

19 If it is truly about 90,000 gallons
20 per day, or 18 trucks-full, I am not going to get
21 hung up on the accuracy of that number, if five
22 per cent of that is lost then it would seem to be
23 about 4,500 gallons per day which would go into the
24 strata below.

24 MR. SOBANSKI: Yes, with that model,
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3 that would be the case.

4 DR. KINGHAM: According to your model,
5 that 4,500 gallons per day before and now is
6 coming up somewhere between, or generally in the
7 area of Highway 403 and the CN tracks.

8 MR. SOBANSKI: That's what the model
9 indicates. That's why I say on Father's Day, I
10 couldn't see the 4,500 gallons per day.

11 DR. KINGHAM: Four thousand, five
12 hundred gallons per day indicates there might be a
13 lake there or a duck pond or something and it is not
14 there. If it is not there, where would it be
going?

15 MR. SOBANSKI: First of all, if we
16 use the second model, we don't have that much water
17 to deal with, we would be dealing with a much
smaller volume of water with the better-fit model.

18 DR. KINGHAM: Excuse me?

19 MR. SOBANSKI: The second model we
20 used which has the anisotropy in it.

21 DR. KINGHAM: Let me make sure.

22 You have got 90,000 gallons per day
23 getting into the site, the bottom of the site, and
24 you are collecting 95 per cent of that, leaving
25 4,500 gallons per day.



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My question is, if this 4,500 gallons per day doesn't wind up between the 403 and the CN tracks, where would it end up?

MR. SOBANSKI: In my opinion, it will end up in the lake. It will go into the regional flow system and stay there.

DR. KINGHAM: Into the regional, okay.

In your drilling program and in many of the charts that we have seen showing the strata, the boreholes north of HC-4 don't show the fractured shale at depth. You show it pinching out therefore in your Exhibit H-40. Maybe we have covered this in cross-examination.

You are not 100 per cent confident about the pinching out nature of that zone.

MR. SOBANSKI: Of that zone, no we are not 100 per cent confident of it pinching out on the north at all. We have run models, a model that carried the zone to the north. It behaves in a fairly similar fashion to the main model. I would have to check it exactly. I don't think the fit was quite as good, but if that zone could extend to the north. We just don't have information on it.



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3 DR. KINGHAM: Of course if you
4 constructed a model that was fractured 20 metres
5 thick, 10 metres thick, whatever, to the north and
6 you wanted to follow the same kind of exercise that
7 you did in matching heads, you would again play
8 with the conductivities and porosities to make the
9 model better fit the field observation and that
10 would thus have had an effect on those parameters.

11 MR. SOBANSKI: It could have.
12 We actually had more success with the model than
13 that. We didn't really fool with them a lot.
14 We did assume a 10^{-7} as I mentioned. The way the
15 model actually worked for us, we went through and we
16 selected that table. We just worked them out
17 sort of as educated guesses as we said the other
18 day, plus the fact that we did have data in some of
19 the units and we used the data where we could.

20 The run that comes out of the model
21 was assumed at 10^{-7} for the tight layer. That was
22 the first run that we ever did with that model and
23 that is the one that is presented. We fooled
24 with parameters afterwards for sensitivity but in
25 fact, the model that is in the report was the first
model that was run with the horizontal layering and
we never changed it after that, other than this.



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better fit.

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DR. KINGHAM: Are you tell us you
were first-time lucky?

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MR. SOBANSKI: I think I have said
a couple of times we were lucky. We ran it
afterwards at 10^{-8} and we didn't get as good a fit
but because of time constraints in preparing the
report and meeting the deadlines we didn't go
much beyond it at that stage other than to do some
sensitivity analysis, changing the spacing on the
grid and things like that to see how sensitive it
was.

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In fact, I know it is somewhat
incredulous, but that was the first run and that is
the one that is in the report.

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DR. KINGHAM: With regard to your
Exhibit H40-3, which you might have handy and Table
12 in the report, it is at page 97, it is the one
in which you have the summary of the linear ground-
water velocities. If you can't find H40-3 because
I can refer you to Figure 11 on page 102 as well.

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The question is really very simple.
If you just look at page 97 and 102 of H40...

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MR. SOBANSKI: Can I have those
pages again?

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DR. KINGHAM: Pages 97 and 102.

MR. SOBANSKI: Yes?

DR. KINGHAM: You state on page 97 in the table, that the groundwater flow is downward from landfill through the weathered shale and downward from landfill through the weakly fractured shale and you reflect that on page 102 in showing egress of material from the site downward through the weathered shale and downward through the weakly fractured shale.

I was surprised to see no rightward moving arrow, lateral arrow between the weathered shale and the weakly fractured shale. The question is, if you have a relatively impermeable layer, do you not expect water to come towards that layer and then move fairly smartly laterally rather than downward? Can you explain that?

MR. SOBANSKI: Yes, we do.

If you look at Figure 11 on page 102, the Table 12 and Figure 102 are not completely comparable. If we look at 102 we have what is shown essentially on Table 12 is the downward progression and then the lateral movement and then finally the discharge.

On page 102, there is the other little box on the right-hand side that says "lateral



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migration through weathered shale." This is the portion that isn't considered in our model because this is the portion that would be picked up by the tiles and toe drains.

DR. KINGHAM: In the Site D case, if my recollection is correct, that was considered to be a predominant route for egress in the models used at Site D, but you expect to collect that as well in your tiles, wouldn't you?

MR. SOBANSKI: Yes, we would.

DR. KINGHAM: Why was it important in D then and not important in the model at F?

MR. SOBANSKI: That is a good question. It would also -- any failed system here would apply in the weathered till also just as it would at Site D. I would think that the models would probably be very similar.

DR. KINGHAM: There wasn't a particular reason why you included it in one case and excluded it in ...

MR. SOBANSKI: Not really. It wasn't an intentional exclusion. I think that you could apply the Site D. model to this case as well. That is the migration through weathered till.



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DR. KINGHAM: Okay.

Mr. Beechinor, yes, give
Mr. Sobanski's voice a rest.

MR. BEECHINOR: This Figure H40-2, what we have
come up with with respect to the hydrostratigraphy,
is the till at the north end of the site and then
the moderately fractured shale weathered at surface.
The weakly fractured shale and the highly fractured
shale and then the bulk shale unit, those are the
various units and the discharge zone tills south of
Highway 403.

I think the intent was that the
landfill would be essentially dug into the weathered
portion of the shale and at the south end founded,
or very closely founded into the weakly fractured
shale unit. It didn't become a direct off-site
pathway since the landfill would be founded into the
weakly fractured shale unit at the south end, towards
the south end of the site. So, the landfill now
has intercepted the pathway, physically intercepted
that pathway.

DR. KINGHAM: So, you are saying
anything that runs down into your tile drains at
Site F and follows the slope down quickly runs into
the weakly fractured shale?



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MR. BEECHINOR: Right.

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DR. KINGHAM: And thus your model should somehow reflect the assumption that that is the real conduit, the toe of the site through the weakly fractured shale.

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MR. BEECHINOR: At that contact, that's right.

MR. SOBANSKI: I think, Mr. Chairman, what has happened is there have been a couple of designs done on the Site F and in the redesigned site, a portion of the fill near the south end does in fact end up in till.

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Your question is valid that since the toe of the waste is in fact in glacial till, there is the potential, in the total failure, of contaminants in the weathered zone.

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DR. KINGHAM: Could I ask you to put up Map 1 which was attached to Exhibit N-185, please? That is the one that I believe shows the Bayview site, the present Burlington landfill site.

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I would just like you to explain a little more clearly to us, either of you, the comparison and contrast between the three areas that are clear there, the original Bayview site,



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the current Burlington site and the proposed site between them. They compare and contrast in terms of what the site was like before it was landfilled to your knowledge and how that compares with what Site F is like now before being landfilled. Is that clear? Bayview for instance, was that a till site that was partially excavated and filled on top? Is the same true of all the current Burlington site, or was in fact a good portion of that like Site F? How did they compare in your view?

MR. SOBANSKI: It is difficult for me to say. Actually we are attempting to find out exactly that. We can see from the leachate wells that were put in that there certainly may have been some till in some areas although it is difficult to know after leachate has been sitting on a material for a while whether it is till or not.

If we look at the map, this is the geology map, the quaternary geology map, 2509.

DR. KINGHAM: Exhibit B-209.

MR. SOBANSKI: I noticed on this afterwards with interest that the work that was done



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on this site was done by a Dr. Paul Carol and assistants in 1958 and 1959, which would put their work in this area just about the time that land-filling may have started here.

At that time, they mapped it as a sort of continuous outcrop area running from a part of the Bulington site across Site F and then across the Bayview Park site. They show it as a continuous area of relatively low overburden cover. They have mapped it all as bedrock. I am attempting to get some air photos from about that time, 1955, to see if we can cast more light on that. It will take some time to get them from the Archives.

At this time, about the time that filling may be going on at this site, it is being mapped as in fact an area of overburden, absence of overburden.

Another source that we had was an old map, I don't know whether it requires going into evidence, but if we look back into the 40s, back into the original topographic maps of the area, the first RCAF air photos. They mapped that area both on the proposed Site F and extending onto Bayview Park as clay pits.



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3 DR. KINGHAM: So, you would, in your
4 professional opinion, based on the limited informa-
5 tion available now, conclude that there are more
6 comparable, the three sites, than contrastable?

7 MR. SOBANSKI: I think that they are.
8 In terms of rock we know that there are complexities.
9 After all, it is a regional type of formation.
10 In fact, we are talking a fairly small spatial
11 distance over what is a major geologic feature.

12 So, we would expect that the sites
13 would be comparable to one another.

14 DR. KINGHAM: We have already heard
15 your evidence about proportion of till and the
16 proportion of exposed bedrock and so on in the
17 proposed site.

18 MR. SOBANSKI: Yes. I believe,
19 Mr. Beechinor and I were going over, I think, in
20 my evidence I had indicated the southern part of
21 the Bayview site, the Burlington site, was similar
22 to ours. In fact, I was not quite correct. The
23 overburden thickness south of the Burlington landfill
24 is thinner than what we are finding on our site.
25 If anything, the southern end of the proposed Site F
has more till on it than either Bayview or Burlington
landfill, so on the southern end of the proposed



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Site F, the till is thicker.

DR. KINGHAM: Thank you.

MR. BEECHINOR: Some of that information falls in the test pits presented this morning.

DR. KINGHAM: We will take a look at that.

Could I ask you to turn your attention to Exhibits N-189, N-191 and N-192? I believe you have overheads of those. Maybe you could put them on, the first one being N-189.

This is N-189, is it?

MR. SOBANSKI: I think we had the problem of numbering between what you were getting.

DR. KINGHAM: I want the one with the numbers on it, the overlay on that.

MR. SOBANSKI: We have to combine the two.

DR. KINGHAM: Move it down a bit so we can see HC-1 at the top. I am just going to ask you to look at that and remember the numbers there. Sulphate 2,550; 2,080; 1,500, and chloride 19.9; 13.8 and 367.

Then I would ask you to put up N-192 with its overlay. It is actually easier for us to do this than it is for you since we can get the



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pages. Sorry, N-191 first, please. You may have to remove the overlay that was already there.

MR. SOBANSKI: I think you are right. You will have to give me just a second here. We can't use that base. We have to go to a different base unfortunately. These are on different scales. You have to use the 191 base. That should be close.

DR. KINGHAM: That is close enough to see that for one of the Morrison-Beatty wells close to the former HC-1, you have chloride readings of 23; 91 and 10,900 and sulphate readings that are in some cases higher and lower. Still, we are talking orders of magnitudes difference.

MR. SOBANSKI: We are talking Morrison-Beatty 6 and 10.

DR. KINGHAM: Yes. Then if you look at the other Morrison-Beatty wells there you will get one quite close to that which shows 4,690, that is at the top of the chart, another one of those wells.

If you look at another one in the same vicinity, I guess these are the ones, 14 and 6 and 10. These numbers are quite different and I will ask you finally to turn to N-192 with its overlay.



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3 Yes, that is GL23 right there. Now
4 look at the sulphate and chloride numbers for GL23
5 which is almost beside HC-1 in a not landfilled area.
6 I am just wondering why the numbers between those
7 various wells in the same vicinity are so widely
8 different for various constituents. How would
9 you account for that? We have got 4,000 in some
cases, 37 in other cases.

10 MR. SOBANSKI: They may not be
11 directly comparable in that the Morrison-Beatty well,
12 I believe, towards the south, is already getting
13 into the shale. Certainly, the HC-1 well and
14 the GL23 well are probably in similar types of
15 stratigraphy. If I can just check the Gartner,
16 Lee report on the 23 well.

17 DR. KINGHAM: In fact, it is those
18 two wells that first alerted me to this difficulty
19 in understanding the evidence here. HC-1, not
20 very far from GL23 shows sulphates at 2,550, 2,080
21 and 1,500. The adjacent well has them at 37,
22 116 and 1,520. Similarly, the chlorides are
about an order of magnitude different.

23 MR. SOBANSKI: The chlorides, other
24 than the bottom value are fairly comparable. I
25 know it is an order of magnitude, but 4 and 20 in



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3 groundwater ... Let me just check their well
4 record for that so I can see what I am doing.
5 Their upper two piezometers are in the overburden
6 and their bottom piezometer is in the rock. I
7 believe that -- isn't that our situation as well,
8 Mr. Beechinor?

9 MR. BEECHINOR: The upper piezometer
10 is in the till. The second piezometer appears to be
11 at the shale, till contact and the deepest piezometer
12 which is at 30.9 metres is into shale.

13 MR. SOBANSKI: So, there would be
14 one part of the explanation is that the two
15 piezometers of Gartner, Lee, the upper two are in the
16 overburden. Only one of ours is in the over-
17 burden in this case, but there is a big discrepancy
18 indeed between the sulphate values.

19 My recollection is, I think this may
20 be a function of the material for some reason or
21 other because we had some very wide discrepancies
22 as well at Site D. We had some very high sulphate
23 values and very shallow depths at Site D in that
24 glacial till as well.

25 It may be a function of the minerality
in the till itself that is giving us these large
differences, but we could check back in D.



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3 DR. KINGHAM: But you would not think
4 that it is some underlying geological irregularity
5 that leads to cleansing, if it were, in till in
6 one area and the relatively sluggish flow in till
7 in an area less than 100 metres away. I just
8 want to know.

9 MR. SOBANSKI: I understand. It is
10 a possibility. We said for Gartner, Lee, in my
11 recollection that it sort of didn't fit the mould
12 for the till. The one thing I could see different
13 in the Gartner, Lee well, is it is located fairly
14 close to the valley of the stream there. It could
15 be that because it is there near the stream, the
16 flow system may not be as sluggish because there may
17 be a higher gradient in the glacial sediments there
18 towards the stream itself which would increase
19 groundwater velocities and give you a better quality.
20 My recollection is we did talk about that in direct
21 evidence a bit, because I had some trouble with it as
22 well. It was so fresh compared to other zones
23 that we had looked at and it was the only thing that
24 I could think of at the time that might have
25 accounted for it.

Our well is right out, pretty well,
on the flat in the field without being very close to



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1 the stream. The Gartner Lee well is getting
2 close to the stream. It is incised on the west to the
3 north sides of the Burlington landfill.
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5 DR. KINGHAM: Local topography could
6 account for it.

7 MR. SOBANSKI: It might account for
8 it, Mr. Chairman.

9 If the gradients were higher there
10 because of the topography, then we could move more
11 water through the system and have it a little ...

12 DR. KINGHAM: Is it a problem with
13 Site F that the local gradients and contours are
14 really quite dramatic in different areas?

15 MR. SOBANSKI: They are, very much so.

16 DR. KINGHAM: In this same series
17 of exhibits, we have N-193. N-193, you might
18 just put up briefly. It is a series, then there
19 are overlays that show chlorides and sulphates and
20 organics.
21

22 My recollection is that you said at
23 the time that the values at GL-24, being that well
24 closest to the Burlington landfill, were not
25 necessarily from the landfill and so my question to
you is, if they are not from there, where are they
from?

They are not necessarily a reflection



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of loss from the landfill.

MR. SOBANSKI: We are talking now the chloride values?

DR. KINGHAM: We could talk about all three of them since the chloride values are certainly very high at GL-24 relative to GL-27 and HC-15 as are the sulphate values. Of course, the organic values only show up. It is just that you made the statement that the values at GL-24 were not necessarily from the landfill.

My question is, if from not there, where?

MR. SOBANSKI: Certainly, in the case of the high values, if we look at the chlorides first these, we believe, would be natural. We have demonstrated, we believe, on the site that with depth, the chloride increases dramatically at the site, being some 20,000 as we get down to about 30 metres.

DR. KINGHAM: Excuse me, Mr. Sobanski, but your piezometer 1 at GL-24 is well above piezometer 1 at GL-27.

MR. SOBANSKI: Yes.

DR. KINGHAM: But the chloride value



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is again almost an order of magnitude greater at piezo-
meter 1 at GL-24 than it is at piezometer 1 at GL-27.

MR. SOBANSKI: Yes, it is. I cannot
really explain GL-27 and why it has the lower values.
In terms of landfill contamination though, the chlorides
in landfills typically run around 1,500. So,
these are a full order of magnitude above the type
of chloride we would expect from a landfill. This
has been the problem in monitoring the site is the
poor quality groundwater masks any effect of some
of our traditional tracers even when we start running
at 400, 500 in terms of background. The most we
are going to see, we could double it I suppose from
a landfill, so in other words the upper piezometer
there and the number 3 piezometer might respond at
some time to indicate or reflect some contamination
from the landfill, but the lower ones when we are
dealing with 30,000, 10,000 we would never see 1,500
superimposed on those types of numbers in all
likelihood.

Strong leachates in terms of chloride
might run 2,000 to 3,000 from landfills. Literature
reports more. It depends on how the landfill is
used. Sometimes they can fool you and go and do
things like disposing of road salt, when they pick up



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the snow off the streets and bring the road salt out.
If you are not careful at a landfill, you can
actually foul up your whole monitoring system and
program.

DR. KINGHAM: That is something I
want to talk to you about after lunch, but it is
12:30 and I can see it will be some time before I
will be finished with these questions.

Perhaps we will break for lunch now
and resume at a quarter-to-two.

--- Luncheon recess at 12:30 p.m.

--- Upon resuming at 1:55 p.m.

DR. KINGHAM: Thank you, please be
seated.

I am glad to see that you are still
in health. We will make it to the end of this
yet.

We were discussing, before lunch,
Mr. Sobanski and Mr. Beechinor, the exhibits N-193
and you were explaining to us the possible
explanations for those high concentrations near the
Burlington landfill. I want to continue with the



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discussion of these exhibits, but to move slightly to deal with 193D and 193E.

Now, 193D and E show certain measurements in the vicinity of the existing Burlington landfill. When we examined that in the context of your computer model on page 125, of H-40, if you recall that, it poses an interesting question and to deal with the question, I would like you to go to the flip chart. Perhaps, Mr. Beechinor, you can do this since it is nearer to you.

Take any pen you can find. I think you will need a clean page. Just draw a line for us, sloping gently down from upper left to lower right. That is fine. That will do.

Then, draw a vertical tube descending from the left-hand side, a line down there. That is fine, further, much further, and across the bottom and then coming back up somewhere through your horizontal line. You will see what we are doing here is roughly simulating your landfill superimposed on computer simulation of groundwater flow system, down across and then back up.

Now, put little arrows on that going down on the left-hand side of your dashed line and



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then across the bottom. Maybe you can put one or two arrows coming up through the solid line on the right-hand side.

Now, the question is this: We have heard a lot of evidence in your answers about this plume delineation study that emerged in the course of the cross-examination. We received results like those shown on N-193D and E. We heard evidence from you that seemed to indicate that contaminants from the landfill were not migrating to the position where you would pick them up.

I would like you to give me some indication in terms of where those wells are, whether you would expect them to intersect that FLONET model of yours or not. That is to say on the flip chart, if you were to put GL-27 say, would that pass through your flow lines, would it be above your flow lines, is it in play?

MR. SOBANSKI: Let me just think for a moment about that. GL-27, Mr. Chairman, is located at elevation just a little under -- I am sorry, you may not be able to see that. I will swing it further. The base of GL-27 is located at about elevation 96, 97, somewhere in that order.

DR. KINGHAM: And the main lateral flow



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on your page 125, landfill superimposed on computer simulation of groundwater flow system, Figure 21.

MR. SOBANSKI: Somewhere around 90 metres. The simulation, of course, he did the best he could because of his grid, but I think you will recall from some of the other evidence that was submitted, the zone, the main zone is around elevation 100, 102, somewhere in there and goes down as deep as elevation about 92.

So, this base piezometer would probably be somewhere within or near that unit or in the highly fractured shale unit.

DR. KINGHAM: My question is quite simple and quite direct. With the wells, would you have expected wells in those locations to have intercepted your predicted trajectory from wastes from the landfill site?

MR. SOBANSKI: Probably, yes.

DR. KINGHAM: Would you have expected them to be at locations like that by now if they were leaking from the Bulington site at the rate that you predicted they would leak from Site F?

MR. SOBANSKI: Perhaps not.

DR. KINGHAM: So, what conclusions do you draw from the results of these wells?



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MR. SOBANSKI: I believe that the wells are showing still the natural concentrations in the ground. If I might just go back to B, the fluoride, for example, we can see that at that level we are running fluorides sometimes in the order of about 3,000. If we look at the leachate strength at that site, the chloride concentration is around 1,200. Sulphates, which were the subject of the other figure which was N-193C, they are relatively high. In fact in leachate, sulphate concentrations are usually fairly low because sulphate reducing bacteria utilize them in their metabolism.

So, again, the values are high. At some sites I have actually seen a halo around the Mississauga site, a deficiency of sulphate downgrade, whereas off on the perimeter you could see background. In the plume you actually have a decrease in sulphate concentration.

DR. KINGHAM: Could you put the overlay up for organics which is N-193E, and then raise it up so everyone can see it. Can you explain that to us in terms of your model and in terms of the numbers that appeared there? Is that a reinforcing of your model, or a conflict? How



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should the Board understand that in the context of your model in your view?

MR. SOBANSKI: In terms of the model it is probably still acceptable. The number 3 nest is a fairly shallow depth. There is indication that there may be some organics in there. Gartner, Lee felt, in their report, at the GL-24 well, 25 metres from the waste may have some contaminants.

At the present time it is low enough that they are not sure. They are certainly saying there is nothing concentrated there. The two, TCEA, I think we just need further sampling to know whether or not there is an indication of something at that well.

DR. KINGHAM: That is part of my concern, Mr. Sobanski, part of my question. According to your model, if what occurs at the proposed Site F occurs at the Burlington landfill site.

Would you be then predicting a strong downward gradient to the left of the diagram and 193E and then laterally across to TCE, excuse me, to GL-27?

MR. SOBANSKI: To the GL-27, yes. That would be the general model for that unit.



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DR. KINGHAM: So, that number could be the leading edge of the plume containing organics.

MR. SOBANSKI: I think, I suppose it is possible. We had a fresh well when that was taken. It had declined to zero so that wouldn't necessarily surprise me. However, I think it is further monitoring that is required to ensure whether or not that is a real value or not. Across the road, we didn't detect it in ours at all in HC-15, but there was a reading there, one reading which couldn't be duplicated, it wasn't duplicated.

DR. KINGHAM: Okay, if you can find N-196A I think that must be an overhead, yes, that is a map of the area showing contours, volatile organics.

Then, if you could look as well at page 27 of H-83.

MR. SOBANSKI: Page 87 was it, Mr. Chairman?

DR. KINGHAM: Page 27 of H-83.

Here we see values for various volatile organics. I was unable to relate them to the values of volatile organics which appear on page 27 of the Gartner, Lee Report. They seem to be quite different. I don't understand



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3 why that should be.

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5 MR. HODGSON: I am sorry,
6 Mr. Chairman, what is the first exhibit you are
7 looking at?

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9 DR. KINGHAM: I am looking at N-196
10 with its overlay which is on the

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12 overlay and H-83, page 87, both of which give
13 concentrations for volatile organics. We see
14 paradichlorobenzene.

15 MR. SOBANSKI: Are we saying why aren't they the
16 same number, Mr. Chairman?

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18 DR. KINGHAM: Or in the same

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20 ballpark?
21 MR SOBANSKI: This data comes from
22 the Conestoga-Rovers information from leachate wells
23 and this, of course, is from the Burlington site.
24 I would think that part of the reason would be that
25 perhaps the age of the site, number 1, and perhaps
in the type of waste that may have been put in here.

It would appear from the Conestoga-
Rovers data that the TCEA is now non-detectible
whereas in the -- TCEA at the Burlington site is
varying quite a bit. It is varying from 4 to
236, which is the third row down. So, again

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at times, even at the Burlington site, we are getting quite low values for TCEA.

DR. KINGHAM: Let me see if I understand that. You say the levels are going down with time from the 85 to the 86?

MR. SOBANSKI: I really haven't said, I really never really looked at this particular chart to see what was happening. These data are from two different sites. The Figure 196 is from the Bayview Park site and the information in Gartner, Lee's Report is from the current site at Burlington. So, there are two different sites.

DR. KINGHAM: Of course. Thank you. That certainly makes it very clear.

On Exhibits N-200 and N-201, we are still in the same area. You, or somebody, drew on those charts, those overheads with the orange marker, zones of hydraulic connection. I just wondered how those -- it was determined that the zones of hydraulic connection were at those levels. I don't see any reference to much else. Is it because it went from piezometer 3 to piezometer 3?

MR. SOBANSKI: I believe that is what the Morrison Beatty had attempted to show on that. We didn't, in pump well 1, for example, we



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3 didn't map the individual zones of connection in that
4 well. What they are showing are three wells at
5 roughly the same elevation and they drew the orange
6 line on. What we have said is, "Well, we have
7 an effect in Morrison Beatty 13 at that elevation
8 and we had an effect in Morrison Beatty 16 at that
9 elevation, which would show that that connection is
10 there." We didn't find that connection to
11 Morrison Beatty 17, so they didn't draw the connec-
12 tion right across. This is their interpretation
13 as opposed to ours. They had us look at this.

14 DR. KINGHAM: And the connection,
15 do you mean the connection at that level?

16 MR. SOBANSKI: At this level which
17 was, they are showing it at about the 97-metre
18 level that there was draw-down in two of the wells
19 at about that elevation. Again, showing this
20 horizontal connection in the zones.

21 DR. KINGHAM: I can see that because
22 there are, in fact, two piezometers there at
23 position 3 in both wells, but then if you turn
24 with me to N-201 with its overlay, does it matter
25 that there appears to be no piezometer in that zone
of hydraulic connection at MB-13 or not?

MR. SOBANSKI: I think that they have,



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perhaps, stylized it a little bit too much.

In fact, MB-13 did have some draw-down which they show. In fact, the connection -- let me try that again. They are showing that there is a connection at this upper level. They didn't choose to include the connection that they had already demonstrated at the lower level. The problem I am having, is I am having to interpret what their drawings show.

DR. KINGHAM: I think you have dealt adequately enough with my question. Your connection is based on a combination of geologic and pumping test information. As you read these charts, you are of the view they have done it on the basis of connections at piezometers at different levels.

MR. SOBANSKI: That's right. What they are showing there, the orange there, I think, isn't shown quite as well as it could be. One could have thickened that zone, the orange zone to include piezometer 3 of Morrison Beatty 13, which we saw in the previous drawing. It was connected on the previous drawing and here it isn't. They really should have thickened it up to show a thickening of this unit to include both of these zones.

DR. KINGHAM: I won't dispute their



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MR. SOBANSKI: The difference in elevation between the two isn't that much. There is such a gross vertical exaggeration on it that the difference in elevation is...

DR. KINGHAM: On the same subject, on the 29th of September, we were discussing again, or you were discussing with various counsel, this horizontal fractured zone. On that day you said quite clearly, yes, we have demonstrated it in response to the question about the extensiveness of the zone. You demonstrated it by means of what?

MR SOBANSKI: By means of the pumping test itself.

DR. KINGHAM: You don't mean you demonstrated it from the model, the model is not inconsistent with it.

MR. SOBANSKI: Not entirely. We can never be entirely consistent. That fracture zone is in the model. It has been put in as that 10^{-3} layer in the model. To that extent, yes it is consistent. They are together and they have been combined. We used the results of that pumping test to construct that permeable layer within the model.



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3 DR. KINGHAM: The one thing I have
4 been wondering about as we went through this whole
5 exercise, understanding the movement of the ground-
6 water beneath the slope and your concept of purge
7 wells to intercept, are we correct in imagining this
8 is some sort of sheet of water as it were, under-
9 ground, down-slope and you put in a well at one
10 place and pump and you can detect some metres beside
that, an effect of drawing the water away?

11 MR. SOBANSKI: Yes, that is what you
12 are seeing.

13 DR. KINGHAM: Does that lead you to
14 the conclusion that if you pump fast enough, you
15 would intercept all that water running down that
16 slope between wells?

17 MR. SOBANSKI: Yes, through that
18 layer as opposed to calling it a slope, the water
19 going through that layer would be intercepted by
wells.

20 DR. KINGHAM: As it comes down the
21 slope it would be drawn towards the wells
22 and the areas between the pumping wells would be
23 dry.

24 MR. SOBANSKI: Essentially, yes it
25 could be dried right up between the wells.



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DR. KINGHAM: Okay, ...

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MR SOBANSKI: This is fractured rock and it is not quite that simple. The point is, the wells are open throughout their length so they are intersecting, in fact, all the permeable zones within the rock. In other words, you would construct the wells as open holes.

DR. KINGHAM: I appreciate your clarification. That is more like saying you have not just a sheet of water, you have a wall of water, not just a well, but the screen going down. You are telling me that you, in effect, would divide the waters, as it were, to collect it at the wells as it flows down.

MR. SOBANSKI: That's right, for a layman, for people that may understand it is a common technique used in dewatering for construction. When we put these big buildings in downtown Toronto they have to deal with groundwater as they go through the soils and down into the bedrock. The excavation is literally pumped dry. Those buildings are permanently dewatered. They are equipped with foundation drains and the groundwater is continually seeping into them and being carried off. That is why the basement complexes are dry.



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They are, in fact, below the watertable though,
below lake level in some cases.

DR. KINGHAM: Good. Thank you.

I wonder if you have got a copy of
the drawing number 5 from Exhibit H-40 available.

As you have looked at that and
explained to us the formation of geological strata
in the area and what they mean, would we be
correct in assuming that the lay of the land, so to
speak, is from left to right across that chart?
It sort of steps down from the Escarpment towards
Lake Ontario.

MR. SOBANSKI: Actually, from north
to south or from top to bottom, it is stepping down,
yes.

DR. KINGHAM: And the strata running
into the hill as you put into your stylized earlier
figure, seems to be fairly horizontal. It emerges
as it were, at Site F.

MR. SOBANSKI: They are essentially
horizontal. In fact, there is a slight dip to the
strata this way towards Lake Huron, about 20 feet
or so per mile.

Essentially, for a small area, they
would be flat.



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DR. KINGHAM: You still have a concept, east-west, in the sense of this diagram but with a slight downward tilt to the west as it were?

MR. SOBANSKI: A slight downward tilt to the west.

DR. KINGHAM: The kinds of features or effects that you would observe along an east-west line would be fairly similar if you observed a fractured zone and a massive zone and so on as you went down.

On the west side of the site you would expect to find it at sort of the same place as you would expect to find it on the east side of the site.

MR. SOBANSKI: It may not be there everywhere, but I would expect that this fractured layer at roughly elevation 100 feet could well be demonstrated on the west side also.

DR. KINGHAM: I would like Mr. Beechinor to do a little drawing on that map if he could. Mr. Beechinor, I don't know that this is going to become an exhibit, but it will help us understand, I hope, Exhibit H-220.

If you just drew a line between



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HC4 and HC14, that would be a north-south line.

Do you know what it means to drop a perpendicular? Could you drop perpendiculars to that line from PW-1 to the right, project it straight across horizontally. It comes just about to HC8, doesn't it?

MR. BEECHINOR: That's right.

DR. KINGHAM: Similarly, if you dropped a perpendicular from HC5 to the line, it would come just about to the same point as HC6 would coming from the other side, wouldn't it?

MR. BEECHINOR: Fairly close.

DR. KINGHAM: Similarly, HC7, can you drop a perpendicular -- that's away off to the right-hand side of the site to the east. It would come some centimetres up and finally, HC3 dropping a perpendicular from it across, it is fairly close to HC4.

Would it be fair for me to say that if you really wanted to do a cross-section of that site from HC4 to Highway 403 or to HC14, you might take the values of geography or geology, excuse me, the strata from those wells and run them along that line.

MR. BEECHINOR: Yes.



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DR. KINGHAM: Could you then put up H-220, please?

What is the horizontal scale in H-220?

MR. BEECHINOR: It is generally one centimetre is about 20 metres.

DR. KINGHAM: So the lateral separation between the wells should correspond in a north-south sense as we look from left to right on H-220?

MR. BEECHINOR: I think that is generally the case.

DR. KINGHAM: I would invite you to consider, then, your wells HC6 and HC5. You have them separated on H-220 by some distance, by in fact about 3.5 centimetres.

MR. BEECHINOR: That is about right.

DR. KINGHAM: Yet, on the projection of the line, they should be, in fact, just about side by side.

MR. BEECHINOR: HC6 and HC5, that is right on that projection.

DR. KINGHAM: On a true section they would, in fact, be just about adjacent?

MR. BEECHINOR: Right.



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DR. KINGHAM: HC5 and HC6 don't
bother me too much.

I would like your clarification,
however, with regard to pumping well 1 and HC8.

MR. BEECHINOR: Pumping well 1 and HC8.

DR. KINGHAM: You can put that up.

MR. BEECHINOR: Pumping well 1, I think the difficulty
perhaps in this is we are putting a lot of informa-
tion on the horizontal scale and that is why the
scale perhaps isn't identical to a line that you are
drawing such as HC4, HC14. What we were trying
to do with Exhibit H-220 was -- conceptually what
you are describing here. We took all the informa-
tion we had through a section and tried to through
a north-south section, put all of the information,
all the drilling sites, all of the pumping test
information on. It is not to true scale just
because we simply couldn't put all the information
on at that scale and see the information.

DR. KINGHAM: Exactly what I thought.

Now, leaving that up, H-220. if you
look at PW1 and you look at HC8.

MR. BEECHINOR: HC8, yes.

DR. KINGHAM: If you look at the strata,
represented schematically there, they should be just at
about the same levels and the same depths because those



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two sites, in the right-left sense, are in fact, immediately adjacent to each other. They are on the same latitude as it were on your original drawing.

MR. BEECHINOR: We are talking about HC8, are we?

DR. KINGHAM: Yes, we are.

MR. BEECHINOR: The pumping well, TW1?

DR. KINGHAM: Which is your PW1? Do you see the difficulty the Board has in understanding that at PW1 the depth of Zone 4 is very considerable and very low.

MR. BEECHINOR: Yes.

DR. KINGHAM: We are trying to relate that to what Mr. Sobanski explained is essentially the east-west lie of the land which means it should be just about identical to what it is at HC8.

Maybe you can explain to us what that all means.

MR. BEECHINOR: To find the extent of the highly fractured zone from pumping test 1, W1, based on where we got the effect in the observation wells, I think some of them have just been shown on the previous overlay. That information



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was plotted on here. For instance, we got the effect at MB13 at the deep piezometer and the intermediate piezometer. The same effect at MB16 at the deep piezometer and the intermediate piezometer. There are also other wells that were affected that are not shown on here.

We also identified a zone of discontinuity in HC8, two zones in HC8 actually, a third zone in HC8 actually. Since we didn't get the effect at the pumping well, an observation well installed at HC8, we were relying on using the discontinuity seen in that core hole to define the vertical extent of it. That is how we made that line.

Now, there is another piece of information. We used the borehole log from MB13. It showed, when you put it on this line in the section that the overburden did seem to dip a little bit at that point. That had an effect on where we drew the line. It seemed to dip and come back. The bedrock surface seemed to dip between HC8 and the pumping well 1. That seemed to have an effect on where we picked it.

DR. KINGHAM: It was a representation like the one on H-220 that included your pumping



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3 data and your strata, your geologic data that led
4 you to a similar kind of stylized presentation on
5 Figure 4 based on more or less the left to right
6 scale of H-220. Just so the Board will understand,
7 if we wanted to go from something like H-220 to
8 a model, we would perhaps redraw that with the
9 horizontal scale accurate as viewed in a proper
cross-section and see whether those zones match up.

10 MR BEECHINOR: Actually, Ms Vigod
11 had asked for that information. I don't think it
12 ever came forward in the subsequent testimony.
13 That information is on Exhibit H-219. It never
14 came out again after I provided it to Ms Vigod.
15 That is precisely what we have done. We have
16 put the information that we drew our interpretation on,
17 on drawing number 6, cross-section A-A. I think
18 what you see here is the lineation that we described
19 for the various hydrostratigraphic units. We
20 do, in fact, even in this diagram, 219, we did show
21 that towards Highway 403, the weakly fractured
22 shale unit, or the highly fractured shale unit, I
23 mean, has dipped to a slightly lower elevation than
24 we have projected it across the site.

25 DR. KINGHAM: Okay, turning back
your attention to H-220, how confident are you that



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the zones shown in that exhibit as yellow and red, don't pinch out between wells either way, either a red zone pinches out leaving you a less permeable one, or vice-versa?

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MR. BEECHINOR: Even in an overburden environment such as Site D, one can have some uncertainty about projecting, say, one of the granular units between one borehole to the next borehole. I think we have the same uncertainty here. We were able to show, for instance, the yellow defines areas where the rock was competent. We had a lower frequency of discontinuities. We set the information on the discontinuities in the bar graphs which are shown here, and then we correlated it by elevation. We were seeing fairly consistent units through the site between HC4 and say, HC8 following a general horizontal or a lateral extent at the same elevation. So, we felt comfortable with making this horizontal interpretation which is not inconsistent with the way this Queenston shale would have been laid down originally.

It would have been laid down flat in a shallow, salt, sea environment. It wasn't surprising to us once we looked at the discontinuities by elevation that we were able to correlate between



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drilling site to drilling site because that is the way the sediment was laid down.

DR. KINGHAM: Going back to my question to Mr. Sobanski earlier on, with regard to Site D, if it was laid down as a lake bottom at some time would ultimate layers of more and less permeable materials make sense to you as a geologist?

MR. BEECHINOR: Yes, I would think you would have to -- I would pass this on. I think Mr. Sobanski has a comment on this too. It would depend on what activity was going on during that, for instance, if there was some sort of tectonic disturbance or the way that the sediment was being laid down at that particular time, you might get a correlation of either a tight zone or a fractured zone. It also depends on the minerals I would think, that were deposited in that shallow sea environment.

For instance, I think we noted somewhere in the text that the competent units have a higher per cent of calcites. So, if the sediment being laid down in the shallow sea was calcite rich at that particular time, then it led to something



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which is more competent and less affected subsequently by any tectonic forces such as pressure release.

DR. KINGHAM: Okay, finally, or maybe not finally, have you got a copy of E-214 there and in particular Drawing D5, E-214?

That is Ms Hewetson's study, I believe.

MR. SOBANSKI: I was just thinking, Mr. Chairman, as Mr. Beechinor was describing. We have a problem here that has persisted for a while and that is the difference between geology and this hydrostratigraphy. The geology we talk about east to west as being fairly uniform but the fracture patterns don't seem to be entirely uniform. It is these fracture patterns that start to change thicknesses on these units because they are the factor that controls hydrostratigraphy.

In other words, we may thin up on a unit, although it might be in a straight east-west direction along the same lineation roughly, the same elevation. We may have interpreted it to thin out because we suddenly see competent units in the core and the fracture zone, you know, that we were correlating to in the pumping well has suddenly disappeared and what we are seeing now is nearly solid rock.



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3 So, consequently, although we have
4 the geological correlation, we have changed our
5 hydrostratigraphic correlation. In other words,
6 the hydraulics of the way the zone would behave
7 by thinning it up a bit, but now would be based,
8 because we just don't see any fractures in the core.

9 It may be in fact, that what you
10 were alluding to, would be correct. It is our
11 interpretation based on that particular core, but it
12 could be locally tight and in fact the unit might
13 extend a bit deeper, similar to what we found at
14 the pumping well is a possibility. This is an
15 interpretation based on trying to put everything
16 together.

17 DR. KINGHAM: Thank you.

18 Now, turning to Drawing 5 on E-214,
19 I will try to get you a page, page 25, that is the
20 one.

21 I just want to know from you, I see
22 on that drawing, do you have it?

23 MR. SOBANSKI: Yes, I do.

24 DR. KINGHAM: There are some lines
25 shown there below the ground going through the nests
of piezometers with 130 metres; 120 metres; 105
metres, and so on.



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3 MR. SOBANSKI: Yes.

4 DR. KINGHAM: Are those lines of
5 hydraulic head ?

6 MR. SOBANSKI: They are equipotential
7 lines.

8 DR. KINGHAM: Does one normally draw
9 lines perpendicular to equipotential lines to get
10 flow lines?

11 MR. SOBANSKI: Yes.

12 DR. KINGHAM: Would it be reasonable
13 for the Board, based on this diagram to draw flow
14 lines running down and to the right throughout each of
15 these equipotential lines?

16 MR. SOBANSKI: Yes, you could, keeping
17 in mind the vertical and horizontal distortion.
18 In fact, the lines would be more vertical than
19 indicated in this drawing, more vertical if you were
20 to reduce the vertical scale, then the lines would
21 flatten out a bit.

22 DR. KINGHAM: Those lines do go from
23 WAT-3 which is near the Bayview Park landfill close
24 the middle of Site F, right down to your discharge
25 area. Would the lines then, throughout that area
from 130 metres hydraulic head to
105 metres be going downwards in each case?



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MR. SOBANSKI: Yes, I believe what you are saying is there is still a downward potential at the bottom of each of those piezometers, yes, there is.

DR. KINGHAM: How does that square then with the model for discharge and in particular in the vicinity of Highway 403?

MR. SOBANSKI: Because the OW-18 hasn't been taken into account. The change in the flow system begins to occur in that area. There is a change in the flow system at about OW-18. We go into a far more horizontal system at that point as indicated by our observation well nest that was located nearby, HC9.

DR. KINGHAM: Or in fact, more than a horizontal flow, an upward flow requires some sort of loop around OW-18, equipotential loop.

MR. SOBANSKI: This again, we got into this a bit again in the model which pretty well predicts the same sort of configuration.

DR. KINGHAM: Okay.

MR. SOBANSKI: This was the thing of course that made us wonder what type of hydro-stratigraphy would give us this kind of loop as you have explained it by way of strong downward



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3 gradients on the site and then go to lateral
4 gradients after we go across 403.

5 DR. KINGHAM: And I really do just
6 have one final question for you. It is something
7 that has come up a number of times and despite the
8 number of times, was still not clear to me. If
9 you would look at the core log for HC85 which I guess
10 is going to be an H-40A. You can help me find it.
11 Which appendix is that, Mr. Beechinor? That is
12 Appendix 2, yes.

13 When you go to the core log, you go
14 to the part of the core log that appears, the first
15 part of it in fact starts at elevation 131.30 that
16 first page. Do you have it?

17 MR. SOBANSKI: Yes, I do.

18 DR. KINGHAM: I recall the discussion
19 on June 18th at which time you described fracture
20 zones in Appendix 2. You described some in a 10-
21 centimetre section as fractured and the next 10-
22 centimetre section as not fractured and the next
23 10-centimetre section is fractured and so on. I
24 look in the middle of that page in Appendix 2 and
25 see fracture zones. You see what I am getting at?
You would say that there is a fracture zone for
instance from 23.5 to 23.55 metres.



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MR. SOBANSKI: Yes.

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DR. KINGHAM: Then there is not one
presumably to 28.5. Then there is again one from 28.5
to 28.9. Presumably not for five centimetres
more. That is to say to 28.95 but there is again
a fracture zone for another 60 or 70 centimetres.

MR. SOBANSKI: Yes.

DR. KINGHAM: The question that comes
to my mind is that looks to me like you have got
really a zone with a whole bunch of little fractures
and a whole bunch of little competent pieces
between them. Is that best described as a
competent zone or a fractured zone in its broadest
extent?

MR. SOBANSKI: We will find out how
Mr. Beechinor put that on those logs.

MR BEECHINOR: Well I think it is --
even between the fracture zones noted there can be
some competent zones. I think the important thing
to recognize is where these fracture zones have not
been reported. Then they are competent.

DR. KINGHAM: So, how would you have
us read that information as we consider this
evidence?



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3 MR. BEECHINOR: A fractured zone,
4 starting at a fractured zone. I think in many cases
5 it is difficult, it probably wasn't necessary to
6 say top and bottom of a particular fracture. You
7 could probably have reported it as a single number
8 and made things a little bit easier. So there
9 was a fracture at 10 metres. It shows it going to
10 10.1. We could just say there was a fracture at
11 10 metres. There is also a fracture at 10.5 met-
12 res. There is a fracture at 10.7 metres and so
on. In between it there isn't a fracture.

13 DR. KINGHAM: Okay. You would
14 encourage us to just look at that in terms of zones
15 in which you would say 10 metres to 11.92 is more
16 or less fractured, yet I am reading that same area.
17 I am taking the first number in your fractured
18 zone, the 0.0 and going through the small spaces
19 to 11.92 and saying essentially that almost two
metre space has got a number of fractures in it.

20 MR. BEECHINOR: That's right, you
21 could look at it that way.

22 DR. KINGHAM: The next, almost five
23 metres, you don't find it.

24 MR. BEECHINOR: That's right.

25 DR. KINGHAM: Then from 16.9, there



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Sobanski, Beechinor

is just that one fracture.

MR. BEECHINOR: There is one fracture there.

DR. KINGHAM: There is one fracture at 23 and a bunch of them between 27 and 30.

MR. BEECHINOR: That's right.

DR. KINGHAM: That's how we should understand this information.

MR. BEECHINOR: That's right. You would also now have to add the other information into it too. For instance, if you look at just below that, the clay mud seam, there was a clay mud seam at 10.7 metres. You have to put all of the information in that summary together to get the full picture of all the discontinuities over that core run.

DR. KINGHAM: Which would be this.

MR. BEECHINOR: Which would be that.

Can I just add one more thing? I just made a quick check of the scale distance. In total, I think the scale is correct. The distance between HC4 and HC14, you just drew on here is about 900 metres. That is, I just quickly scaled this off, that is about 900 metres too.

So, it was intended to have a lateral



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Sobanski, Beechinor

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3 horizontal scale to it. It is just the way the
4 information is reported. By going from one
5 drilling site to another it is not a true scale at
6 that microlevel.

7 DR KINGHAM: The difficulty with it,
8 I felt was, and why I asked the question is that
9 the spacing between HC4 and HC3 was two centimetres
10 on D5 and between 3 and 7 with three
11 centimetres. Yet on this map, 3 and 7 are miles
12 apart. Similarly, between 7 and 6, that should be
13 the same separation as was the case between 3 and 7,
14 but clearly it is not.

15 MR. BEECHINOR: That is right.

16 DR. KINGHAM: Thank you both very
17 much for your patience and clarification.

18 Mr. Hodgson, I return them to your
19 care.

20 RE-EXAMINATION BY MR. HODGSON:

21 Q. Mr. Beechinor, before we
22 get started, I wonder if you could put up Drawing
23 18 from Exhibit H-39, which shows the upper
24 granular unit at Site D and also while you are
25 looking, Exhibit M-158. Exhibit M-158 is a
map very similar to Drawing 18 that was prepared



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by Mr. Estrin.

I wonder also, Mr. Beechinor, if you
can also find cross-section E-E from Exhibit H-39.

Now, Mr. Sobanski, I first want to
read to you, a series of excerpts from Mr. Estrin's
cross-examination of you, which took place on
September 17th. It is found in Volume 29 of the
transcript. You don't need Volume 29 of the
transcript. I am going to read three or four
questions, a series of questions from Mr. Estrin.
I am not going to read to you your answers because
they are not really all that pertinent. I just
want to, first of all, they are not pertinent to
my question. They were clearly pertinent to his
questions.

I want you to understand the
suggestion that Mr. Estrin was making to you. He
said at page 6215 of the transcript, and here he is
referencing a cross-section. He says:

"Can I stop you there? Where is
the upper granular unit in the hole
closest to the First Line shown on that
section,..."

Now, on cross-section E-E, can you
just identify for us where is the hole closest to



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First Line in the upper granular unit?

MR SOBANSKI: The hole closest to
First Line that shows the upper granular unit
would be HC-5-84 about in the middle of the site.

Q. Can I ask you to highlight
that in yellow on Exhibit H-171?

Now, to repeat, Mr. Estrin says:

"Where is the upper granular unit
in the hole closest to the First Line
shown on that section as I don't
see it? I don't see it,
Mr. Sobanski. In fact, I don't see
it for most of the site."

Then, at page 6216, Mr. Estrin
continues with this thing.

"What I am seeing, looking at Drawing
Section E-E from the First Line,
except in one little area of the
site, I can't see any upper
granular unit coming over to the
First Line."

Then at page 6218, Mr. Estrin
says finally:

"I don't see any indication of the



1 8904 Sobanski, Beechinor,
2 re-ex (Hodgson)

3 upper granular unit except in that
4 narrow area between two boreholes
5 on Drawing E-E --on E-E I don't see
6 it coming over to First Line, period."

7 Now, that is a series of questions
8 which Mr. Estrin put to you. He was suggesting
9 to you that the upper granular unit which you have
10 drawn on Drawing 18, which is reconfigured for
11 other purposes as H-171, he is putting to you that
12 the upper granular unit does not go to the First
13 Line.

14 Now, could I ask you, Mr. Sobanski,
15 to bring out Exhibit 158RB and 158RD?

16 Perhaps we could start with Exhibit
17 158RD. Now, Mr. Sobanski, you have got a tight
18 space to work in, but what I am asking you to do
19 is move across now to Exhibit M158 and first of
20 all with an orange pen simply indicate to the Board,
21 just with one little mark at the top and one little
22 mark at the bottom, where Mr. Estrin's cross-section
23 158RB-RB ' occurs.

24 All right, so you have it going down
25 First Line?

A. Yes, it is.

Q. Could I ask you to take the



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yellow highlighter which matches the yellow that Mr. Estrin has used for the upper granular unit on 158RB-RB' and looking first of all at 158RB-RB' identify the upper granular unit on 158RB-RB' , identify the upper granular unit.

A. In what way, just with Xs again?

Q. No, I want you to just indicate again first of all, can you locate, can you transfer, what I want you to end up doing is draw a line on M158 down the First Line showing where on Mr. Estrin's cross-section, he shows the upper granular unit to exist. Then perhaps just for the record, can you indicate where you are drawing that on Exhibit M158? From how far above the site to where in the site?

A. It would extend about 450 metres north of the site to the vicinity of Morrison Beatty OW-2 which would be located about 200 metres north of the south end of the site.

Q. Could I also ask you to carry out the same exercise with cross-section RD-RD'? First with the orange highlighter, indicate where the cross section occurs on Exhibit M158.

A. Yes, it is done.



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Q. Then, just pausing briefly,
Mr. Chairman, we have a small problem at this point.

Mr. Estrin, when he first put these
Exhibits M158 and M158RB-RB' and RD-RD' to the
witness in fact handed out a package of cross-
sections to everyone and that package was given to
the Board. In fact, last night we checked and
found on Ms Tanner's bottom shelf, I think it is
there now, the four cross-sections.

Mr. Chairman, I suggest that for
completeness, the two cross-sections that have not
yet been marked should be marked since they are in
possession of the Board and we should be able to
make use of them for this re-examination in order
to make Mr. Estrin's exhibit complete since
M158 is shown with four cross-sections and we
only have two in evidence.

DR. KINGHAM: We will have to sort
them out. I know we all have copies of them.

MR. ESTRIN: Mr. Chairman, I would
like to address the Board on that matter.

What Mr. Hodgson is now doing is
really speaking to ask the Board to deal with a
document about which the Board has heard nothing
because I don't believe my friend's witnesses have



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spoken a word about those latter documents.

We will be calling witnesses with regard to cross-sections of a nature similar to those. They may or may not be the same, because if you will recall those cross-sections are marked preliminary. I don't know whether the final version will be the same or not. At this time I have no idea. The point is that, I guess, the witnesses could be asked to comment on them assuming they have some reason to agree that the information on them is accurate in their opinion.

I think before Mr. Hodgson asks, any questions relative to ones that have not yet been numbered and to which the witnesses have not addressed themselves they will have to deal with the question of whether they can express any opinion as to the validity of the information on them. Otherwise, I don't see how we can put them in.

DR. KINGHAM: Did you not want these entered as exhibits, Mr. Estrin?

MR. ESTRIN: I am just saying there is no information. We will be calling the person who did these. It shouldn't be referred to as my cross-sections because obviously they were drawn by Geocon Consultants. I know it is



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1 just a figure of speech. I have no difficulty.
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3 What I am saying is, I have no difficulty in the
4 witnesses being asked to answer questions relative
5 to these drawings which the Board and other people
6 have, but I am saying that until there is some
7 basis upon which these witnesses can say the
8 information on there is accurate, I don't see how
9 we can ask them to then start drawing lines on some
10 other exhibit.

11 DR. KINGHAM: The Board has had
12 access to these exhibits, the Board
13 has not heard any evidence
14 on these exhibits. I think I can confirm with
15 my colleagues that we have not studied these
16 exhibits, is that right; nor have I. So, the
17 option is clear, it seems to me to either enter as
18 exhibits, those which were discussed in your cross-
19 examination or to enter all of these in anticipation
20 that you are going to be needing them subsequently,
21 but to not entertain questions on those which we
22 did not hear previous cross-examination on.

23 MR. HODGSON: I think, Mr. Chairman,
24 we have already established that the exhibits have
25 been put to these witnesses on the basis that they
were subject to further proof. With great respect



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Sobanski, Beechinor
re-ex (Hodgson)

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3 to my friend, I think these are four exhibits that
4 are put on the basis that they are subject to
5 further proof and my friend indicates they will be
6 subject to further proof.

7 In the meantime, you have them.
8 You have had them now for three-and-a-half months.
9 It seems to me that it is time we marked them at
10 least for identification purposes.

11 DR. KINGHAM: The problem is not with
12 marking them, Mr. Hodgson, the problem is whether we
13 are going to go into questions or re-examination on
14 matters which we have not heard concerning ...

15 MR. ESTRIN: Exactly, you know there
16 have been no questions asked about the ones other
17 than the ones that have been referred to. That
18 is the real difficulty. What we are doing is
19 starting the examination and re-examination and
20 cross-examination over again of these witnesses
21 relative to documents that have not been discussed
22 at all.

23 DR. KINGHAM: Excuse me just a
24 moment.

25 We will enter these as documents
subject to further proof. You will have to assist



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re-ex (Hodgson)

us as to how they should be numbered because it is not immediately obvious what the final distinction is. It might be the number in the lower right-hand corner.

MR. HODGSON: Each one is a cross-section, Mr. Chairman. I think you will find there as a cross-section, RG-RG' and a cross-section, I think, RH-RH'.

DR. KINGHAM: Would it be simplest for the purpose of marking them to work from the numbers in the bottom right-hand corner that appear to be sequential? They are 2, 4, 5 and 3. No number 1. I see that you have already called that 158 RB-RB'. Okay, you are suggesting we exhibit the remaining ones as M-158RH-RH' and RG-RG'.

--- EXHIBIT NO. M-158 RH-RH': Cross-section.

--- EXHIBIT NO. M-158 RG-RG': Cross-section.

MR. HODGSON: I am asking permission to use these for purposes of this re-examination since Exhibit 158 and two of these cross-sections



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re-ex Hodgson)

1 have been put into evidence. M-158 shows clearly
2 that there are four cross-sections and everyone in
3 fact has had possession of these four cross-sections.
4 We now have an incomplete exhibit if we only have
5 two cross-sections and are not permitted for some
6 reason to use the other two cross sections.
7

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9 With great respect it seems to me that
10 if M-158 is going to be in evidence,

11 it should be in evidence as a complete exhibit and
12 we should have the use of it as a complete exhibit.

13 MR. ESTRIN: They can go in as
14 documents which may or may not, which would be
15 revised in the future or may not be. I don't know.
16 The point is that, as I say, I don't have any
17 difficulty with Mr. Hodgson asking the witnesses
18 to deal with them if these witnesses are capable
19 of saying, based on their studies, that the informa-
20 tion on them is accurate. Otherwise, why bother?

21 Mr. Chairman, when I put in the first
22 of these I think you will recall there was a lot of
23 time spent while these witnesses looked at them,
24 compared them to their own notwithstanding the fact
25 that they had looked at them previously overnight.
If we are now going to get these witnesses to look



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Sobanski, Beechinor
re-ex (Hodgson)

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3 at further ones, then they had better, I think,
4 satisfy themselves that they are happy with the
5 information on them as to its accuracy.

6 MR. HODGSON: I read to the Board
7 from Mr. Estrin's cross-examination where he wanted
8 to have the upper granular unit disappear for the
9 purpose of his cross-examination. I wanted to
10 have these witnesses show the Board that he was quite
11 happy to have the upper granular unit in place when
12 he started this cross-examination. The
13 contradiction is somewhat meaningful in light of
14 other questions he asked which I will come to later.
15 All I am asking to do is show the Board from
16 Mr. Estrin's exhibit where Mr. Estrin says the
17 upper granular unit is and then I am going to ask
18 these witnesses whether or not, once they have drawn
19 it on Exhibit M-158, I wanted them to transpose
20 that information to drawing 18, Exhibit H-171 and
21 ask them the extent to which they agreed or dis-
22 agreed with Mr. Estrin's interpretation of where this
23 upper granular unit in fact is.

24 It is a limited purpose because it
25 doesn't require these witnesses confirming all of
the information on these other two cross-sections.
I am really only going to refer to the upper granular



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Sobanski, Beechinor
re-ex (Hodgson)

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3 unit and see whether or not Mr. Estrin's drawing of
4 it matches really theirs from Exhibit H-171.

5 DR. KINGHAM: We have allowed this
6 to be exhibited in its entirety. It was brought
7 in by Mr. Estrin. It is two-fourths of it at
8 least subject to proof but we will allow the
9 question on the very topic which is being addressed,
10 namely the upper granular units.

11 MR. HODGSON: Mr. Chairman, if I could
12 ask you to loan the witnesses your copies of RG-RG'
13 and RH-RH' and Mr. Sobanski could complete the
14 exercise.

15 MR. ESTRIN: Before Mr. Hodgson
16 continues, I would like to make a couple of points
17 for the record.

18 One is there is no warranty made by
19 me that these other documents will or will not be
20 addressed in the same form. They will be addressed
21 there will be cross-sections, the same cross-
22 sections, cross-sections dealing with the same holes.

23 Whether or not there will be any
24 changes, I can't say. Because as I said, this was
25 preliminary work. But, I think the only fair way
that Mr. Hodgson can put his questions is if we all
understand that they are on the assumption that he is



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Sobanski, Beechinor
re-ex Hodgson)

asking these witnesses simply to assume that whatever units, for example, the granular units that are illustrated on M-158 or RB-RB is, assuming that that is an accurate representation of those units to transfer it somewhere else.

The Board, of course, cannot take it unless these witnesses wish to agree with it on the basis of their own knowledge, or their own professional opinion that the lines that they are now going to be asked by Mr. Hodgson to draw on M-158 demonstrate the actuality of the upper granular unit.

DR. KINGHAM: We are aware of your concern and your objection in this matter and we will be carefully watching.

MR. HODGSON: I can't, Mr. Chairman, let this go without commenting that where the usual practice is to put a document to a witness subject to further proof, Mr Estrin now seems to wish to put a document to a witness on the basis that he can withdraw it at a later date rather than prove it. He appears to want to put in evidence to show that what he was putting to the witness, he now wants to deny. I con't think he can have it both ways, with the greatest respect, although we may just see that happen before the end of this hearing.



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Sobanski, Beechinor
re-ex (Hodgson)

MR. ESTRIN: If Mr. Hodgson is going to continue, what I would like to do is continue the examination of these witnesses before he gets to in effect re-examine them. How can we have re-examination on something that hasn't been examined, with the greatest of respect?

DR. KINGHAM: As the Board understands it, the re-examination is on the location of the granular unit which was a matter of cross-examination.

MR. HODGSON: And Mr. Estrin put to the witnesses, it didn't exist. I want to show from his own exhibit where it is.

MR. ESTRIN: That is not correct. I was simply referring these gentlemen to their exhibits and saying on their exhibits I don't see it. I think they are perfectly entitled to look at the documents Mr. Hodgson wants them to look at and see if there is a difference, fine, but on the understanding we have just discussed that in order for that to have any demonstrable evidentiary usefulness, they either have to say they agree with our exhibit or not.

Mr. Hodgson, do you want to ask them that first, before we do this exercise, otherwise it becomes quite meaningless?



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Sobanski, Beechinor
re-ex (Hodgson)

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MR, HODGSON: Q. Mr. Sobanski, can I ask you to take cross-sections RG and RH and carry out the same exercise on Exhibit M-158 to show where on these two cross-sections, the upper granular unit is shown to extend?

MR. SOBANSKI: A. If I may, Mr. Hodgson, I have to make a small change on RB-RB'. On the cross-section that is shown on M-158, RB-RB', the lower granular unit becomes the upper granular unit and vice-versa. I have extended the upper granular unit too far on this drawing. I just misread the cross-section.

Q. Perhaps you could withdraw it in orange.

A. I will withdraw it in orange.

DR. KINGHAM: So, the portion now marked in orange is not part of the unit.

MR. SOBANSKI: It no longer exists, Mr. Chairman.

If I could then, for the record, come back and give that scale. That would mean that the unit would now extend approximately 200 metres north of the proposed landfill site.

MR. HODGSON: Q. Could you draw on from the other two cross-sections where the upper



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granular unit isn't interpreted to exist.

MR. SOBANSKI: A. I will endeavour
to do that.

First, we are dealing with, we will
mark RH again in the orange crosses which is running
east to west -- or sorry -- west to east across the
site. Now, we will try the upper granular unit.
Where there are question marks on Mr. Estrin's
drawings, I will put it in as a dashed line on
M-158. That completes RH-RH'.

Q. I am having difficulty seeing
it. On RH-RH' is the unit interpreted to extend
past the First Line to the west?

A. Yes, it is, it extends past
well 4074 as a dashed sort of an interpretation
extending to the west of First Line. It extends as
a potential interpretation to the -- also to the east
of HC-5-84 for about 100 metres or so.

RG-RG' starts from the south, in the
southwest corner of Exhibit M-158 and then runs to
the north, roughly to the northeast corner of M-158.

Q. Mr. Sobanski, I wonder if
you would -- perhaps you would move H-39D so as
we have a clear view of H-171 beside you.

I wonder, comparing the yellow markings



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of M-158 with H-171, if you could advise the Board as to whether or not you now wish in any way to revise the contours you put on Exhibit H-171 or where do you now interpret the upper granular unit to extend.

In particular, does it extend to the west at the First Line?

A. In fact, the interpretations are fairly close other than in the vicinity of HC-1-85

where we didn't call having any of the unit. We did not have information for Morrison Beatty INOW-3, so we had no way of knowing whether or not it was in any unit. So, there is a little bulge in the area that should perhaps be shown as a bulge in the area of MBINOW-3, just to the north of our HC-2-85. The remainder of the interpretation is fairly similar other than in those two areas. We certainly did show an extension to the west of First Line which could be connected to the wells to the west of that road.

Q. Do you agree or disagree with Mr. Estrin's question to you that the upper granular unit does not extend over to the First Line?

A. I believe our interpretation



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Sobanski, Beechinor
re-ex (Hodgson)

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is that it does extend over to the First Line.

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DR. KINGHAM: Perhaps we will take a

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break for 15 minutes and resume at about 3:30.

6

7

--- Recess

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DR. KINGHAM: Thank you, please be

seated.

10

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MR. ESTRIN: Mr. Chairman, I think

12

I found the mounted versions of these two other
cross-sections. So the Board can have theirs.

13

back. I think I located the other two mounted
versions.

14

15

In other words, I think the witnesses

16

borrowed the Board's. I will just mark them and
throw them into the pile.

17

18

DR. KINGHAM: Mark them in the same

19

way we marked the others then in M-158, RH-RH'
and RG-RG'.

20

21

Those are the same as the ones that
the Board has?

22

MR. ESTRIN: I hope so.

23

MR. HODGSON: Q. Mr. Sobanski, if

24

I could ask you to turn to Exhibit H-39 at page 94.

25



1 8920 Sobanski, Beechinor
2 re-ex (Hodgson)

3 DR. KINGHAM: Page please?

4 MR. HODGSON: Page 94 of H-39.

5 Q. On page 94, you have modelled
6 the contaminant pathways. One such pathway reads
7 "lateral migration through granular units." Does
8 that mean that you have put both units together?

9 MR. SOBANSKI: A. Yes, we did.

10 Q. To go back to Mr. Estrin's
11 cross-examination, if you were to accept Mr. Estrin's
12 question to you that the upper granular unit
13 doesn't exist or doesn't exist over towards the first
14 line then would that change the way in which you
modelled lateral migration through the granular unit?

15 A. If they didn't exist, yes,
16 it would come out of the model.

17 Q. If the upper granular unit
18 didn't exist, you would model the lower granular
unit; correct?

19 A. Yes.

20 Q. Can I ask you to go back to
21 page 88?

22 When you modelled the granular units
23 together, you selected a hydraulic conductivity
24 of 8×10^{-3} . Is that the conductivity in the upper
25 unit, the lower unit, or both on an average?



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Sobanski, Beechinor
re-ex (Hodgson)

A. It is the conductivity of
the upper unit.

Q. If the upper unit didn't
exist, as per Mr. Estrin's question to you, what
K value would you accept for this equation?

A. We would now use a K value
of 3.3×10^{-4} . That comes from page 46 which is
the results of the pumping test on the lower granular
unit.

Q. Would it cause you to change
any of the other inputs to that equation, hydraulic
gradient and effective porosity?

A. No, they would remain about
the same.

Q. How would that substitution
of a new K value for the lower granular unit affect
travel times in the calculation of this contaminant
pathway?

A. It would reduce -- sorry --
it would increase the travel time significantly.

Q. I am sorry?

A. It would increase the travel
time significantly.

Q. Reducing the hydraulic
conductivity to read the conductivity now in the lower



1 8922 Sobanski, Beechinor
2 re-ex (Hodgson)

3 granular unit?

4 A. Yes, would you like me to
5 calculate it for you?

6 Q. Yes.

7 A. You will have to pardon me.
8 I have taken some stuff for my throat here, and
9 my brain is a little fuzzy.

10 Q. Can you eyeball it? Is it
11 half a magnitude?

12 A. Yes, it is at least half a
13 magnitude difference.

14 Q. If it were just a half
15 magnitude difference that would increase the travel
16 time by how much?

17 A. Five times.

18 Q. I think that is sufficient
19 for the purposes of my question, Mr. Sobanski.

20 Still looking at Table 10, Mr. Estrin
21 asked you a number of questions about the input
22 factors in calculating the linear groundwater
23 velocity in the weathered upper till.

24 A. Yes.

25 Q. I just want to have you
confirm, if you would, on Exhibit H-170A, there
was a recalculation of the hydraulic gradient in the



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Sobanski, Beechinor
re-ex (Hodgson)

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2
3 weathered upper till. H-170A was a small piece
4 of paper with the calculation on it. You got
5 0.0052. I just want to ask you now whether or not
6 we should make a substitution on this document for
7 0.0052 from 0.004 for the hydraulic ...

8 A. We can. It wouldn't make
9 a large difference. It would be something in the
10 order of 20 per cent.

11 Q. Now, Mr. Estrin also asked
12 you about a possible substitution of the figure
13 that you used for effective porosity and he sub-
14 mitted -- he put to you, Gartner, Lee's Report on
15 this same site which is exhibited as Exhibit M-155.
16 He suggested to you that the effective porosity
17 should be 0.0001, three zeros. What I wanted
18 to ask you is, from Exhibit M-155, Gartner, Lee say:

19 "The fracture porosity is considered
20 to be approximately 0.0001 and it
21 is based on the Desaulnier 1981
22 investigation in similar fine textured
23 deposits."

24 Have you had an opportunity to
25 review Desaulnier 1981 report?

A. I haven't reviewed Desaulnier
1981 but I know of the sites that he looked at.



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Sobanski, Beechinor
re-ex (Hodgson)

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Q. Do you know where he derived that porosity figure? "He" being Desaulnier derived that porosity figure from?

A. Desaulnier was working on sites in the southwestern Ontario in the Sarnia, Wyoming area.

Q. Do you accept the substitution of 0.0001 for the effective porosity you have used on Table 10 in Exhibit H-39?

A. I don't believe it is necessary to change the porosity value. It is an estimate in any event. The velocity is relatively high and it is a zone that would have to be monitored. As I have said in practice we haven't seen these large types of velocities in weathered till in any event.

Q. Now, on Exhibit -- sorry, on Table 10, you show an effective porosity in the weathered upper till of 0.25, which is substantially different.

A. The unweathered upper till?

Q. The unweathered upper till 0.25 is substantially different from the effective porosity you have used in the weathered upper till.

A. Yes.

Q. Could I ask you to turn to page 63 of H-39?



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Sobanski, Beechinor
re-ex (Hodgson)

The last two sentences on that page:
"Also, the rate of tritium advance indicates that the effective porosity of the weathered upper till is similar to unweathered till. Nonetheless, to maintain a margin of safety in the impact assessment calculations, the hydraulic conductivity of the weathered upper till is assumed to be 1×10^{-5} centimetres per second and the effective porosity is 0.001."

I just want to know why you have chosen 0.001 when you have indicated in the previous sentence that the effective porosity of the two units could be the same and the effective porosity you have chosen for the unweathered till is 0.25?

A. It is to be conservative and to recognize a common point of argument in these hearings on how rapidly contaminants can travel in the weathered zone. So, we have attempted to be conservative and take that into account.

Q. Is the selection for the weathered upper till of 0.25 a reasonable selection?

A. For the unweathered upper till,



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Sobanski, Beechinor
re-ex (Hodgson)

I am sorry, I believe so, yes, the approximate porosity for tills.

Q. Would it also be reasonable for the weathered upper till?

A. Based on the tritium, based on the tritium information it could have been used in the weathered upper till.

Q. Thank you.

Now, again looking at this Table 10, Mr. Estrin has suggested to you that you should have used an effective porosity of 0.0001. Using such an effective porosity, you would get travel time through the upper weathered till of approximately one order of magnitude greater; is that correct?

A. Yes, that would be right.

Q. That would mean, going now to page 96, first of all from page 96 you have -- you calculated the travel time to the boundary as five years. If Mr. Estrin's selection of 0.0001 is taken what would be the travel time to the boundary?

A. It would be about 0.5 years.

Q. In your view, is that a reasonable amount of time?



1 8927 Sobanski, Beechinor
2 re-ex (Hodgson)

3 A. I don't believe so. It
4 would be far too rapid.

5 Q. What is your worst case
6 travel time from the landfill to the boundary should
7 a failure occur?

8 A. Our worst case was the five
9 years.

10 Q. Are you aware of monitoring
11 of flows of this kind in weathered till being done
12 by any other scientist in this province?

13 A. Yes, I am.

14 Q. Do you know anything about
15 the results that they are finding?

16 A. There are some studies being
17 carried out at the Tricil site and under a unit
18 gradient drive they found velocities in the
19 weathered zone of one metre per month. That is
20 under unit drive, which would mean under these
21 conditions of this hydraulic gradient, it would
22 only be 4/1000ths of that. So, it would be
23 very, very slow in fact at these very low gradients.

24 Q. The Tricil site you are
25 referring to is the Tricil site that you gave
evidence on?

A. Yes.



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Sobanski, Beechinor,
re-ex (Hodgson)

Q. The results that you have just reported to the Board, how did they affect your opinion to the Board as to what a worst case travel time would be through the upper weathered till at Site D?

A. The worst case travel time, I think, is one that we have given here, but in fact I have for some time been of the opinion that the groundwater velocities in weathered zones of tills are very low and that in fact what we may be seeing is where we see water level fluctuations of four and five feet in these zones. It may well be due to evaporation and evapotranspiration in the water table, in fact, there is very little movement in fact and the rises and falls we see are created by water just being evaporated from that material.

I believe they are very slow in these materials.

Q. Now, Mr. Sobanski, changing subjects, I want to take you back to Mr. Estrin's cross-examination in which he put various scenarios to you of possible breakdown in the leachate collector tiles underneath Site D and what might happen as a



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Sobanski, Beechinor,
re-ex (Hodgson)

result.

First, I would also like to take you back to Mr. McQuaid's cross-examination and his Exhibit H-212. I am sorry, it is B-212 and it is one piece of paper, Mr. Sobanski, it looks like this.

A. Yes.

Q. Now, first, if there is a failure of the under-drains, just looking at Exhibit B-212, what would be the effect of the drainage layer marked as 3 on Exhibit B-212, and the leachate drain, should the kind of failure that Mr. Estrin suggested occur?

A. If you want me to assume a failure as indicated by Mr. Estrin of the internal tiles all failing and what would be the effect on the leachate drain in this drawing?

Q. Yes?

A. In the Estrin scenario, as I recall, the leachate drain at the edge of the fill would continue to work and the internal tiles would fail.

Q. How would that affect mounding within the site?

A. We threw some large mounds



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Sobanski, Beechinor,
re-ex (Hodgson)

1 into the site. I don't recall exactly what the
2 value was, but it certainly was well above ground
3 level. It would be difficult again to envisage
4 that sort of thing occurring. It would mean that
5 leachate would come out of the side of the landfill
6 in my opinion.
7

8 Q. Would this leachate drain
9 continue to be effective though in controlling the
10 mounding?

11 A. Well, if it is working, it
12 would be controlling the mound on the edge of the
13 site, but wouldn't be controlling the mound inside
14 the site, if we failed all the tiles inside the
15 site.

16 Q. If it controlled mounding at
17 the edge of the site, how would that affect
18 migration, lateral migration of leachate out the
19 side of the site and through the upper granular
20 weathered till?

21 A. In terms of the weathered
22 unit, this would still control the weathered unit.

23 Q. Could I ask you to get out
24 Drawing 2 from the Design and Operations Report?
25 The site design for Site D and I think you have
got it mounted there somewhere. It will be H-41



1 8931 Sobanski, Beechinor,
2 re-ex (Hodgson)

3 Drawing 2.

4 I just wanted to ask you,
5 Mr. Sobanski, there are a series of dots on this
6 figure. What do those dots represent?

7 A. Those are manholes, clean-out
8 manholes.

9 Q. If there is a failure in the
10 under-drains, a potential failure of the leachate
11 toe drains, what use would those manholes be?

12 A. They would be used for
13 cleaning out failed tiles or drains.

14 Q. Do you have any views which
15 you could share with the Board as to whether or not
16 clean-out is possible of these tiles?

17 A. As far as I know, it is.
18 It would be standard sewer design. The tiles have
19 been cleaned before in other locations.

20 Q. Now, supposing a malfunction of the
21 underdrains, is there any means that you could
22 recommend for monitoring leachate height within the
23 cells of a landfill at Site D?

24 A. It would seem to me that if
25 we were to fail the system in that manner that
monitoring the manholes themselves would give some
indication as to whether there has been failure.



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Sobanski, Beechinor,
re-ex (Hodgson)

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They are located around the cells.

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Another possibility would be upon completion of a cell is actually constructing a well right into the cell itself. Another possibility.

Q. If you constructed a well right into say the middle of one cell ...?

A. Yes.

Q. Would that make it possible to monitor any mounding occurring in that cell?

A. Yes, it would.

Q. Are there any other mechanical, technical engineering methods for monitoring, say in the middle of the cell aside from putting a well into the middle of it?

A. I suppose one could work with something like a pressure transducer or something of that nature. I don't know how well it would work in leachate service. There may be some other method. We normally work with the simpler methods such as wells which are positive.

Q. What is a pressure transducer?

A. It would be a device for measuring pressure to see if there was a pressure buildup within the cell itself or a fluid level building up.



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Sobanski, Beechinor,
re-ex (Hodgson)

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Q. Are you aware of any pressure transducers in any other landfill sites presently in Ontario?

A. I am not sure about the Maple liner. They may be using that type of a device at Maple, but I am not aware of any sites that are using that type of device.

Q. Whether or not a leachate mound is monitored by use of a well or a pressure transducer, should monitoring detect a buildup, a substantial buildup of a mound at one of the sites. Are there any engineering methods available to reduce a mound?

The assumption is that the under-drains have failed and clean-out at this point isn't effective and the mound can't be reduced by that method. Is there any other engineering solution to reduce a mound in the middle of a landfill?

A. I would think that it may be possible to pump the cells. This has been undertaken at one site by Mr. Beatty, was to physically put a well in and pump the liquid level down in the cell, using a pumping well within the waste.

Q. If there should be a failure to the point that, say you as the person in charge



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Sobanski, Beechinor
re-ex (Hodgson)

1 of monitoring were concerned about the level of the
2 head in the cell, would you recommend that as a
3 method of controlling the head in the cell? I
4 am assuming a failure scenario now of the kind
5 Mr. Estrin suggested?
6

7 A. I would consider it. I
8 would think I would have to see, first of all, the
9 effects of -- I would like to see the effects of
10 the monitoring system itself. Is it a problem
11 or isn't it? The environment can accept some
12 leachate. To me, the backup systems that can be
13 considered for the site would be put into place if
14 it were demonstrated that a problem exists. I
15 would want to see, for example, if it were a partial
16 failure and a little bit of leachate were escaping,
17 the environment can assimilate some of that.

18 Monitoring would tell us whether we
19 have to go to some other form of backup system. It
20 could be pumping cells, it could be the methods we
21 have discussed.

22 Q . Going back to any concern that
23 has been expressed about migration, leachate laterally
24 through the weathered till, I am taking you back
25 to Exhibit B-212, this document of Mr. McQuaid's.

Mr. McQuaid's solution number five is



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Sobanski, Beechinor
re-ex (Hodgson)

to install a perimeter drain. I wanted to ask you if you would turn to page 131 of your Exhibit H-139 which talks about perimeter drains, and if you could just advise the Board as to whether or not the solution Mr McQuaid is suggesting compares in any way to a solution that you are suggesting at page 131.

A. Yes, it is pretty much the same type of device.

Q. Now, Mr. Estrin, turning to a different subject ...

A. I am Mr. Sobanski!

Q. I am sorry, Mr. Sobanski.

MR ESTRIN: I would be happy to answer.

MR. HODGSON: I am afraid he will withdraw his evidence, otherwise I would call him.

Q. Mr. Sobanski, can I ask you to take out Exhibit M-162? I don't know what yours looks like but mine looks like this at this point. It has got so much scribbling on it, I think we should ask Mr. Estrin if he can provide us with new, clean, unscribbled-on copies so we can start scribbling over again.

A. I may need to be provided



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Sobanski, Beechinor
re-ex (Hodgson)

with a copy.

DR. KINGHAM: That was M-162?

MR. HODGSON: Yes.

Q. Now, first, Mr. Sobanski,
what is your understanding, first of all, we are
talking here on Exhibit M-162, about the contaminant
pathway through the upper till unit and the upper
part of the lower till unit to the granular units
and then, I guess, actually it is an upper granular
unit in this example although we have it disappearing
later, but Mr. Estrin here, I think is referring to
the upper granular unit.

Then, from the upper granular unit,
off-site, do you recall first of all, from Exhibit
H-39, what was the calculated travel time following
that pathway that you and your group achieved?

A. On page 102 of the report?

Q. H-39?

A. Yes, page 102 under
discussion, the time to arrive for non-absorbed
or weakly absorbed contaminant would be in the order
of about 60 years.

Q. From Exhibit M-162, I believe
that Mr. Estrin has calculated the travel time of
approximately 10 years going that same pathway; is



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Sobanski, Beechinor
re-ex (Hodgson)

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that correct?

A. Using the lower value, yes it
is nine years.

Q. But if you accept his mounding
of leachate and his calculation of the hydraulic
conductivity in the upper till unit, it is eight
years?

A. I see the number you are
referring to; yes, that is right.

Q. And his fastest travel time
below is less than 2.4 years?

A. Yes.

Q. So, we would have approximately
10 years as the fastest travel time according to
Exhibit M-162?

A. Yes.

Q. Just taking you through this
document, first, you have calculated in Exhibit
H-39, and then recalculated on Exhibit H-172A,
the origin of the hydraulic conductivity in the
upper till as 8×10^{-8} .

A. Yes.

Q. What is your current view
of what the hydraulic conductivity of the upper till
unit is? You were cross-examined at length on



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Sobanski, Beechinor,
re-ex (Hodgson)

the subject by Mr. Estrin. I would like now to
have your final word on the subject.

A. The 8×10^{-8} was certainly our
best estimate based on the tests that we conducted.
and I have no reason to change it.

Q. Mr. Estrin, for his worst
failure scenario has used a figure of 2.4×10^{-7} .
Do you accept that number as an appropriate hydraulic
conductivity for the upper till?

MR ESTRIN: Let us be clear, please,
of the questions.

Mr. Sobanski told us in evidence that
he had done no scenarios and done no calculations
for hydraulic conductivities after the respective
mounding of anything above 1.5 metres.

MR HODGSON: I am only asking about
hydraulic conductivity. I don't think the
hydraulic conductivity changes with the amount of
mounding, does it, Mr. Sobanski?

MR. SOBANSKI: No, it does not.

MR. HODGSON: Q. Whose figure do
you now accept for the purposes of the Board's under-
standing of how to calculate the travel time
using the failure scenario out the bottom of the
site down through the upper till and the upper part



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Sobanski, Beechinor,
re-ex (Hodgson)

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3 of the lower till and to the upper granular unit
4 and then off-site? What figure do you ask the
5 Board to accept as your opinion of the hydraulic
6 conductivity of the upper till?

7 A. Our own, of course.

8 Q. Now, Mr. Estrin, in calcula-
9 ting this failure scenario, has suggested to you a
10 head buildup of 12.9 metres. I believe that is
11 12.9 metres in excess of the head buildup that you
12 had calculated. Is that your understanding?

13 A. I expect it would be something
14 in that order. I think that this, as a matter of
15 fact, right now it fails me as to whether it was
16 12.9 metres above the base of the cell or 12.9
17 metres above where I said it was going to be. It
18 is, nonetheless, a significant mound we are
19 dealing with. We are dealing with 13 metres which
20 is somewhat in excess of 40 feet.

21 Q. Is that a reasonable
22 assumption for a failure scenario?

23 A. Not in my opinion, no.

24 Q. Assume for the moment,
25 notwithstanding it is your view that it is not
reasonable that it could occur, how long would it
take such a mound to build?



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Sobanski, Beechinor,
re-ex (Hodgson)

A. About 14 years.

Q. You have already told us that
you could monitor head buildup within the cells
of the landfill.

A. Yes.

Q. I take it then you would be
able to monitor this particular failure scenario?

A. I would think so, yes.

Q. Now, I want you to assume,
for the moment, all of Mr. Estrin's assumptions and
conclusions.

His conclusion is from Exhibit M-162,
that leachates leaving the bottom of this landfill
could reach the boundary of the site in 10 years.

A. Yes.

Q. Now, would you monitor for
those 10 years?

A. Well, yes, the site would be
monitored for as long as it is felt necessary.
The site will be monitored for much longer than 10
years.

Q. All right, and monitoring, I
want to now go to Exhibit M-176, which is an excerpt
from a report prepared by your firm having to do
with Brock West Sanitary Landfill. Do you have



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Sobanski, Beechinor,
re-ex (Hodgson)

a copy of that? M-176? I will give you my
copy, Mr. Sobanski.

In paragraph 3, could you read the
first sentence in paragraph 3?

A. "Groundwater and surface
water monitoring has been under-
taken at essentially three-month
intervals since November, 1976."

Q. I believe you told
Mr. McQuaid when he took you through monitoring
that each of the monitors would be screened in each
of the permeable layers detected in each of the holes
that you put in for monitoring?

A. Yes, that's right.

Q. Assuming then that you
monitored every three months and you should, in fact,
detect contaminants moving at the boundary or
towards the boundary within the time that Mr. Estrin
has suggested, how long does it take to design and
install a purge well system?

A. It can easily be done well
within a year. We have designed major dewatering
systems in a lot less time than that.

Q. I have asked you to assume
Mr. Estrin's failure scenario was reasonable and



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Sobanski, Beechinor,
re-ex (Hodgson)

the 10 years was reasonable.

In your view, is 10 years a reasonable period of time with which to expect contaminants to move to the site boundary assuming failure at Site D?

A. I have difficulty thinking that it could move in glacial till to the site boundaries that quickly considering the conditions that we see at that site. We don't even have tritium in that unit. You have to assume very high, relatively high hydraulic conductivities, huge mounds, large gradients. I find it difficult to conceive.

Q. Thank you.

Could I have my copy of Exhibit M-176 back?

Now, Mr. Sobanski, I want to take you to part of the -- first, Mr. Estrin was concerned that you hadn't developed a monitoring program. Mr. McQuaid sought to have you do it here and took us around Exhibit -- Drawing 24, and had you put on Drawing 24 all of the places where you would recommend that monitors be installed at the current state of knowledge.

A. Yes.



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Sobanski, Beechinor,
re-ex (Hodgson)

Q. I want to read to you part of a sentence that your firm has inserted in this M-176. It appears in the middle of paragraph 3 on the first page. It reads -- we are now referring to the groundwater and surface water monitoring system that is in place at the Brock West Landfill. It reads:

"The network was gradually monitored with the addition of monitors..."

Would you explain that, please?

A. It means that -- I am not sure that you want it specifically for this, but what it indicates is that there should be flexibility in any monitoring program, or if there is the need for additional monitors to be installed at a future date, they can and should be installed as the need arises.

In this case, Metro started out with a relatively small network of perimeter wells to monitor the landfill site at Brock West. Gradually, they increased it and we have gone on beyond that and increased it again to answer specific questions of the Ministry of the Environment. So, monitoring at sites is a dynamic activity that is



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Sobanski, Beechinor,
re-ex (Hodgson)

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changed to meet the needs of the times.

Q. Is that something that you
would recommend for Sites F and D?

A. I think that we always have to
have a dynamic system and some flexibility to change
things. I don't believe that we should rigidly
adhere to a fixed plan. If contaminants were to
be noticed in a certain monitor, one might want to
then install an additional set of monitors to start
looking at distance versus concentration to see
whether it is going to be a problem or not. Because
some contaminants are detected in the well does not
mean it will necessarily be a problem. So, it
should be dynamic to that extent and have some
flexibility so that you don't have to respond in a
way that is not necessary.

Q. Now, thank you, Mr. Sobanski.

Mr. Beechinor, I am going to turn
to Site F and the first series of questions is for
you.

Do you have your copies of Exhibits
H-215 and 216? H-215 and B-216, these were
borehole logs for holes drilled in Bayview.

MR. BEECHINOR: A. Perhaps it would
be simpler if you lent me your copies for the moment.



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Sobanski, Beechinor,
re-ex (Hodgson)

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Q. First of all, Exhibit 215, is a series of borehole logs prepared by your firm in respect of three holes in Bayview?

A. That's right.

Q. Were you present when those holes were created?

A. I think I was in the field to initiate the program. I wasn't out there for the full extension of the drilling program.

Q. Were you out there when at least one hole was drilled, or any of the holes?

A. I can't recall at the moment, quite frankly.

Q. Do you know what kind of equipment was used to create these holes?

A. Yes, it was a drilling rig, an augering machine to auger through the refuse.

Q. Can you distinguish for the Board, the difference between an augering machine and the type of equipment that was used to create the cores we looked at the other day in this room?

A. An augering machine is equipment used to auger through refuse. In this particular case, there was no sampling of the refuse itself. I believe there was one split-spoon



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sample taken at the end of the drilling program to ascertain whether or not the borehole had finished in the shale or not. The coring program we did on Site F was a double-tube sampler with a diamond bit on the end of it to slice through the shale and we also -- with this double-tube system, retrieved on a continuous basis, a sample of the shale.

Q. We have seen the kind of material that you got from the coring mechanism. What kind of material comes out of a hole that is augered?

A. Usually unless it is specifically sampled with a split-spoon, it is going to be ground up, broken up soil material that is picked up as a result of the augering action of the drilling rig.

Q. In several of the borehole logs at Site F, we have an indication that you augered until there was a refusal. What does that mean?

A. That means that the augering process couldn't advance any further into the shale, meaning that the shale at that point is competent and there isn't sufficient power in the augering machine to move any further.



1 8947 Sobanski, Beechinor,
2 re-ex (Hodgson)

3 Q. Because, can we tell from the
4 fact that you can auger through material whether or
5 not it is shale or till?

6 A. You can because you can see
7 the cuttings of the material as it comes up the auger.
8 But not to the same degree as a sampler such as the
9 continuous sampling procedure that we carried out.
10 It gives us precise definitions of where one contact
begins and another contact ends.

11 Q. Can you auger through weath-
12 ered shale?

13 A. Yes, you can.

14 Q. Did you do that, in fact,
15 at Site F in a number of places?

16 A. Yes, we did.

17 Q. Can you tell, assist the
18 Board from the logs that you have before you,
19 Exhibit H-215 and B-216, what kind of material
20 was being augered at the base of the garbage in the
Bayview Landfill?

21 A. Well, looking at the first
22 log, LW-1, we were augering starting at elevation
23 zero or depth zero, reddish brown soil cover into
24 a dry refuse. At around four metres, it was
25 reported that there was a hard layer of dry refuse.



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re-ex (Hodgson)

At eight metres, we came into a zone that was saturated with refuse. At about 10 metres, we moved into a material that is reported here as a reddish-brown slurry, medium loose sand, sandy clay at a depth of, if I can read this log, it looks like 12 metres. We are into the red weathered shale.

Q. Right. Can you give this Board your opinion as to whether or not the material found at the base of that particular hole was till or shale?

A. Well, all I can do is report at this time since I didn't actually see the sample, of what the geologist reports in the log.

In this log, they do report about a two-metre section of reddish-brown slurry, medium coarse, sandy clay. There is no indication that is till. I am not sure what that material is.

Q. What colour is weathered shale?

A. It is red.

Q. Could you just tell the Board, I assume that the cores that we saw in this room, came up out of the ground, they come up through the middle of the drilling?



1 8949 Sobanski, Beechinor,
2 re-ex (Hodgson)

3 A. The core barrel, yes.

4 Q. Where does the material come
5 up on an auger?

6 A. It is coming out -- the
7 cuttings that are being drilled through with the
8 auger, or augered through, are coming on the
9 outside of the auger itself in cuttings, bits of
10 cuttings.

11 Q. Can you just look quickly
12 at those six logs and give this Board your opinion
13 as to whether or not, first of all, can you tell
14 from these logs whether or not they were drilling
15 in shale, weathered shale or till or both?

16 A. Well, Log LW-1, it appears
17 that there is a soil material lying above the red
18 shale. A thickness of about two metres. For
19 Log LW-2, there is a unit there described as a
20 red silty clay till and I would have to accept that
21 that is what the geologist found at that particular
22 borehole. Three metres of clay, silt till above
23 red shale.

24 LW-3, at that location it appears
25 that we got -- again, moving down starting around
26 11 metres, we are into something called the hard



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Sobanski, Beechinor,
re-ex (Hodgson)

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3 layer. It says "chocolate-brown refuse slurry."
4 Starting at approximately 12, 13, 13.5 metres, we
5 have got a thin unit of what is described as a
6 red silty clay till.

7 At just under 14 metres, we entered
8 the red weathered shale. There could be, in that
9 particular case, again I have to rely on what the
10 geologists reported here. The interpretation made
11 is that there was a very thin unit of till above
12 the red shale.

13 Q. Mr. Beechinor, I want to take
14 you now to Exhibit E-214, which is Ms Hewetson's
15 thesis and at page 2 reading from the third line from
16 the bottom, Ms Hewetson represents the following:

17 "Between 1961 and 1974, waste from
18 the surrounding community was
19 deposited in shale quarry excava-
20 tions at this site."

21 A. Yes.

22 Q. - Do you have any information
23 with which you would agree or disagree with her
24 statement that Bayview's garbage was deposited in
25 shale quarry excavations?

A. I wouldn't dispute that.
In fact, that has always been my understanding that



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Sobanski, Beechinor,
re-ex (Hodgson)

prior to the deposition of waste there that it was
a shale quarry.

Q . Thank you.

Now, Mr. Sobanski, if I could turn
to you for a moment.

Could you first of all, get up
Exhibit H-40-3 which shows groundwater flows at
Site F?

DR KINGHAM: Mr. Hodgson, how much
longer do you have scheduled here?

MR. HODGSON: I can finish before
5:00. Is that good enough? I might be finished
in 15 minutes.

DR. KINGHAM: Let us go.

MR. SOBANSKI: That was what number
again?

MR. HODGSON: Q. H-40-3.

Do you recall, Mr. Sobanski, that
both Mr. McQuaid and Ms Vigod put to you a series
of questions which suggested there are irregularities
in the flows beneath Site F?

MR. SOBANSKI: A. Yes.

Q. Can I ask you, what does
the bottom long line represent on Exhibit H-40-3?

A. The bottom long line, are we



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Sobanski, Beechinor,
re-ex (Hodgson)

1 talking about the one with the arrow on it?

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4 Q. Yes.

5 A. This would be the regional
6 flow in the fairly massive bedrock unit.

7 Q. Can I ask you to turn to
8 Ms. Hewetson's thesis, Exhibit E-214, first
9 of all, page 41 where at the bottom of the page,
10 the fifth line from the bottom, Ms Hewetson indicated
11 that she has piezometers as deep as 35 metres?

12 A. Yes.

13 Q. Then, if you would turn to
14 page 30, you will see that she has reported the
15 depth of a series of piezometers going 31, 28, 33,
16 26, 32, 25, 27 metres and more?

17 A. Yes.

18 Q. Are those piezometers, how
19 do those piezometers relate to the regional flow
20 system which you have indicated on H-40-3?

21 A. WAT-2 was the background
22 well. It would not be in the regional flow
23 system.

24 On Exhibit H-220, WAT-5 and WAT-7
25 which are shown on page 30 would be within the
unit that we are calling the regional zone.

Q. Could I ask you to turn to



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Sobanski, Beechinor,
re-ex (Hodgson)

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3 page 10 of Exhibit E-214? You will recall that
4 Mr. McQuaid read to you a number of passages from
5 Ms Hewetson's thesis. He read to you passages
6 from page 10, but he did not read the paragraph in
7 the middle of the page and I would like to read it
8 to you:

9 "On a regional scale, using a
10 broad contour interval, the
11 hydraulic head distribution in
12 the shale shows a general trend
13 (Figure 5). The study site appears
14 to be on the edge of a recharge
15 zone dominated by the permeable
16 caprock of the Niagara Escarp-
17 ment (Figure 2). Downward
18 gradients predominate in the shale
19 to some depth at which flow lines
20 are believed to turn upward to
21 discharge to the bottom of Lake
22 Ontario."

21 From this, what does Ms Hewetson's
22 thesis appear to be as to the flow of any
23 contaminants leaving this particular area?

24 A. Her thesis would indicate,
25 according to that description, that it is a downward



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Sobanski, Beechinor,
re-ex (Hodgson)

gradient -- first of all, it is a recharge area.
She says a recharge zone. She says the downward
gradients predominate in the shale to some depth
at which flow lines are believed to turn upward
and discharge to the bottom of Lake Ontario.

What she is saying is that she
is envisaging a downward gradient on the site into
a deep regional flow system that ultimately comes
out somewhere in the bottom of Lake Ontario.

Q. Could you compare her
thesis in this regard with your thesis as exhibited
on H-40-3?

A. In terms of the regional
system we would have the same conclusion in terms
of the site itself. Our description is more
conservative indicating a shallow or potential
flow path that would have to be invigilated. That
is the highly permeable unit at the site which
could carry some contaminants.

Overall, when you look at the mass,
she not having identified the permeable zone, has
drawn the same conclusion that we have for the
deeper zone for the regional flow system. We
would agree with her regional flow system, but
on top of that, we have imposed a shallower flow



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Sobanski, Beechinor,
re-ex (Hodgson)

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system where, if you like, that is where all the
action is at the site.

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Q. Assuming for the moment,

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Miss Hewetson's deeper flow system, what would you
expect to happen to the concentration of any
contaminants entering that flow system as it moves
along the paths suggested by Ms Hewetson?

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A. I don't think that you would

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ever detect anything. First of all, we obtained

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numbers that indicate that this material has some

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reasonable attenuating capability. It has

14

organic carbon in it, the shale, that is. It

15

has carbonate materials within it. It has clay

16

minerals within it. We believe that in that

17

deep flow path, there would be no way that you

could detect contaminants. We believe they would
be attenuated.

18

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Q. Can I ask you to go to

Exhibit H-40, Table 12 at page 97?

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Ms Vigod, this morning, asked you

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about the effective porosity value which is stated

on Table 12 for the weakly fractured shale as

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0.1.

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A. Yes.

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Q. Could you advise the Board



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Sobanski, Beechinor,
re-ex (Hodgson)

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whether or not that 0.1 is an assumed or a measured value?

A. It would be an assumed value.

Q. Do you know where you got that value? Do you now recall how you got that value?

A. I think I have stated that I felt it was my educated guess, it was sort of a value one might expect for that unit.

Q. Right. Now, could I ask you to -- Mr. Sobanski, the Chairman asked you this morning about, referring to the permeability contrast between the upper weathered shale and the massive shale at Site F. He asked you whether or not contaminants or water moving downward through the weathered shale would then move laterally along the face of the massive unit. Do you recall that?

A. Yes.

Q. Could you advise the Board as to how the design for the landfill at Site F accommodates the concern expressed by the Chairman as to lateral movement of contaminants along the face of that massive shale unit?

A. Yes, the tiles are laid along the base of the cells. Of course, anything



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Sobanski, Beechinor,
re-ex (Hodgson)

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3 that is migrating, it is an incised plain, so that
4 whether it migrates down that plain perpendicular, or
5 at an angle to that plain, it arrives at the tiles
6 other than that portion which we can't stop that is
7 being controlled by this under-draining effect of the
8 permeable zone.

9 The bulk of the movement of anything
10 that would move in these horizontal layers, that
11 would move down the face, would be controlled by
12 the tiles.

13 Q. Now, one last series of
14 questions having to deal with the cores from HC6
15 which were exhibited and referred to in cross-
16 examination by Mr. McQuaid. How does the core,
17 I guess it is one core, how does the core reviewed
18 with this Board, correspond with the depiction of
19 the geologic units in your Exhibit H-40?

20 MR. BEECHINOR: A. I would indicate
21 that for the core that we did see, what was evident
22 in it at the top portion of it were discontinuities
23 that did indicate our interpretation of Unit 1 as
24 a weathered portion, a mildly fractured portion.
25 I think we did see that unit in that core. We
also saw a major section of very competent un-
fractured rock beneath this upper portion at HC6.



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Sobanski, Beechinor,
re-ex (Hodgson)

For a major length, I think something in the order of seven or eight metres, we saw a unit of shale without, other than perhaps machine breaks or transportation breaks, a zone that was virtually unfractured and without any other discontinuities.

What we didn't see in this particular core which I had seen in many of the other cores, were a number of discontinuities that would be representative of what we call the highly fractured shale unit. There was, I believe at an elevation of just below an elevation of -- what was it, about 109 we saw some discontinuities and then we also saw another set of discontinuities somewhere around an elevation of 101.

In between those discontinuities we saw a fairly thick mass of weakly fractured shale. I saw, in my response to your question, I would indicate that this core was fairly typical of what we saw on-site except for the evidence of the major discontinuity that we had seen representative of the highly fractured shale unit in such cores as HC4 and the base of HC4 and the base of HC3. Generally, the core that we saw was representative of what we were seeing on-site.



1 8959 Sobanski, Beechinor,
2 re-ex (Hodgson)

3 Q. Do you expect these geologic
4 units to be at the same depth throughout the site?

5 A. We have correlated them
6 by elevation. For instance, that is why we see
7 these yellow lines. We have correlated zones
8 without a high frequency of discontinuities at say
9 an elevation at HC4 we found it in approximately
10 the same elevation at HC3. This approximately
11 same elevation at HC7. They have been correlated
12 by elevation, not necessarily depth. What we
13 are seeing at common elevations, we are seeing
14 horizontal, we could horizontally correlate
15 zones of discontinuities among the various drilling
16 sites and zones without major discontinuities
17 among the drilling sites.

18 Q. Do you expect the geological
19 units identified to be the same thickness throughout
20 the site?

21 A. No. The units can be
22 variable. I think we have mentioned that in the
23 centre of the site we felt that the thickness,
24 we are speaking of the geologic units, are we?

25 Q. Yes.

A. There can be some variability
in the thicknesses from north to south of the site.



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Sobanski, Beechinor,
re-ex (Hodgson)

A. I think that was evident
in some of the testimony that we have given so far.

Q . Do you expect to find a
highly fractured zone throughout the site?
Highly fractured geologically?

A. We made our best estimate
that the highly fractured shale unit pinched out
somewhere around the north end or the centre of the
site just north of HC4. We were uncertain whether
or not it extended to the north end. We saw
the extent of the highly fractured shale from the
pumping test at PW-1. It made wide lateral
extent towards the south end of the site. We, through
our information and our data, were able to define
that the highly fractured shale unit extended from
the mid-point of the site to somewhere just south
of Highway 403. We were not certain how far north
it went since we do not have drilling sites to that
depth at the north end of the site.

Q. Now, when a geologist looks
at a core such as the core we had on this floor
that day, he would identify geologic zones within
that core and they appear to be the same. Does
that mean that the K values will be the same,
the permeabilities will be the same?



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Sobanski, Beechinor,
re-ex (Hodgson)

A. I would say yes.

Well, I think we saw evidence, a lot of evidence of what I was describing as the competent rock. The permeability of that competent rock is extremely low. I think it is evident from the packer test that we conducted at HC6 where we had zero water loss into that very competent zone. So, I would expect that we would see somewhat similar hydraulic conductivities for those competent pieces.

Also, I think we have indicated previously that even in this massive or this weakly fractured shale unit we do have some discontinuities which would indicate a somewhat higher hydraulic conductivity. So, there could be some variability in that sense in terms of the variability of the hydraulic conductivity of the weakly fractured shale, a very incompetent piece, that variability would not be nearly as great.

Q. Could I ask you to refer to Exhibit B-222 which Mr. McQuaid put to you? It is a blowup of Figure 2 in your H-40 report?

Now, looking at this Figure 2, which is your Figure 2, do you expect that in the ground the boundary between geologic units would be as



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Sobanski, Beechinor,
re-ex (Hodgson)

clean as the line on the page?

A. No.

Q. What is the relationship
between geological and hydrostratigraphic units?

A. The geologic units are what
we saw from the cores without the geologic informa-
tion, meaning the zones where we had discontinuities
as compared to the zones where we did not have
discontinuities. Geologic units were simply
defined on that basis.

When we speak of hydrostratigraphic
units, or perhaps even hydrogeologic units, we are
now imposing or superimposing the hydraulics of the
system, the groundwater movement through these
geologic units and defining the hydrostratigraphy
based on the effects, for instance, from the pumping
test, the hydraulic information obtained from the
packer tests, the information of the vertical
downward gradients.

We are making, with the hydro-
stratigraphy, we are making an interpretation of
both the geologic or stratigraphic information
along with all the hydraulic information that we
have obtained about the site.



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Sobanski, Beechinor
re-ex (Hodgson)

Q. One final question, when
you are attempting to predict movement ...

A. I might just put a little
analogy in here that might help clarify it a little
bit.

If you recall at Site D, we
described the upper till as a single stratigraphic
unit, a single geologic unit. Then, when we
spoke about hydrostratigraphy, we broke the upper
till into two units, a weathered portion and an
unweathered portion and denoted different hydraulic
properties to them. That is an example of
moving from a stratigraphic delineation to a
hydrostratigraphic delineation.

Q. When you attempt to predict
the movement of groundwater or other liquid
substances in the ground, do you rely on your
geological interpretation or your hydrogeological
interpretation?

A. We rely on an input to the
hydrogeologic interpretation was the geology but
in the final analysis
of course we rely on the hydrostratigraphic
interpretation to assess the behaviour of ground-
water movement and the potential behaviour of
contaminant transport.



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Sobanski, Beechinor

MR. HODGSON: Thank you.

Mr. Sobanski, Mr. Beechinor, when we were preparing for this hearing, I recall that Mr. Lederer and I estimated that you would be in the witness box two weeks, three weeks, at the outside. By my calculation, this is the 20th day of your testimony. I want to thank you very much for your patience and your assistance.

MR. SOBANSKI: We can hear the fat lady singing.

DR. KINGHAM: Thank you very much. We will adjourn until 9:30 a.m. on Tuesday morning, Monday not being a sitting day.

MR. HODGSON: Before you go, I should just announce for your benefit, and I think for the benefit of all the counsel that the next witness will be Mr. Crysler on hydrology.

We handed out a revised witness statement for Mr. Crysler. I think it has been exhibited and you have that. As a result of discussions with other counsel, we anticipate Mr. Crysler's evidence will not be lengthy.

The next witness will be Vicki Henderson from the Region, who will give evidence about energy from waste and the Region's



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previous studies and current proposals in that area. Again, as a result of discussions with our friends, we anticipate Ms Henderson's evidence will not be extensive.

Following those two witnesses, we propose to call the witnesses from Pollutec. There are two. Actually, one witness from Pollutec and the other is a toxicologist. Unfortunately, those witnesses are not available until Wednesday. So, this new expedited manner of hearing this thing is now creating witness problems.

We might, in fact, run out of evidence at some point on Tuesday and I just wanted to warn you in advance, there is nothing we can do about that.

I am going to call the Pollutec witnesses on Wednesday morning. I expect they will be brief and we will go from there to Mr. Feenstra sometime on Wednesday.

DR. KINGHAM: Can we look forward to an early break on Wednesday? I don't see too many people nodding.

We are now adjourned.

--- Upon adjourning at 4:58 p.m.



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Sobanski, Beechinor

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CERTIFIED CORRECT:

P.D. McQueen

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