

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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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, September 24, 1987

VOLUME 33

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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J.H. Olah for the Halton Region
Conservation Authority

* * * * *

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185 Richmond St. W.
Toronto, Ontario
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Per: C.F. Nethercut, C.V.R.



Oakville, Ontario.
September 24, 1987.

--- Upon commencing at 9:30 a.m.

ALFRED A. SOBANSKI, resumed:
JAMES BEECHINOR, resumed:

DR. KINGHAM: Mr. Tidball.

MR. TIDBALL: It occurred to us yesterday that there were one or two outstanding undertakings related to my cross-examination. I raised them with Mr. Sobanski and Mr. Beechinor last night and we thought it would be appropriate to deal with them first thing and one of them in particular Ms. Cronk may have some question on and really there is only one.

There was one undertaking related to more information as to how Mr. Beechinor interpreted the borehole logs or core logs into the four distinct units that he has identified, and I believe Mr. Beechinor will make that information available to Mr. McQuaid, who was more interested than I was and prior to Mr. McQuaid's cross-examination, so I don't see that as a problem.

MS. CRONK: That is perfectly acceptable but if it's available to Mr. McQuaid, it must be available to everybody and if any questions arise, either by Mr. Estrin or myself, I presume we



1 will be permitted to put those questions when we have
2 the information.

3 MR. TIDBALL: The second one is; you
4 will recall on the second day of my cross-examination
5 I was asking Mr. Beechinor and Mr. Sobanski about
6 the location of the wet areas in the area or what
7 has been called the discharge zone till south of
8 Highway 403 and we were going through an exercise of
9 identifying where they were on the large aerial
10 photograph up there, and part-way through that Mr.
11 Hodgson interjected and said would it be more
12 appropriate if the witness simply refreshed their
13 memory and went out and had another look and
14 they agreed to do so on the weekend, and that was
15 the weekend we ended up breaking for the extended
16 period. I thought I would raise that this morning
17 and perhaps Mr. Beechinor or Mr. Sobanski could go
18 back to the aerial photograph and indicate on the
19 aerial photograph, and I think you started marking
20 in blue, as I see blue marks on there, but where
21 the wet areas are in the area south of 403.

22 DR. KINGHAM: A lot happened on that
23 weekend!

24 MR. TIDBALL: I am sure Mr. Lancaster
25 remembers the weekend well.



1 MR. LANCASTER: I certainly do.

2 MR. TIDBALL: I think I'm a slow
3 warm-up act this morning.

4 MR. SOBANSKI: For the record, I
5 am referring to Drawing M-103, Exhibit M-103. I
6 put a little legend at the top which is a red circle
7 and it says Wetlands - Father's Day, 1987, whichever
8 date that was, and I will put this on in red and
9 the red will be the final version.

10 We also have rough areas outlined on
11 this map in blue, and hopefully they will go into
12 history as opposed to being final editions.

13 MR. LEDERER: Maybe while this is
14 going on, I could assist in using some of this time
15 profitably.

16 With respect to the first of Mr.,
17 Tidball's comments, there was a request for some
18 information, as I recall it, from last June and it
19 relates to how you move from the boreholes
20 to the delineation of the four zones of geology,
21 the stratigraphic units at Site F, and I was given
22 that information this morning. If it would assist
23 I can distribute that now.

24 I also have additional copies of
25 the plume delineation study which has been referred to



1 in the course of cross-examination and I think the
2 Board has two copies and we have an extra one to
3 make it the full three and we have an extra copy.

4 DR. KINGHAM: We would certainly like
5 a copy of the plume delineation study and this would
6 be a Halton exhibit. Let's call this Summary of
7 Information for Zone Delineation and we will call
8 it H-206.

9 --- EXHIBIT No. H-206: Summary of Information
10 for Zone Delineation

11 MS. CRONK: I am sorry, what was the
12 number?

13 DR. KINGHAM: H-206. We had reserved
14 marking the exhibit which was introduced last
15 night, but not discussed in any substantive way on
16 the shale reserves and the clay brick industry which
17 may mark this morning presumably. The plume
18 delineation study was H-83.

19 MR. TIDBALL: Could you briefly for
20 the record indicate where you have marked the red
21 markings on Exhibit M-102 or rather M-103?

22 MR. SOBANSKI: It's not so easy to
23 describe when they are out in the middle of fields.
24 The so-called areas we have marked were essentially
25 bullrushy areas and it wasn't particularly wet on
Father's day, it was quite warm and it had been



1 dry for a period of time, but there are two areas
2 to the east of King Road which occur to the north
3 of the industrial complex, one along the roadway
4 and another along a creek that flows down from
5 the junction of Highway 403 and King Road. To the
6 south of the site and to the west of King Road,
7 we have several areas, two major ones being located
8 roughly in the centre of the property and running
9 out approximately to the west side of the Bayview
10 landfill and then several intermittent small bullrushy
11 areas, and these may be shown on the diagram just a
12 little larger than actual life, but I have such a
13 thick pen it is difficult to draw these accurately,
14 but several bullrushy areas and one along the
15 escarpment here where I have observed flows.

16 Another area which was of interest,
17 although not bullrushy, was to the west of the bullrushy
18 areas. There is a particularly luxuriant growth of
19 vegetation here which is unlike anything else on
20 the property, very, very dense, almost impenetrable
21 by walking, which occurs to the west, which would be
22 described just beyond the west side of the Bayview
23 landfill about two-thirds down the property, NSP
24 property south of Highway 403, and I have put that
25 on as lush heavy vegetation.



1 In my traverse of that area back a
2 year ago Christmas, there was a particularly
3 heavy flow of water going through that area at the
4 time. There are no more indications of this zone
5 any further to the west because now we come into
6 the Falcon Creek itself, which now cuts down through
7 the NSP property, starting at about -- at 403 near
8 the west side of Site F and cutting down diagonally
9 at an angle and ending up at about the mid-point of
10 Site F.

11 So, Falcon Creek intersects this
12 area, again another possible source of some shallow
13 groundwater discharge. In general we can see a trend
14 of these areas that roughly parallels Highway 403
15 and at a bit more of an angle than parallel, but
16 just roughly paralleling 403.

17 DR. KINGHAM: That is the area in
18 which you described discharge of something of the
19 order of 10,000 cubic metres per year.

20 MR. SOBANSKI: I believe the number
21 is about 6 gallons a minute. I must admit that
22 that value appears to be high and which could be
23 in the model, in the sensitivity of the model,
24 by reducing the permeability of that zone slightly,
25 the highly fractured unit would reduce the water



1 flow. I have seen flows in that order, more than
2 6 gallons a minute in my traverses of the site.
3 During the dry Father's day period, there wasn't any
4 indication of any real flows in the area, other
5 than some trickles from the upper sections of the
6 site, but not in the bullrush areas themselves.
7 That discharge number may in fact be somewhat lower
8 than what is indicated presently by the model.

9 MR. TIDBALL: Mr. Sobanski, am I
10 right that anything discharged in that area, as long
11 as it wasn't over towards Falcon Creek, will end up
12 in Indian Creek if it discharges to surface?

13 MR. SOBANSKI: I would have to look
14 at that. I'm not absolutely positive. It is possible
15 that parts of the west side might go to Falcon
16 Creek. Certainly the east side would go to Indian
17 Creek via the ditch system along the railroad
18 tracks.

19 MR. TIDBALL: The point I was coming
20 to is there is a drainage ditch, is there not,
21 which runs along the railway track and which drains
22 into Indian Creek over at King Road?

23 MR. SOBANSKI: That's right.

24 MR. TIDBALL: I don't think it is
25 necessary to mark it on there; someone else might,



1 but I don't, but we have this on a map which doesn't
2 illustrate the monitoring wells and could you show
3 us where the wet areas are in relation to the line
4 of wells you have in the area, HC9, 14 and 15
5 and MB18 is in that area and just roughly if you could
6 indicate that for the Board.

7 MR. SOBANSKI: It's difficult to do
8 roughly. I have looked for HC14 myself a couple of
9 times and I haven't been able to find it and our
10 technicians can, but I have not been able to find it.
11 HC9 and Morrison Beatty 18 are located generally
12 to the west of the most easterly swamp on the west
13 side of King Road.

14 MR. TIDBALL: I am sure that will be
15 clear in the transcript.

16 MR. SOBANSKI: I hope so.

17 HC14 is located closer to mid-way,
18 close to mid-way between the proposed fill area of
19 Site F about roughly the mid-point, somewhere in
20 the mid-point of the NSP property.

21 MR. TIDBALL: Fairly close to one of
22 the wet areas you have marked?

23 MR. SOBANSKI: I am not sure. As I
24 said, I have not been able to find that nest of
25 wells. The others I haven't seen, but they are



1 located south -- that was HC14 and HC15, I have
2 not looked at this set of wells myself but I believe
3 it is marked as being in this little clearing a
4 couple of hundred metres south of 403 and south of
5 the Burlington landfill. The area that might be
6 described as having some white patches on it, although
7 there had perhaps been some excavations there, but
8 I haven't seen that location myself. It would be
9 several hundred metres to the east also of a pond
10 located south of the nearby industry, and I think
11 it's Tridon, Tridon Industries, and that would give
12 the rough location of HC15.

13 MR. TIDBALL: Thank you, those
14 are my questions.

15 DR. KINGHAM: Thank you very much.
16 Ms. Cronk.

17 CROSS-EXAMINATION BY MS. CRONK (cont'd):

18 Q. Mr. Sobanski, would you put
19 that back up. Am I correct that in the entire
20 area you have delineated south of Highway 403
21 encasing or encompassing all those wetlands, that
22 entire area is owned by National Sewer Pipe Limited?

23 MR. SOBANSKI: I am sure the wetlands
24 are, but I am just not so sure how far the NSP
25 property extends to the west and I would have to look



1 at a property map to be sure. I know it ends somewhere
2 south of Site F, but I am not sure where it is.

3 Q. Coming south from Site F
4 and south of Highway 403 in that middle area where
5 you have described the wetlands and moving to the east,
6 would you confirm all of that is owned by National
7 Sewer Pipe?

8 A. I believe it is.

9 Q. Right down to the CNR track?

10 A. Yes.

11 Q. Mr. Sobanski, did you have an
12 opportunity last evening, as I requested you to do,
13 to look at the inventory maps which appears in the
14 technical appendix to the Proctor & Redfern report,
15 the clay brick industry and shale resources of
16 Ontario, so you could confirm the possible reserves
17 in the Region of Halton?

18 A. It wasn't quite left with me
19 that way. I did review this technical appendix,
20 but it was left with me as well to check with
21 various people to find out whether this report
22 had been used to generate the number of 676 million
23 tonnes in our report.

24 Q. Could I stop you there. There
25 were two questions and we will come to that, but the



1 first was I asked you to make inquiries to determine
2 whether this was the technical appendix to the
3 Proctor & Redfern 1978 report referred to in Exhibit
4 H-45 and is it, or have you been able to confirm
5 that? My understanding is that it is and I would
6 appreciate it if you can confirm it?

7 A. First of all I checked two
8 sources; I talked to Mr. Cam Watson and this is not
9 the report that he has. His is different than this
10 and his is a single volume and it does not refer to
11 suitable available reserves. It has a greater
12 depth of detail in the table of contents and there
13 are more sections added than this, and so it would
14 appear that in the case of Mr. Watson, he does not
15 have this particular report and the figures in his
16 report, while similar to these, they do not contain
17 the same information.

18 I then attempted to check this out
19 with our geologist who did this work on our behalf
20 through the Trow organization, and it appears that
21 he's at a funeral and I phoned until about 11:00
22 o'clock last night and was unable to get him. We
23 are still trying to raise him.

24 MR. HODGSON: Metaphorically
25 speaking!



1 MR. LEDERER: I hope it wasn't his
2 funeral.

3 MR. SOBANSKI: Sometimes you luck into
4 a good one.

5 MS. CRONK: Q. To cover what you
6 have said, did you ask Mr. Watson whether or not he
7 had the appendix to the Proctor & Redfern report?

8 MR. SOBANSKI: A. He doesn't have it
9 in this form at all.

10 Q. Are you saying he has an
11 appendix in a different form?

12 A. He does not call it an
13 appendix at all. It's a single report and that
14 is my information from him and he has relied on us,
15 I believe, for the 676 million tonnes and I am unable
16 to check that.

17 Q. Because it is not imperative
18 it be done today, when you have made your further
19 inquiries and have been able to speak to the second
20 individual you tried to speak with, could you let
21 us know if you are able to confirm that the 1978
22 report in fact includes the appendix?

23 Secondly, with respect to the actual
24 reserves cited in the appendix, are you in a
25 position to confirm that they have been accurately



1 transposed on this summary list?

2 A. Yes, they have been accurately
3 transposed.

4 Q. So, looking at the summary,
5 do I have it that according to the reserves cited
6 in the technical appendix, there are possible
7 reserves in the townships making up the Region of
8 Halton in the aggregate amount of 3,163 million
9 tonnes?

10 A. Yes.

11 Q. And suitable available reserves
12 in the same area, that is the Region of Halton,
13 are in the aggregate 676 million tonnes?

14 A. Yes.

15 Q. Moving down to the four sub-
16 headings or sub-paragraphs, dealing with the first,
17 am I right that that is merely taking the Site F,
18 total Site F quantities as estimated in your report
19 as a percentage of the 3,163 million tonnes of
20 possible reserves in the Region of Halton?

21 A. Yes.

22 Q. That equals 1.5 per cent?

23 A. Yes.

24 Q. A very small percentage?

25 It's a very small percentage of the total reserves?



1 A. Yes.

2 Q. Scenario (b), and it's not
3 really a scenario but sub-paragraph (b) is an
4 expression of the Site F reserves as a percentage
5 of what are referred to in the appendix as regional
6 suitable available reserves and that percentage
7 goes up to 7 per cent?

8 A. About 7, 7.1, but given the
9 accuracy of these numbers, I think seven is close
10 enough, yes.

11 Q. And sub-paragraph (c), if we
12 look just at the shale quantities covered by the
13 quarry licence on Site F, you will recall your firm's
14 estimate of that quantity was 18 million tonnes?

15 A. Yes.

16 Q. Expressed as a percentage of
17 the regional reserves, in fact it's .5 per cent,
18 is that correct?

19 A. Close enough, yes. It should
20 be .6 if you are carrying it to one decimal.

21 Q. Are you rounding to get .6?

22 A. I am rounding because it's
23 greater than .55.

24 Q. .6?

25 A. .6.



1 Q. And again....

2 A. But .5, as I say, is close
3 enough and I am not trying to be too critical, but
4 .5 is good enough considering that 3,163 million
5 tonnes will not be a totally accurate figure.

6 Q. Whether it's .5 or .6 is
7 diminimous?

8 A. It's quite small.

9 Q. In paragraph (d), taking the quarry
10 licensed area, quantity of shale as a percentage of
11 all of the reserves available in the region, the
12 result is 2.6 per cent?

13 A. Close enough, yes.

14 Q. Well again....

15 A. 2.7 if you want to carry it
16 to one decimal point.

17 Q. When you say "close enough",
18 on a scale of one to ten are you talking 9.9?

19 A. I was asked to check the
20 numbers and when you look -- you put the decimal
21 place in.

22 Q. That's fine. Again we are
23 talking a diminimous amount compared to regional
24 reserves?

25 A. Greater than before.



1 Q. The summary sheet does not take
2 into account, nor does it represent or portray
3 the significance of the quantities of shale on Site F
4 in a provincial context and is restricted to the
5 regional context?

6 A. That is right.

7 Q. Clearly we can agree that to the
8 extent the provincial reserves are greater than the
9 regional reserves, the significance of the shale
10 quantities at Site F would be further reduced?

11 A. Yes.

12 MS. CRONK: I would ask this be
13 marked as the next exhibit.

14 DR. KINGHAM: The long sheet, but
15 I am curious about the status of this. Has it any
16 status?

17 MS. CRONK: My information from
18 Proctor & Redfern is it's the appendix to the report
19 referred to and if it requires further proof, I
20 will put it to Mr. Watson when he is here and we
21 will have the answer to Mr. Sobanski's further
22 inquiries, and I don't think it's an issue and
23 I would ask the two be marked.

24 DR. KINGHAM: I am advised that in
25 fact we had marked one of these as 205, the long one,



1 so we will leave that as 205.

2 --- EXHIBIT No. N-205: Document showing
3 regional shale deposits.

4 MS. CRONK: Would the next one be
5 207?

6 DR. KINGHAM: I am trying to understand
7 if the technical summary has any status in light
8 of what the witness has told us. We could reserve
9 205A.

10 MR. LEDERER: I don't think much will
11 turn on it, but I think as I said yesterday at some
12 point there is a limit to reports that should be
13 received in the absence of someone who can speak to it.
14 While I don't think much will turn on this, and I
15 won't formally object, I don't want it to be taken
16 that we don't recognise it and in certain circumstances
17 we might object to a report being entered in the
18 absence of someone who can speak to it.

19 MS. CRONK: I am in the difficulty,
20 not to complicate things, that I haven't got Mr.
21 Watson here and I have the author of the report's
22 assurance as to what it comprised, and I am
23 informing the Board of that and I am indicating it
24 is subject to further proof when Mr. Watson is here
25 -- it should be reserved now.



1 MR. LEDERER: If it is subject to
2 further proof, I cannot object.

3 DR. KINGHAM: We will call it N-205A
4 and return to it at some further date.

5 --- EXHIBIT No. N-205A: (Reserved) Technical
6 appendix to Proctor
& Redfern report.

7 MS. CRONK: Thank you for your
8 assistance over the last few days. Thank you.

9 MR. LEDERER: Before we move on, I
10 wonder if we could establish, and I hope everyone
11 will agree, that in 1987, Father's Day was June 21.

12 MR. LANCASTER: It certainly was.

13 MR. LEDERER: It is something I will
14 be able to discuss with my children when I get
15 home tonight.

16 MS. CRONK: That's very revealing.

17 DR. KINGHAM: Yes, Mr. Garrod. The
18 floor is open for you.

19 CROSS-EXAMINATION BY MR. GARROD:

20 MR. GARROD: I am quite conscious
21 of the fact that coming third in the order of cross-
22 examination, and given the position of my clients,
23 there is obviously a great deal of territory that
24 has already been covered and it is my intention, to
25 the extent possible, to not duplicate areas



1 unnecessarily that either Mr. Estrin or Ms. Cronk
2 have covered. This has necessitated a considerable
3 amount of editing of what was originally going to
4 be my cross-examination and I have found it necessary
5 to leave in some areas covered previously just to
6 maintain some continuity and also some areas where
7 I felt there was further clarification required.
8 I hope if there is some duplication everyone will
9 bear with me and I expect I will finish this
10 morning and I hope to finish by the break, but I
11 am hesitant to make any guarantees in light of
12 the performances of those who came before me.

13 MS. CRONK: Thank you very much!

14 MR. GARROD: Q. Mr. Sobanski and
15 Mr. Beechinor, I think predominantly my questions
16 will be to Mr. Sobanski and I have no objection,
17 Mr. Beechinor, if you want to contribute to the
18 answers. Please feel free to do so.

19 I am going to ask you, Mr. Sobanski,
20 to step back somewhat from the level of detail
21 that has been pursued by both Mr. Estrin and Ms.
22 Cronk with you over the past couple of weeks and
23 back in June and I would like to review and explore
24 with you some of the more general implications of
25 some of that detail that has been discussed.



1 There will be some areas of detail I fear we will
2 have to get into, but in general I hope to keep the
3 discussion on a more general plane.

4 I would like to start if I might
5 with an overview of the geology of Site F and perhaps
6 I could ask you to put up Exhibit H-40-2. I think
7 at one time I had separated out the exhibits I wanted
8 to use...

9 MR. SOBANSKI: A. It may have got
10 changed during the furniture shuffle.

11 Q. H-40-2

12 MR. SOBANSKI: A. Site F?

13 Q. It's the panel of the bedrock
14 and overburden units. I think it's at the front and
15 I suppose it has been shuffled. I suspect it's in
16 that pile, Mr. Beechinor.

17 A. Is this the drawing, is it
18 Drawing 7?

19 Q. There it is. This is a
20 conceptual representation of what you discovered at
21 Site F, is that correct?

22 A. Yes. If I could just take
23 a quick moment to review the units here. Yes.

24 Q. Generally what this shows is
25 we have a top layer of shale that has been weathered



1 and fractured by that weathering and that is in
2 the north covered by a relatively thin layer of till?

3 A. Yes.

4 Q. And a large part of the site
5 is openly exposed?

6 A. Yes, that is right.

7 Q. That is underlain generally
8 be a more weakly fractured massive layer of shale?

9 A. Yes, and I should point out,
10 since perhaps this is a bit of a refresher, that
11 even the upper unit, the weathered shale, does contain
12 some tight competent units within it and then we
13 get into, as you have said, the zone that is weakly
14 fractured, yes.

15 Q. Having raised it, I think that
16 that is a point I want to make with you. In
17 reality when we look at this site, we don't see
18 these layers so discretely, do we? I mean there
19 are zones....

20 A. We think we can see them, we
21 think we can see them, but I agree there are zones
22 within it and it is interpretive.

23 Q. In fact, would you agree
24 with me -- let's continue this first of all. You
25 have the massive zone which I suggest to you is



1 essentially an aquitard?

2 A. Yes.

3 Q. It is not permitting water to
4 move through it, at least not at any appreciable
5 rate?

6 A. That's right.

7 Q. That is the zone on Exhibit
8 H-40-2 which is the darkest shading?

9 A. It is.

10 Q. That is the zone which will
11 underlie or at least be the first layer underlying
12 the garbage?

13 A. The first layer in some cases
14 in the upper reaches will be the till; near the north
15 end of the site it will be the till. In some
16 portions it will be the weathered shale and then
17 as we approach the south end of the fill it will
18 either be in the till or on the weakly fractured shale
19 toward the south end.

20 Q. In terms of the scale, the
21 depth of your excavation will not extend as far
22 as that weakly fractured massive unit, at least
23 over most of the site?

24 A. That's right, yes.

25 Q. That will, I suggest to you,



1 provide essentially an impermeable layer under the
2 waste to a large extent?

3 A. It's not impermeable, Mr.
4 Garrod, but certainly it is a layer of low permeability
5 that impedes movement of water.

6 Q. Very low permeability?

7 A. Very low permeability or about
8 10^{-7} and the massive unit being where we have no
9 fractures at all, being even lower.

10 Q. And then below that the largest
11 unit shown on this exhibit is essentially competent
12 bedrock shale that is fractured and you have called
13 it moderately, but I suggest it is also predominantly
14 very low permeability?

15 A. Just one second, please. Yes,
16 that is correct.

17 Q. In fact, there is not a
18 lot to choose between that massive shale and the
19 unit you have identified as weakly fractured shale.
20 They could be conceptually seen to be all of one
21 unit, could they not, given the range of
22 permeabilities you have for both?

23 A. It would be close, I suppose,
24 in some areas. We are dealing with about 10^{-6} or so
25 in the lower zone and 10^{-7} in the upper zone.



1 Q. You have drawn what would
2 appear to be two very distinct zones here, but really
3 what we are looking at, I suggest to you, on the
4 site is that at the surface we have some till and
5 some weathering of the shale that has occurred and
6 below that predominantly we have low, very low
7 permeability, basically massive shale with some
8 zones of some fracturing, and just to generalize
9 what you have found?

10 A. It's close. We believe we can
11 see this layer as being somewhat different.

12 Q. The weakly fractured layer?

13 A. The weakly fractured. We
14 think you can see it, but overall your description
15 isn't too bad, but I think this can be visualized
16 in the cores as being somewhat tighter than the
17 lower zone.

18 Q. But it is certainly much more
19 similar to the bulk of the shale below the site
20 than it would be to either the weathered zone
21 above or to the more permeable zone you have tested
22 with your pumping test?

23 A. Yes, yes it would.

24 Q. They are very closely --
25 they are very similar in their characteristics?



1 A. Yes. It's something we can
2 see, we can see it in cores, but overall your
3 description is not too bad and there is some
4 difference in permeability, but they are both fairly
5 tight.

6 Q. If we look at it in those
7 terms, I suggest to you, if you will go along with
8 me for the time being, we have this weathered zone
9 on top, which of course is expected, is it not?

10 A. Yes.

11 Q. The action of frost and drying
12 and wetting and what-have-you causes these fractures?

13 A. Yes, we expect it and yet in
14 some cores we don't seem to see it, but where it is
15 exposed, certainly where it is exposed it is
16 weathered, and in some cases to a depth of a couple
17 of metres and into something that is fairly loose.
18 We do find in some cores find where it is covered with
19 till that we can see the fairly solid shale come
20 into our section and not find much of a weathered
21 zone.

22 Q. Because it hasn't been able
23 to weather?

24 A. After glaciation or during
25 glaciation it was covered with a protective layer.



1 Q. You have also interpreted,
2 based on the results of your pumping tests, I
3 suggest primarily, that there is at least some part
4 of this more competent rock that is more permeable
5 than the rest?

6 A. Yes.

7 Q. Here you have called it the
8 highly fractured shale and you explained that
9 terminology with Ms. Cronk yesterday?

10 A. Yes.

11 Q. Now, you have, as I understand
12 it, identified that and let's move on and come
13 back to that later. What I want to do now is
14 understand with you what this means in terms of
15 how groundwater is presently moving at the site.
16 What I am going to suggest to you is that what you
17 have found, and again keeping things on a relatively
18 general plane, is that the regional groundwater is
19 strongly downward under the site and ends up
20 flattening out and moving towards Hamilton Harbour
21 in essentially a lateral line and eventually coming
22 up in the bottom of the lake?

23 A. Yes, that is right.

24 Q. I think that is shown on
25 another simplified drawing, I think it's number 4 or 5,



1 and Mr. Beechinor, I wonder if you might pull that
2 out and I think it's the same place as the other
3 ones.

4 You have made corrections on this,
5 Exhibit H-40-3, and you have done some corrections
6 to flatten out that arrow as you indicated in your
7 earlier testimony?

8 MR. BEECHINOR: A. That is correct.

9 MR. SOBANSKI: A. I believe this
10 was discussed and perhaps I could put a red
11 marker through the ones that don't apply, since
12 we have three arrows near the lake.

13 Q. You are crossing out the
14 ones that would appear to come towards the surface
15 north of Hamilton Harbour?

16 A. Yes. I mentioned yesterday
17 in my testimony that even in the piezometer near
18 the lake we still had slightly downward gradients.

19 Q. That shouldn't curve up at
20 all, I would suggest, and it should be essentially
21 lateral?

22 A. Essentially lateral and maybe
23 even down a bit more, heading deeper into the
24 harbour, but it is out of scale and I am just
25 not sure how deep the harbour is there, but somewhere



1 it discharges into the harbour.

2 Q. If I can quote from your
3 report, Exhibit H-40 on page 57, you summarize
4 the implications of this for groundwater movement
5 in the following words, starting, I guess about
6 half-way through that first paragraph on page 57
7 under Table 8 where you say:

8 "This supports the interpretation
9 that the shallow groundwater flow
10 system representative active local
11 zones of recharge and discharge,
12 while the regional groundwater flow
13 system is active at depth and does
14 not discharge between Site F and
15 Hamilton Harbour."

16 A. That is right.

17 Q. I take it from that, and can
18 you confirm that this means that any local discharges
19 of groundwater that are occurring south of Highway
20 403 and between 403 and the lake, are not originating
21 in the vicinity of Site F, but are originating in
22 more local flow systems in perhaps the urban area
23 of Burlington? If there are discharges evident
24 in the urban area of Burlington, those are of origin
25 local and not regional?



1 A. Yes, I believe so. I believe
2 we have referred to that in our report as well when
3 we talked about interflow zones where we felt that
4 between the creeks, the shallow flow systems, they
5 were likely controlled by the local streams and
6 beneath that system we have the deep system in the
7 shale which is going towards Hamilton Harbour.

8 Q. I will come back to that with
9 you a bit later, but let's move on for now since
10 we are in agreement.

11 I would like to then suggest to you
12 that rainwater that falls on Site F, the area that
13 is designated as Site F has two possible fates,
14 ultimately, and one such possible fate is that it
15 gets incorporated into this regional flow and I
16 am talking about without any landfill but just the
17 present situation, but one is that it goes down
18 by these strong downward gradients you identified
19 and gets incorporated into the regional flow and
20 eventually finds its way to Lake Ontario. That is
21 one possible fate, do you agree?

22 A. Yes.

23 Q. The other possible fate is
24 that it becomes part of the local flow system around
25 Site F and discharges to either a stream that flows



1 presently through Site F or in the vicinity or it
2 gets caught up in this more highly permeable layer
3 you have identified and then discharges down in
4 the marshy areas around Highway 403 you identified?

5 A . Yes.

6 Q. That is the second possible
7 fate and I guess there are two sub-parts to that;
8 would you agree?

9 A. Those are the two fates we
10 discussed and you can go into your sub parts and I
11 am agreeing with what you have said so far.

12 Q. Would you agree that it is
13 not possible that it would get -- that rainwater
14 going down through Site F would get incorporated
15 into the regional system and move substantial
16 distances and then come up north of Hamilton Harbour?

17 A . I think that depends a little
18 bit, it depends somewhat on whether in the
19 identified discharge area -- the indicated discharge
20 area by surface features and the model -- on whether
21 there is any possibility of some movement along the
22 overburden/bedrock contact which may have some
23 potential to discharge to a local stream. In other
24 words, we did discuss this at some length, I believe,
25 with Mr. Tidball, that if you don't see it on the



1 surface, what are the possible fates and one possible
2 fate was that it might move along the overburden/
3 bedrock contact.

4 Q. You are saying when it comes
5 up in the marshy area, there may be some kind of
6 zone that would allow for some movement from that
7 marshy area further south?

8 A. It's possible; possibly.
9 We don't see evidence of it.

10 Q. If that occurred, where
11 would that eventually end up?

12 A. It would likely end up -- if
13 it did occur --

14 Q. Still with no landfill and
15 the natural situation?

16 A. I understand that.

17 Q. This would be salty water;
18 correct?

19 A. Yes.

20 Q. I am just trying to visualize
21 this a bit. There are two possible places or
22 scenarios on where it could go. If there were a
23 stream incised to the bedrock contact, it might go
24 there. Another possibility is that if there was
25 just a general upward gradient further south, it



1 could well end up in the perimeter tiles around
2 houses and in services, service trenches, and in that
3 manner find its way to some discharge point further
4 down, something like foundation drains around houses
5 which could act as recipients for small quantities
6 of upward groundwater flows as well.

7 Q. But those upward flows, you
8 would agree with me, would only occur if things
9 were founded in the bedrock and not if they were
10 founded in the till that overlies that?

11 A. It depends upon whether there
12 is the upward gradient. If there were an upward
13 gradient from the rock as indicated by this, into
14 the overlying sediments, then you would have small
15 flows up into the till and they could be picked up
16 by foundation drains.

17 Q. That would be extremely small
18 quantities?

19 A. It would be very diffuse and
20 spread over a fairly large area and you would never
21 notice it.

22 Q. You wouldn't notice it?

23 A. I don't believe so because
24 they are all equipped that way and there is quite
25 a development to the south. We are talking



1 possibilities only, things that are running through
2 my mind, and in that type of situation you could
3 have that controlling some of the flow.

4 Q. I will leave that for the
5 moment but I will be coming back to it when I
6 discuss some of the groundwater chemistry and I
7 will be asking you a bit further about what the
8 implications of that are in terms of that theory?

9 A. Yes.

10 Q. So, having identified those
11 possible fates for existing precipitation that falls
12 on Site F, would you agree with me that with a
13 landfill at Site F, first of all the existing
14 groundwater regime will not be being reversed the
15 way you are contemplating doing it at Site D, the
16 flows will not be reversed?

17 A. That is right.

18 Q. The flows will still therefore
19 be downward under Site F and still relatively strongly
20 downward under Site F?

21 A. Yes, they will.

22 Q. To some extent that downward
23 gradient will be reduced by your collection of 95
24 or whatever the percentage is of leachate, but
25 countervailing that will be the increased gradient



1 associated with the mound. Is that fair?

2 A. Yes, I suppose that that's fair.

3 We don't expect much of a mound, but in places we
4 will be cutting insignificantly below what we think
5 is the water table and there might be some mounding
6 and there might be some small changes in gradients
7 associated with the landfill.

8 Q. I suggest that whether you put
9 a landfill site at Site F or not, the existing
10 patterns of groundwater movement are not going to
11 be changed fundamentally. You are introducing some
12 contaminants into that groundwater, but you are
13 not going to be affecting pathways of that
14 groundwater, I suggest?

15 A. Perhaps just slightly.
16 I am trying to think that out. We certainly know
17 that the lower zone has to be satisfied and I think
18 overall what you are saying is right. There may be
19 some benefit in the landfill in that when we do
20 our construction works and scrape away some of the
21 weathered zone, we may end up with a less permeable
22 layer on the base of the site than there is now
23 and which may help to induce a little more lateral
24 flow, but basically we are not overcoming the
25 downward gradients, and so overall the system should



1 stay roughly the same, but there may be a bit of
2 a tendency for it to want to stay a little higher
3 in the system because of the fact we will be going
4 into less weathered material.

5 Q. That would mean that those
6 lateral flows would stay, I suggest, above that
7 layer you have identified as the massive weakly
8 fractured layer and would simply be collected in
9 your toe drain system?

10 A. The underdrain and the toe
11 drain system, yes, yes it would.

12 Q. The other effect, to the
13 extent you are affecting the groundwater at all,
14 is that you are removing a relatively large quantity
15 of water and so there would actually be less of it
16 flowing out of that system than is presently?

17 A. Are we talking deep system
18 now?

19 Q. The whole groundwater system.
20 The water that falls on Site F that presently all
21 goes down into the ground except for what
22 evaporates and so on or runs off, and you will be
23 collecting a large part of that?

24 A. The water that is going to
25 move down -- this is why I was having a bit of



1 trouble with the last question, because I am trying
2 to be fair. We can't dig the site deep enough
3 to overcome these gradients, because we are losing
4 a half a metre for every metre we go down and the
5 water level is dropping that fast and so we can't
6 overcome that gradient. Overall, the lower system
7 will want to be satisfied. It wants the water and
8 it's a dumb thing sitting here that wants to move
9 a certain amount of water because of the laws of
10 physics and it will try to maintain the type of
11 system that is there naturally.

12 So, by us putting the landfill on
13 top of it, other than I suggested that maybe there
14 is a bit of an advantage because we will be
15 getting into some tighter materials below the
16 weathered zone, but overall the amount of water
17 that will want to move in that system will move
18 in that system and this dumb thing will want to take
19 it.

20 Q. You are saying even though
21 you are collecting the water that would be
22 contaminated from the garbage, the system will
23 compensate by drawing it from somewhere else?

24 A. It will try to compensate
25 and it would draw from other parts of the flow



1 system or, alternatively, if you changed the gradient
2 over the poorly permeable layer to increase the
3 infiltration -- it only knows it wants to move
4 some water and it will keep trying to move the water.

5 Q. But, with those sort of minor
6 exceptions, you would agree with me, Mr. Sobanski,
7 that the leachate from Site F that escapes your
8 collection system will have the same possible fate
9 or fates as groundwater presently does?

10 A. Yes.

18B

11 Q. That is it will either go
12 to depth and eventually move to the lake in what I
13 suggest is at least hundreds of years and perhaps
14 thousands, and do you agree?

15 A. We threw a number out of a
16 hundred years or so yesterday and it could be
17 longer. From what we are seeing at the other sites,
18 I can't imagine it would be shorter.

19 Q. And you agreed also that that
20 would be attenuated and diluted to the point where
21 it would be indistinguishable from the present
22 groundwater?

23 A. I believe it would be.

24 Q. And you also indicated that
25 is a very small percentage of the amount that will be



1 generated by the landfill, I think something in the
2 order of 5 per cent or less?

3 A . Yes.

4 Q. The other possible fate for
5 this balance of the 95 per cent, quite similar to the
6 existing rainfall, I suggest to you, would be incorporated
7 in the local flow system around Site F, although
8 that is now an engineered flow system and it would
9 be collected by your underdrains; is that not
10 correct?

11 A. That is correct.

12 Q. And a very small percentage
13 of that, I suggest to you, according to your model,
14 would leak through this massive layer into the
15 more permeable, what you have called highly
16 fractured layer?

17 A . Yes.

18 Q. Now we are talking very, very
19 small percentages, are we not?

20 A. No. Overall the amount that
21 this layer would carry as calculated to date would
22 be the 5 per cent we are talking about.

23 Q. That is the majority of the
24 5 per cent that would escape and the minority of it
25 goes to depth and is that how it works?



1 A. Yes, that is right.

2 Q. So the majority of the amount
3 that escapes then, according to your model, would
4 go into this highly fractured zone and would you
5 agree with me that that would also be attenuated
6 to a substantial extent, based on the evidence we
7 have seen at the Bayview site that Ms. Cronk
8 reviewed with you?

9 A. Yes, I believe so.

10 Q. So even the amount that gets
11 into that fractured zone would be attenuated and
12 you suggest it would come up eventually in that
13 marshy area around Highway 403?

14 A. Yes.

15 Q. If that is wrong in terms of
16 the attenuation or whatever, you are proposing a
17 purge well system into that fractured zone that would
18 provide an alternative means of capturing and
19 dealing with that small percentage, correct?

20 A. Yes.

21 Q. Now Ms. Cronk dealt with this
22 with you to some extent, Mr. Sobanski, but frankly
23 I wasn't clear at the end of her questioning on this
24 so I am going to ask you again if you would please
25 bear with me. I would like to explore with you



1 what happens in the event your highly fractured unit
2 is not there?

3 A. Yes.

4 Q. We have been proceeding on
5 the assumption your model is correct. You indicated
6 you believe that this does underlie Site F; correct?

7 A. Yes.

8 Q. And you based that, as I
9 understand it, on your interpretation and explanation
10 of the gradients, as well as your pumping tests?

11 A. Yes, that is right, as well
12 as visual analyses of the cores and other pieces of
13 information.

14 Q. Right. I know, Mr. Sobanski,
15 and I am sure you anticipate there will be a lot
16 of questions of you about whether in fact the evidence
17 is all consistent with that theory and whether or
18 not it can be borne out?

19 A. I am.

20 Q. I am not intending to ask you
21 about that, but I am intending to ask you for a
22 moment to assume that it is not there and perhaps
23 I was the one who caused confusion by suggesting
24 to you that you would also assume the continuing
25 same percentage going into the rock. So, I will abandon



1 that if it will make you happier?

2 A. It will.

3 Q. I want you to explain to me
4 again, and let's assume it's not there and let's
5 look again at the present system, just rainwater
6 falling down. What is happening presently, I
7 suggest, is that the salty groundwater that is found
8 in the bedrock is not presently contaminating the
9 fresh water rind, if I can call it that, of groundwater
10 that is found south of the site, south of the
11 CNR tracks, that some of these shallow wells are
12 drawing or potentially drawing water from. Can you
13 agree with that?

14 A. Just bear with me a moment.
15 If I could just check a piece of information, please.

16 Q. If you are looking at
17 Appendix 9, that is what I was going to refer
18 to and this is in Exhibit H-40A, the water well
19 inventory?

20 A. That is what I was looking at.

21 Q. You will recall there are
22 five wells; Nos. 37, 39, 41, 42 and 44?

23 A. I don't recall the exact
24 numbers, but there are five wells and that sounds
25 about right.



1 Q. Perhaps I could ask you to turn
2 to those pages because I was planning to do this
3 later, but let's do it now since it has come up?

4 A. I need this information
5 actually to answer your question.

6 Q. Ms. Cronk went through this
7 with you, so I don't want to belabour it.

8 A. Fine.

9 Q. If I remember correctly, you
10 agreed with her that these wells were overburden
11 wells according to the designation on your map,
12 with the exception of well 44 which, Mr. Beechinor
13 pointed out, had a tail on the designation on that
14 map?

15 A. That's right and perhaps we
16 could put the figure as it would be more helpful.

17 Q. I am afraid I can't assist
18 you with the exhibit number of that map.

19 A. It's Drawing 2.

20 Q. Drawing 2 from Exhibit 40?

21 A. Yes. Well 37 is reported
22 as a dug well in the overburden and it's just off
23 King Road, south of the CNR tracks, just to the
24 east of King Road. That well had a small bit of
25 chemistry information, we took a small sample, and



1 the sulphate was 61.5 milligrams per litre and
2 the chloride was 59.3 milligrams per litre.

3 Q. I suggest that tells you and
4 confirms that is an overburden well, those levels,
5 with those chlorides?

6 A. We have mapped it as an over-
7 burden well and certainly the information we have
8 on the shale indicates that the quality would likely
9 be poor if it was in the shale.

10 Q. Substantially poorer, I
11 suggest?

12 A. Based on some of the new
13 information submitted yesterday on HC15 and HC14,
14 yes.

15 Q. Well 39 similarly is indicated
16 on your map as a dug overburden well?

17 A. 39 is located just to the
18 south of 37, a couple of houses perhaps.

19 Q. And it has the same designation
20 on the map?

21 A. Yes, it does, it does have
22 the same designation, but there was no chemistry done
23 on that well.

24 Q. And 41 and 42, the same is
25 true, they are designated on your map as overburden



1 dug wells and in fact there is some confirmation
2 of the water well chemistry for No. 42?

3 A. Nos. 41 and 42 are located
4 between the CNR tracks and Plains Road, about mid-way
5 south or southerly -- I guess that's southeasterly
6 towards Hamilton Harbour, about the mid-point of Site
7 F, the proposed landfill area. Well 42 had some
8 chemistry done on it and it was 51.5 milligrams per
9 litre of sulphate and the chloride was 52 milligrams
10 per litre.

11 Q. Okay. Well 44; this is the
12 one which is on your map as a bedrock well and I
13 suggest to you that your map symbol is wrong. When
14 you look at the chemistry of this water, the
15 chloride and sulphate levels, they would not be
16 this low if this was bedrock water, I suggest to you.
17 If there is difficulty with that, there are two
18 other references I am prepared to refer you to.

19 A. I have no way of knowing for
20 sure whether it's in the overburden or the bedrock.
21 We had a few wells that had a little better quality
22 in the overburden at shallow depths and this well
23 has right now -- it was measured and the concentration
24 of sulphate was 47.5 milligrams per litre and the
25 chloride was 25.3 milligrams per litre.



1 Q. Which is completely consistent
2 with the other overburden wells in that location;
3 correct?

4 A. Yes, it is consistent in terms
5 of chemistry as being in about the right range.

6 Q. Since you are not prepared
7 to agree with me that your map symbol is wrong, I
8 would ask you to turn to N-189 and this is the
9 photocopy, Mr. Sobanski, of the chloride and sulphate
10 readings from a number of different wells in the
11 vicinity and these are your readings, as I understand it.

12 A. Yes.

13 Q. First of all, would you agree
14 with in looking at the map behind you, Drawing 2
15 from Exhibit H-40, that is your HClO well that is
16 in the immediate vicinity of well No. 44 we were
17 just looking at in Appendix 9?

18 A. Yes.

19 Q. It's quite close to that?

20 A. About 150 metres to the
21 south.

22 Q. At that location you would
23 agree that Exhibit N-189 shows that your chloride
24 readings in the first reading was 175?

25 A. Yes.



1 Q. And that you would agree with
2 me is your piezometer which is at 5.5 metres of
3 depth and founded in the till?

4 A. Yes, that's right. That would
5 put it in the overburden.

6 Q. The next reading on Exhibit
7 189, the 1700 reading at HC10, is at the interface
8 between the till and the shale?

9 A. Yes, it is.

10 Q. And below that, 1960 is in
11 the shale?

12 A. Yes, the next one would be
13 15.1 metres.

14 Q. Given at well 44 you have
15 100 metres or so away a chloride reading of 25,
16 Mr. Sobanski, would you not agree with me that
17 it would have to be in the overburden?

18 A. It would certainly seem to
19 be possible, yes.

20 Q. "Possible"? You are being
21 awfully cautious today?

22 A. The reason I am being cautious
23 is that--

24 Q. It's very likely, isn't it?

25 A. The only reason I was a bit



1 hesitant is that it would seem to be more indicative
2 of overburden than bedrock and the reason I was a
3 bit hesitant is that even if you look at the over-
4 burden at this particular well at HCl0, the values
5 even within the overburden, which is half-way into
6 the overburden in piezometer HCl0-3, were only down
7 about 15 feet and we already have chemistry that
8 is significantly worse than was measured at the
9 domestic well of 44. I would tend to agree that
10 it certainly looks like overburden, but assuming
11 it is overburden, for example, it is still difficult
12 to explain the chemistry between that well and HCl0
13 as they are quite a bit different.

14 Q. It's not an order of
15 magnitude?

16 A. They are not an order of
17 magnitude different, but sulphate in our well is
18 already approaching the recommended limit for
19 drinking water and the chlorides are 175. It is just
20 possible that the well may be effected by some
21 road salting, but I would tend to agree that overall
22 it may be that that well is in the overburden and
23 perhaps Mr. Beechinor who conducted that part of
24 it might just comment on what his basis is for thinking
25 the well was in wrong, if he can recall.



1 MR. BEECHINOR: A. I can't recall
2 directly, but it probably would have come from the
3 report from the resident. I agree that it is
4 conceivable that that well is in fact in the overburden.

5 Q. Would you agree with me that
6 it's more likely it's in the overburden than in the
7 shale?

8 A. Based on the chemistry, I would
9 say it is more likely in the overburden, but we
10 reported the information given to us during the
11 time we interviewed the resident.

12 Q. When you look at Exhibit N-191,
13 and maybe this is not necessary, Mr. Sobanski, but
14 there was some discussion about Exhibit N-191, the
15 Morrison Beatty results for chlorides and sulphates
16 found in the vicinity of Site F, and I see you have
17 that?

18 MR. SOBANSKI: I have that.

19 Q. You will remember we added
20 on the figures of 87 and 87.7 for MB-13?

21 A. Yes, I just don't have them
22 in front of me, but I recall them.

23 Q. Can you confirm that those
24 chloride figures are also in the till whereas
25 the lower and substantially higher values, the lower



1 values on the table and the higher in numerical size,
2 are in the shale?

3 A. Overall, if you will pardon
4 me, overall even in Morrison Beatty in the overburden
5 the chemistry is a little poorer at that site,
6 particularly with respect to sulphates. The
7 chlorides are somewhat higher, but the sulphates
8 are indeed quite a bit higher, even at Morrison
9 Beatty in the overburden. I am not arguing too much,
10 and I think you are making your point, it appears to
11 be in the overburden.

12 Q. If you can answer my questions,
13 we will move through this considerably faster than
14 if you try and anticipate my questions.

15 A. I am not trying to anticipate, I
16 know your question and I am trying to find out if
17 I feel it's in the overburden.

18 Q. But is the reading of 87 and
19 87.5 recorded by Morrison Beatty for chlorides taken
20 from their piezometer located in the clay till. You
21 have the log record.

22 A. It is.

23 Q. It is?

24 A. Yes, it is.

25 Q. The ones below that are in



1 the shale?

2 A. Yes, they are.

3 Q. The higher values. The same,
4 I suggest, is true for the other two Morrison Beatty
5 wells in the vicinity of well 44 from your Appendix 9,
6 and that is Morrison Beatty 16 and Morrison Beatty
7 18. In both cases, the lowest value for chlorides,
8 the 30 value at MB-16 and the 103 value at MB-18,
9 are also till values and not shale values?

10 A. 16 yes and 18 could be in the
11 shale. It straddles....

12 Q. Perhaps it's at the interface?

13 A. It's at the interface, yes,
14 it straddles the interface.

15 Q. There is a zone of mixed shale
16 and till?

17 A. That's right.

18 Q. In any event, it certainly --
19 I suggest to you that when you see a value at well
20 44 of 25, there is no other independent evidence
21 which would indicate that a well located in the
22 shale at that location or near that location could
23 be that free of chlorides, is there?

24 A. No, those are among the lowest
25 chlorides that have been measured in the area, other



1 than our northern till sites.

2 Q. They are completely consistent
3 with it being located in the overburden and not
4 in shale?

5 A. Yes, I believe so.

6 Q. The only evidence you have
7 to the contrary is some information provided to you
8 by the owner of the well?

9 A. Yes.

10 Q. And you must agree that is a
11 very old well?

12 MR. BEECHINOR: A. I would agree with
13 that.

14 Q. Thank you. Coming back then
15 to where we started on this tangent, Mr. Sobanski,
16 you agree with me, looking back at our assumption
17 and trying to understand what is happening at the
18 present site, and assuming we don't have your
19 highly fractured permeable area there, you will agree
20 with me that what is happening presently is that
21 the salty groundwater you find in the bedrock is
22 not contaminating the fresh water and that these
23 wells are seemingly drawing their water from?

24 MR. SOBANSKI: A. That is correct, yes.

25 Q. And this is an equilibrium



1 system that has, I suggest to you, developed over
2 the past ten thousand years or whatever since the
3 last ice age?

4 A. Yes, that is correct.

5 Q. What we have essentially is a
6 fresh water rind of water that is floating, if you
7 like, or on top of the salty water and isolated, I
8 suggest to you, from that icy salty water by three
9 factors; first of all, the fact it's in till and
10 therefore protected, if you like, from any substantial
11 quantities of water coming up from below. Would you
12 agree with that?

13 A. Not entirely. It's in
14 equilibrium, but it will be affected by the water from
15 below to some degree by diffusion over the long haul.

16 Q. Are talking a long haul, ten
17 thousand years?

18 A. That's right, and you will
19 get a lot of diffusion in that time. I agree it's
20 an equilibrium system, but I believe it's an
21 equilibrium with the dirty quality below it, it
22 is currently in equilibrium with that bad quality
23 water.

24 Q. What that tells us is that the
25 quality of that water in that fresh water rind is



1 determined by the rainwater input predominantly and
2 not by the quality of the groundwater below it?

3 A. Yes.

4 Q. And that is a kind of water
5 that is continually replenished by rainwater and
6 constantly kept fresh by that source?

7 A. Where it exists, yes.

8 Q. "Where it exists." I would
9 agree with that. I suggest to you further that
10 the quality of that water is much more dependent on.
11 inputs such as urban runoff from roadways like
12 salt on roads, oil on roads and what-have-you, than
13 it would be by the quality of the groundwater that
14 is below it for that very reason. It is much more
15 susceptible to contamination from above than below;
16 would you not agree?

17 A. Yes, I agree with you on that.

18 Q. In fact I suggest to you that
19 you would have to change the concentrations of
20 contaminants in the groundwater below that fresh
21 water kind by a substantial amount before you could
22 have any considerable alteration of that fresh water?

23 A. Yes, we ran some rough
24 calculations on that, I believe, in the early
25 evidence.



1 Q. In essence it is isolated for
2 all practical purposes and not dependent on the
3 quality of the groundwater that is below it; would
4 you agree?

5 A. Not entirely, but it is close.

6 Q. For all practical purposes, I
7 said?

8 A. Practically speaking, yes.
9 It is affected, I believe, by water below, but
10 obviously not to any great extent.

11 Q. I suggest to you that that
12 situation will not change in the slightest by the
13 location of a landfill site at Site F, the same
14 equilibrium will exist, and by the time any increase
15 or any leachate gets down that distance, it will be
16 indistinguishable from the present groundwater in
17 terms of its contaminants and it will not have the
18 slightest impact on the equilibrium that exists.

19 A. I'm not sure that it would be
20 absolutely zero and I'm not sure anybody could say
21 that, but very close.

22 Q. It would be indistinguishable
23 from the present situation?

24 A. In all likelihood, yes.

25 Q. I suggest to you also that



1 existence of this salty groundwater also provides us
2 with a natural tracer or a natural indication of where
3 the present groundwater may be coming up. Maybe I
4 haven't made that clear. Because the groundwater in
5 the bedrock is of substantially worst quality than
6 the groundwater in the overburden, if it were coming up
7 in places presently, we would see evidence of that, or
8 you could see evidence of that. Would you agree with
9 that? You would see areas that were saltier.

10 A. Yes, overall. You should see
11 some effect.

12 Q. If there were, for example,
13 between the lake and the site, a large area of
14 discharge of this deep groundwater coming to surface
15 and if this had been continuing over ten thousand
16 years, I suggest to you that we would have either
17 salty marshy areas, or some kind of salt flat where
18 the water was evaporating and leaving the salt
19 behind?

20 A. If there were significant
21 quantities coming to surface, yes.

22 Q. And you don't see that south
23 of the site?

24 A. No. If there were small
25 quantities, one could maybe say that it's washed



1 away by rainwater.

2 Q. But predominantly in your
3 investigations between the site and the lake you
4 found this kind of fresh water everywhere between
5 the site and the lake, did you not, or everywhere
6 you looked?

7 A. No, I don't believe so. We
8 just looked at HC10 which was in the overburden
9 and it wasn't really great quality. It is deteriorating
10 fairly rapidly at the overburden/bedrock contact at
11 HC10 where we have 1700 chlorides.

12 Q. Let's put up the drawing against
13 the wall which has the blue line on it. I'm not
14 sure what that is. It's 21, I believe. Is that
15 Drawing 21?

16 MR. BEECHINOR: A. Yes, it is.

17 Q. From Exhibit H-40?

18 A. Yes.

19 Q. This shows the chloride
20 contours, if I can call it that, Mr. Sobanski?

21 MR. SOBANSKI: A. Yes.

22 Q. You have marked on there the
23 contour of 1000 I think in blue?

24 A. Yes.

25 Q. And you agree that



1 predominantly from your evidence, the groundwater
2 quality is better at surface and that this is a
3 layer, if you like, of relatively better quality
4 in terms of chlorides water that overlies the worst
5 quality?

6 A. Yes. Of course we have lower
7 concentrations at higher elevations than we do
8 at deeper elevations.

9 Q. If this groundwater were
10 coming up presently between the site and the lake,
11 you would see these higher concentrations at the
12 surface, would you not?

13 A. From the deep flow system, yes.

14 Q. I suggest to you that this
15 is supporting evidence for your theory and your data
16 from your piezometers that the groundwater movement
17 in that area is lateral and coming up in the lake
18 and not north of the lake. Would you agree?

19 A. It is supportive, yes.

20 MR. GARROD: I will obviously not
21 finish by the break and if the Board would like to
22 break at some point, this would be a convenient
23 spot.

24 DR. KINGHAM: This would be a good
25 time. Thank you very much. Fifteen minutes.

--- Recess



1 DR. KINGHAM: Thank you, please be
2 seated. Mr. Garrod.

3 MR. GARROD: Q. I am going to move
4 on, Mr. Sobanski, to another area. Do you have a
5 copy of Exhibit 109, the government review?

6 MR. SOBANSKI: A. No, I don't have
7 one.

8 Q. Just to set the stage for
9 my questions about this, Mr. Sobanski, you will recall
10 that you were questioned by Mr. Tidball about what
11 was marked as Exhibit 154, the Ministry of the
12 Environment Policy on Reasonable Use?

13 A. Yes.

14 Q. And your answer, as I recall
15 it, was that that policy didn't apply in the situation
16 of Site F because there was no viable groundwater
17 resource in the vicinity of Site F to be concerned
18 about. Do you recall that answer?

19 A. I felt that way.

20 Q. What I would like to do is
21 ask you to turn in Exhibit 109, the government review
22 of the documentation that was submitted to them
23 prior to this point in time, and I believe that that
24 consisted of the 2C stage material and there was not at
25 this point in time the technical reports prepared;



1 is that your understanding?

2 A. I regret to say that I have
3 never seen this document.

4 Q. Turn to page 105.

5 A. Yes.

6 MR. GARROD: Just to refresh everyone's
7 memory, you will recall Mr. Tidball indicated that
8 the government has an obligation under the Environmental
9 Assessment Act to prepare a review of material and
10 publish it, and this is the review coordinated by
11 the Ministry of the Environment, EA Branch and
12 summarizes the input from the various Ministries that
13 review the matter, and at page 105 we see, as part
14 of the submission of the Ministry of the Environment,
15 their comments on Schedule 34, which is the hydro-
16 geologic and hydrologic assessment report.

17 MR. SOBANSKI: Of course we did see
18 this particular document in a letter form.

19 Q. I would like to draw your
20 attention to No. 4 on the list of comments, page 105
21 and, reading starting from the second sentence where
22 it says Quarry Site F, do you see that?

23 MR. SOBANSKI: A. The third sentence.

24 Q. I am sorry. Perhaps we
25 should read the whole thing.



1 "There are significant differences
2 between Site D and F and the types
3 of analyses used to evaluate the two
4 sites. Site D is located in an area
5 where the till thickness and slope are in
6 accord with normally accepted
7 criteria for landfill site development.
8 Quarry Site F on the other hand does not
9 meet these normal criteria but is in
10 an area where there is no viable
11 groundwater resource."

12 First of all, stopping there, do you
13 take that as an indication that the Ministry at that
14 time, the Ministry reviewers agreed with your position
15 that there was no viable groundwater resource in
16 the vicinity of Site F?

17 A. I would say so.

18 Q. Secondly, going on:

19 "The Ministry has previously stated
20 that Site F would only be hydrogeologic-
21 ally acceptable if the consultant
22 can reasonably demonstrate that
23 leachate infiltrating into the
24 shale will go to depth and will not
25 come to surface between the site



1 and the lake. This is still our
2 position and we understand that the studies
3 to do this are now underway."

4 I suggest to you that, firstly, this
5 was written by the Ministry of the Environment in
6 February of 1986 or before, since that is the date of this
7 document, and that was prior to the publication of
8 the Gartner Lee plume delineation study in December,
9 1986?

10 A. Yes.

11 Q. It was also prior to the
12 detailed technical work you have done on Site F?

13 A. Yes.

14 Q. Having regard to that, and
15 having regard to the review of those documents that
16 you undertook with Ms. Cronk, are you satisfied
17 that you have reasonably demonstrated that the
18 leachate infiltrating into the shale will go to
19 depth and not come to surface between the site and the
20 lake?

21 A. I believe that that is a
22 very difficult question for me, that there would
23 be no leachate surface between the site and the lake.
24 Certainly on the bulk, we are not seeing discharges
25 of the deep waters. We see there is poor quality



1 in the area in general with only spotty fresh water.
2 We still though do have the hydrogeologic situation
3 as we see it on Site F, that while the model is
4 not, and I don't pretend that it is precise, it is a
5 tool that we are using to help us understand the
6 system. It would indicate that there may be some
7 potential, some potential for some discharge.

8 Q. Just so I am clear, first
9 of all you have already indicated that you believe
10 there may well be a discharge zone north of the
11 highway, Highway 403, between the site and the lake
12 if you like?

13 A. No, south of Highway 403.

14 Q. What are you saying now?

15 A. I am talking about the
16 mathematical model which is an indicator of how
17 the flow system is functioning. It would tend to
18 indicate that somewhere south of Highway 403 there
19 could be potential for discharge of some groundwater
20 from the deeper depths.

21 Q. Stopping there for a moment,
22 that is groundwater, but we are talking about
23 leachate and my understanding is that that means that
24 that leachate has not been attenuated to any degree.
25 Do you agree with that?



1 A. Yes, I see your point, yes.

2 Q. So you suggest there may
3 well be in some small location, some amount of
4 groundwater coming up, but you agree with me that
5 that would not be leachate?

6 A. Absolutely, yes.

7 Q. Because it would be attenuated,
8 diluted and what-have-you to the point of being
9 indistinguishable?

10 A. It may not be totally
11 indistinguishable, but it would be at very low
12 concentrations. We ran through some scenarios before
13 on whattypes of concentrations we might expect and
14 they would be quite small, given the equilibrium of the
15 system to date and the amount of contaminants we
are adding.

16 Q. Aside from your calculations and pre-
17 dictions, don't you agree that with what we have seen from
18 the plume delineation study and the work on the
19 Bayview landfill site, that the leachate is
20 indistinguishable from the present groundwater any-
21 where beyond about 25 metres from the existing
22 landfill site, and even there it is questionable?
23 That is what that study shows, does it not?

24 A. Well, we can cast some doubt
25 perhaps on some of the measurements that have been



1 made, but there are still some measurements, and
2 one would have -- we

3 Q. I am not asking you for a
4 standard of proof that is one hundred per cent under
5 all possible contingencies, what I am asking you for
6 is an opinion based on what is reasonable. That is
7 what the Ministry of the Environment document
8 indicates, that you reasonably demonstrate it.

9 A. Reasonably demonstrated at
10 those sites. It does not appear to me to be
11 positive proof that we have a plume extending south
12 of Highway 403 at all.

13 Q. I suggest there is no evidence
14 of it at all, Mr. Sobanski?

15 A. Not quite. Gartner Lee's
16 report, and Mr. Feenstra can speak better to it
17 because he has been assigned to review those reports
18 in more detail, ...

19 Q. Whatever Mr. Feenstra....

20 MR. McQUAID: Let the witness answer.
21 This is the second or third time.

22 MR. SOBANSKI: I believe Gartner Lee felt
23 it was possible in their well at about 25 metres there may
24 be some contaminants and they found levels of
25 phenols that were persistent and which they could



1 not account for. I wasn't really brought into that
2 that area yesterday, but I did allude to that and
3 there is the possibility with Gartner Lee that it
4 has moved 25 metres, but again that is a very short
5 distance, given the period of time involved, and I
6 think too that more monitoring is probably required
7 at that well to be sure so that they can firm up
8 their opinion on whether they have a problem or not.
9 In any event, the concentrations, if there, are
10 extremely low.

11 MR. GARROD: Q. I was quarrelling
12 with you when you said south of the 403, but you
13 are saying there may be some indication at 25 metres
14 south of the Burlington site and I don't quarrel
15 with you.

16 MR. SOBANSKI: A. At Morrison Beatty's
17 wells as well, we can cast suspicion on some of the
18 values, but some of them just aren't confirmed.
19 There are some spotty readings around the Bayview
20 landfill as well and very close to the site in
21 general.

22 Q. Ms. Cronk went into this in
23 some detail with you and I don't want to cover that
24 ground again, but perhaps I could ask you or read
25 to you the conclusion from the plume delineation



1 study on page 1, and the number one conclusion that
2 the Gartner Lee people present in their report on
3 page 1, Exhibit H-83, says:

4 "The impact of the leachate plume on
5 groundwaters to the south of the
6 landfill appears to be negligible.
7 There is some evidence that leachate
8 may have moved 25 metres or more
9 southward, but the plume does not
10 appear to have moved as far as the
11 North Service Road. Any leachate
12 which bypasses the toe drain
13 collection system and enters the
14 groundwater flow system in the shale
15 bedrock appears to be significantly
16 diluted and attenuated. No
17 concentrated leachate was found in
18 any of the plume delineation
19 groundwater monitors."

20 Do you agree that that is their
21 conclusion?

22 A. Yes, I do.

23 Q. I would like to turn if I
24 may to the Reasonable Use Policy, which is Exhibit
25 154 that you were questioned about by Mr. Tidball.



1 What I want to do with you is review this document,
2 review the areas that have some relevance to the
3 proposal before you and ask you whether or not
4 your proposal at Site F satisfies these requirements.
5 Do you understand where I am going?

6 A . Yes, I understand.

7 Q . First I would like you to
8 turn to page 4 of the document and it is identified
9 as 15-01-04, the fourth page in. Do you have
10 that?

11 A . Yes.

12 Q . There is a very general
13 statement made in the middle of this page under
14 the heading of regulated sources of contamination
15 and do you see it?

16 A . I do.

17 Q . You agree a waste disposal
18 site would fall in this?

19 A . Yes.

20 Q . It says:

21 "The waste control requirements
22 for proposed regulated waste
23 discharges will be established on
24 a case-by-case basis. As a general
25 policy, water quality degradation



1 will be controlled in order to
2 protect reasonable uses existing
3 or proposed of both ground and
4 surface waters."

5 I know you are not here as a surface
6 water expert, Mr. Sobanski, and there will be
7 another witness on that, but given our discussion,
8 are you generally satisfied that groundwater to the
9 extent there are reasonable uses in the vicinity,
10 this policy will be satisfied?

11 A. Yes.

12 Q. Turning over to page 6 of
13 the document which is after the second blue page,
14 and this is the document that is entitled The
15 Incorporation of the Reasonable Use Concept into
16 the Groundwater Activities of the Ministry of
17 the Environment?

18 A. Yes.

19 Q. On page 6 there are some
20 statements I would like to ask you about and under
21 the heading of B there is the following statement:

22 "It is not generally possible with
23 present technology to estimate
24 accurately the quantity or the
25 quality of contamination which



1 will discharge from a waste disposal
2 facility. Uncertainty factors on the
3 order of at least five times are
4 common in the measurement of
5 paramaters such as hydraulic
6 conductivity. Therefore large safety
7 measures should be incorporated into
8 all estimates of contaminant dis-
9 charge.

10 The safety margin that is
11 appropriate would have to be assessed
12 on a case-by-case basis depending
13 on the complexity of the hydrgeologic
14 environment, the degree of uncertainty
15 in the assessment, and the conse-
16 quences of failure of the system."

17 Over the page on page 7 at the top,

18 it says:

19 "There is a higher level of certainty
20 when an existing contaminant plume
21 is present and can be used in an
22 assessment than when no plume is
23 present."

24 Do you agree, Mr. Sobanski, that
25 where there is an existing contaminant plume, such



1 as we have from the Burlington site, the Bayview
2 site and so on, there is a higher level of certainty
3 than when that kind of evidence is not available to
4 support your predictions?

5 A . Yes.

6 Q. Turning to Section 3.3.2 of
7 this same paper, and that is on page 12, I believe,
8 Mr.Sobanski, this refers to contaminant attenuation
9 zone. You have indicated, as I understand your
10 evidence, that you do not believe that it will be
11 necessary to use a contaminant attenuation zone and
12 do you understand this concept or shall I go through
13 it in some detail with you?

14 A. Let's go through it a little
15 bit.

16 Q. This is my understanding of
17 this, Mr. Sobanski. This section of the policy allows,
18 if you like, for the limited impairment of an off-
19 site property for the purpose of allowing
20 contaminants from a waste disposal site to be
21 naturally attenuated to levels which would be
22 compatible with the reasonable use policies. Do you
23 understand that?

24 A . I do.

25 Q. I says here under exceptional



1 cases the Ministry will permit a site to be located
2 in an area where there will be some contaminant
3 off-site and that is what this contaminant
4 attenuation zone is in here for?

5 A. Yes.

6 Q. You have indicated in your
7 evidence that that is not necessary at Site F
8 because of attenuation on-site and because of your
9 ability to collect in a purge well if it goes off-
10 site; is that fair?

11 A. Yes. In addition, the
12 naturally poor quality of the water leads me to
13 think that there is really no resource there to
14 protect.

15 Q. Yes. You will be meeting
16 the requirements of the policy without the
17 contaminant attenuation zone?

18 A. I think so, but again you have
19 pointed out with the purge wells if necessary, so
20 yes.

21 Q. Let's assume for the moment
22 that that may be wrong. Will you agree with me
23 that although you don't think it is necessary, the
24 fact that this policy allows for this kind of
25 contaminant attenuation zone, the fact that there



1 is this zone or buffer of land between the 403
2 and the CNR tracks which can serve that purpose,
3 provides in the case of Site F an additional level
4 of back-up, if you like, that is not available at
5 Site D? If all else went wrong with your purge
6 wells and everything else, there is this additional
7 back-up we can rely on, the contaminant attenuation
8 zone?

9 A. Yes. There are actually three
10 levels, the distance between the site and the road,
11 we have a major road allowance there as well which
12 is the North Service Road and Highway 403 and,
13 finally, the NSP lands, if required, for natural
14 attenuation and if NSP were agreeable, that would
15 also be available for natural attenuation, or
16 treatment as Mr. Tidball referred to it.

17 Q. Turning over the page to
18 page 13, there is the heading called The Adjacent
19 Property and the first sentence of this indicates:

20 "The Adjacent Property is the
21 land bordering the Waste Disposal
22 Site or the Contaminant Attenuation
23 Zone."

24 And I presume that means where that is being
25 considered?



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A. Yes.

Q. Then this policy sets out some requirements as far as potential impacts on adjacent property?

A. Yes.

Q. Let's look at these. It says:

"Discharge of the contaminants (leachate) to Adjacent Property will have no more than a negligible effect on the present or potential reasonable use of that property. This will ensure that:

a) the presence of the contaminant will not interfere with the construction, installation or good operation of any usual facility in the subsurface, such as utility conduits."

If Site F is used as the landfill site would that policy be met?

A. Yes.

Q. "b) the soil will not be contaminated to a degree which would interfere with its use."

And would that be met?

A. Yes.



1 Q. "c) the ground water will not
2 be contaminated to a degree which
3 would impair its use, where:
4 (i) it is presently of acceptable
5 quality."

6 Now I have to direct you, I think, to consider here
7 only the fresh water find we have been talking about
8 since you will agree that the other groundwater
9 in the vicinity is not presently of acceptable quality?

10 A. That's correct.

11 Q. Let's focus on this fresh
12 water find. Would it be contaminated to a degree
13 that would impair its use, according to this?

14 A. No. We talked about this before.

15 Q. Yes.

16 A. It's in equilibrium with
17 the existing system and our imposing a landfill at
18 Site F should not interfere with that zone.

19A

19 Q. So we can move on to Section
20 3.4 on page 14. This is coming back to when a
21 contaminant attenuation zone might be considered
22 to be acceptable to the Ministry, and this is
23 exceptional circumstances which you remember and I
24 would like to ask you here to assume for the moment
25 that everything else is wrong and this is required



1 as a back-up. I know you don't agree with that?

2 A. That it escapes the system
3 and purge wells, et cetera?

4 Q. Yes. Everything is failing
5 and you need this in order to attenuate the leachate
6 and you need the NSP lands?

7 A. Okay.

8 Q. What I am wondering....

9 A. Just one second.

10 Q. What I am trying to get at
11 is if that was the case and everything failed,
12 is this the kind of circumstance where from a
13 technical point of view the requirements of this
14 policy would allow for the use of a contaminant
15 attenuation zone at Site F. I would like to take
16 you through this, No. 1, it says it would be allowed
17 "only under the following circumstances."

18 "1. Where an alternate source of
19 water is far superior to any
20 associated with a Contaminant
21 Attenuation Zone. Here the Ministry
22 may support the use of the ground
23 water for dilution and attenuation
24 in a Contaminant Attenuation Zone
25 and take the position that the effect



1

on reasonable uses on Adjacent

2

Property would be negligible because

3

that ground water would not need to

4

be used in any case.

5

This circumstance could arise as

6

follows:

7

a. Where two water-bearing units are

8

present, one being far superior to the

9

other with respect to the quality,

10

quantity and the accessibility of

11

the water contained in it, the

12

Ministry may accept the inferior unit

13

as a Contaminant Attenuation Zone,

14

provided that this will not interfere

15

with the use of the superior unit."

16

I suggest to you that this could

17

apply if we considered the superior unit to be the

18

fresh water rind and the inferior one to be the

19

bedrock water?

20

A. That's possible.

21

Q. Secondly is b:

22

"Where good supplies of water are

23

available, either from surface water

24

sources or from municipal systems,

25

and the ground water supplies in a



1 particular unit are marginal with
2 respect to their quality and/or their
3 quantity, the Ministry may support
4 the use of that ground water as a
5 Contaminant Attenuation Zone."

6 And do you agree that that fits the Site F situation
7 perfectly?

8 A. Perfectly.

9 Q. 2) and the others, I suggest
10 to you, Mr. Sobanski, don't apply and I don't intend
11 to ask you about them, because in my view they
12 don't apply and someone else can look at it if
13 they want to.

14 Looking at page 16, Mr. Sobanski,
15 this deals with The Assessment of Proposed Landfills
16 and this is what sets out the limits of degradation
17 allowed off-site, you realize?

18 A. Yes.

19 Q. This gets into this comparison
20 with the drinking water objectives and so on?

21 A. Yes.

22 Q. We have been through this
23 and you agree that given the quality of the bedrock
24 water, all of these objectives are already exceeded?

25 A. Yes, they are.



1 Q. That is why you took the
2 position that this policy doesn't apply in the Site F
3 situation?

4 A. Overall. It applies to the
5 extent of the shallow fresh water rind, which I think
6 we can see from the data is very spotty in terms of
7 its existence, if indeed it exists at all, and we
8 found in fact there was some degradation between two
9 sampling periods, even of the so-called fresh water
10 rind. I certainly don't believe personally that
11 we could develop groundwater supplies of any
12 significance in that "fresh water rind" on that site
13 without deteriorating the water quality quite
14 seriously from the natural poor quality water beneath
15 it.

16 Q. If you pumped it substantially
17 you would draw the saltwater up?

18 A. If it can be pumped substantially,
19 I would think you would degrade it naturally from
20 the surrounding salty water. So, I don't really
21 feel that this quite applies because I feel that the
22 water quality is not good enough to do this basic
23 approach.

24 Q. Let's skip over this then
25 to page 21, which talks about the assessment of



1 operating landfills. This would apply, I take it,
2 to the existing -- what's known as the Burlington
3 landfill site?

4 A. Yes.

5 Q. This says,

6 "An operating landfill should meet
7 the same limits for contaminant
8 discharge as a proposed landfill."

9 And is there any indication that the existing
10 regional site is not meeting these limits at present?

11 A. From the landfills, no, there
12 is no evidence.

13 Q. That's all I have on that
14 policy.

15 I was going to ask you quite a
16 bit about the plume delineation study but Ms. Cronk
17 has covered most of it, but there are a couple of
18 minor points I would like to ask you about, if you
19 would get it out, Exhibit H-83.

20 I am just interested in this,
21 Mr. Sobanski, from the point of view of the
22 determinations that Gartner Lee made about hydraulic
23 conductivities values. If I could ask you to
24 turn to page 12, you will see that Gartner Lee made
25 a number of determinations of hydraulic conductivity



1 at the Burlington site and reports some values here
2 and I would suggest to you that if you look at the
3 middle of the middle paragraph, or the middle of
4 the third paragraph, it says:

5 "Figure 3 illustrates that the hydraulic
6 conductivity of the shale is generally
7 between 10^{-8} and 10^{-7} metres per
8 second,"

9 and I suggest that that is generally consistent with
10 your findings within the range of variability that you
11 find in this material and these testing techniques?

12 A. Yes. I should point out to
13 the Board that a conversion is required there. That
14 would be 10^{-6} to 10^{-5} centimetres per second. They
15 are reporting them in metres per second. It is
16 generally consistent and we are talking about our
17 weathered shale unit being about 10^{-5} and the lower
18 unit about 10^{-6} and so that is generally consistent.

19 Q. I would like to draw your
20 attention to the last paragraph on page 12 where it
21 says:

22 "In the Halton Region Landfill
23 Technical Report, Site F Burlington,
24 by Trow-Hydrology Consultants, 1986,"
25 and that is your Site F report?



1 A. Yes.

2 Q. "A conceptual hydrogeological
3 model was presented for the adjacent
4 property to the east of the Burlington
5 landfill. In this model is a wedge
6 of highly fractured shale which occurs
7 at an elevation of about 100 to 110
8 metres in the vicinity of the North
9 Service Road. Hydraulic conductivity
10 values associated with this highly
11 fractured zone were in the range of
12 1×10^{-4} metres per second. The higher
13 hydraulic conductivity values which were
14 obtained from monitors 26-1, 27-1
15 and borehole 17, tend to confirm the
16 presence of this highly fractured
17 shale unit. However, other
18 installations completed at similar
19 elevations have hydraulic conductivity
20 values up to two orders of magnitude
21 lower."

22 Does this suggest to you, Mr. Sobanski,
23 that Gartner Lee also in their investigations found
24 evidence to support the existence of a zone of higher
25 permeability, such as the one you identified?



1 A. Yes.

2 MR. McQUAID: I don't see how Mr.
3 Sobanski can testify to what Gartner Lee's author
4 has found, because they are reporting what they found
5 in Mr. Sobanski's report. This is critical to
6 Mr. Garrod's case or to Ms. Cronk's case, I suspect,
7 and we had better hear it from the author of the
8 report about what they say rather than taking it this
9 way, as I don't think it will be helpful to the Board.

10 MR. GARROD: I think Mr. McQuaid
11 has misunderstood what's in this paragraph. Gartner
12 Lee in the last sentence on page 12 is referring to
13 higher hydraulic conductivity values which they
14 obtained in their own tests and monitors and this is
15 not commenting on Mr. Sobanski's work. If necessary
16 I would refer the Board to the previous paragraph,
17 the last sentence of which reads:

18 "The highest hydraulic conductivities
19 were measured in monitors 26-1, 27-1
20 and borehole 17, all of which are
21 deep, 18 to 26 metres below grade,
22 installations located in the
23 southwest corner of the site near
24 the North Service Road."

25 It is clear they are talking about their own results



1 and what Gartner Lee is saying is that their results
2 tend to confirm Mr.Sobanski's.

3 MR. McQUAID: They say some results
4 confirm,and in the next sentence they say some
5 results don't confirm and how does that help?

6 MR. GARROD: I have read the entire
7 paragraph.

8 DR. KINGHAM: What is the question to
9 Mr.Sobanski?

10 MR. GARROD: Does he interpret this,
11 that Gartner Lee found results that would tend to
12 confirm the existence of this highly fractured shale
13 unit at least in some part of the site around the
14 Burlington site.

15 DR. KINGHAM: Can you address that?

16 MR. SOBANSKI: That is exactly what
17 they say, pretty much in those words.

18 MR. GARROD: Q. In summary on these
19 points we have been dealing with since the break, and
20 having reviewed this MOE policy and having reviewed
21 all the detailed chemistry with Ms. Cronk and to
22 some extent with myself this morning, and in light
23 of your own work at Site F, firstly is there any
24 reason to suspect that a landfill at Site F
25 engineered as you propose, would conflict in any way



1 with the Ministry policy as outlined in that exhibit,
2 Exhibit 154?

3 A. No. We believe we have
4 engineered a good site for Site F, for a good landfill.

5 Q. Secondly, then, is there any
6 reason to suspect that it would cause any adverse
7 impacts to the few groundwater users who are downgradient?

8 A. I don't believe so.

9 Q. I would like to turn with you
10 to Site D. Do you agree first of all that we do
11 not have a leachate plume that we can rely on to
12 assist us with our predictions at this site?

13 A. No, we do not.

14 Q. Do you agree with me generally
15 in the field of hydrogeology, that over the last
16 number of years that hydrogeologists have been
17 investigating and proposing and supporting landfill
18 sites, that mistakes have been made?

19 A. I suspect they have and that
20 is why the Ministry requires the contingencies.

21 Q. And in fact I suggest to you
22 that remedial work on landfill sites which went wrong
23 is quite a large part of the professional work of
24 hydrogeologists. You are involved in that kind of
25 work in your own firm, I am sure?



1 A. It's not quite that simple.

2 The requirement for these types of back-up systems
3 has been, is fairly new and in response to problems
4 that have arisen at other sites and a lot of things
5 being done right now are being retrofitted in and
6 in some cases it's surface water problems that might
7 have been predicted and in some cases some groundwater
8 problems because the landfill was put into materials
9 that were far too permeable. So, I understand your
10 point, but it isn't quite fair to put it that way,
11 I don't think.

12 Q. I am sure, Mr. Sobanski, you
13 would agree that at least some cases exist where
14 the predictions were simply wrong about what would
15 happen and that remedial work was therefore
16 necessary?

17 A. I am not familiar with all cases
18 but I am familiar with a few, and yes, that is true.

19 Q. I would like to ask you about
20 my clients on First Line and their wells. First of
21 all, as I understand your evidence, you do not know
22 where the water that feeds my clients' wells on
23 First Line is coming from?

24 A. I don't know where the water
25 is coming from?



1 Q. That feeds the wells on First
2 Line.

3 A. It is coming from precipitation
4 originally.

5 Q. But you don't know its pathway
6 between when it falls on the ground and when it
7 comes out of the taps in my clients' kitchens?

8 A. Oh, fairly well, I think so.
9 It infiltrates under the strong gradients we have
10 at the site, vertical gradients, and ends up at
11 the wells.

12 Q. You are predicting that that
13 is where the water is coming from, is that not fair?

14 A. Well, it's either that or its
15 materializing out of nowhere. It has to come from
16 that type of a source. We have downward gradients
17 and it's not coming out of the rock, so it must be
18 coming there from the precipitation falling on the
19 land and working its way down through the glacial
20 till into the sand units.

21 Q. I don't quarrel with that,
22 but you don't know whether that is originating
23 under Site F -- under Site D or under some other
24 area in the vicinity, do you?

25 A. The -- our flow system would



1 indicate it is originating, assuming that the flow
2 system is as shown, it extends westward and it would
3 indicate it is originating somewhat to the north and
4 west of the wells. However, for contaminant modelling
5 type purposes we have assumed it is originating on
6 Site D and are directing the leachate or any
7 contaminants that may escape the trap to flow directly
8 towards those wells. We have made the assumption of
9 the worst case, that it will flow towards the wells,
10 or your clients' wells along First Line.

11 Q. I think, Mr. Sobanski, the
12 question is quite simple. You do not know where that
13 water comes from. You are relying on your predictions
14 in your opinion about where it comes from, aren't you?

15 A. I can give you a fairly strong
16 opinion, based on what we see on Site D and that is
17 it is coming from the northwest.

18 Q. I understand you have
19 confidence in your predictions, but you are relying
20 on those in giving your opinion?

21 A. No, no I'm not, I said I
22 didn't rely on that and what I said is I will take
23 the water -- the leachate, and move it directly
24 at your clients' wells and I can't make a worse
25 assumption than that.



1 Q. I am not asking you about
2 your assumptions but about what you know?

3 A. What I know is that the leachate
4 wouldn't move towards the clients' wells based on
5 the flow system we have drawn, but I have assumed it
6 will.

7 Q. That is not the question. Do
8 you know where the water in my clients' wells
9 originates?

10 A. In general from the northwest.

11 Q. You don't know that?

12 A. Yes, based on our site, it
13 would be coming from the northwest.

14 Q. Based on your predictions?

15 A. Yes, which carries out to
16 the First Line and you are only 150 metres away and
17 from the data base we do have, then yes, I feel it's
18 coming from the northwest.

19 Q. It could quite easily be
20 coming from underneath Site F?

21 A. Site F?

22 Q. Site D, sorry.

23 A. We don't believe so. It
24 wouldn't be consistent with the flow system we have
25 drawn at Site D.



1 Q. I am not asking you for your
2 belief.

3 A. That's not belief but data,
4 it's based on data and based on water level
5 elevations that have been contoured.

6 Q. Would you agree with me that
7 the granular layers that you found under Site D are
8 formed by geological processes first of all?

9 A. Yes.

10 Q. I hate to have to start at
11 such a basic level, Mr. Sobanski. These were laid
12 down during the course of the last ice age or the
13 end of the last ice age, some ten thousand years ago?

14 A. Yes.

15 Q. And they were laid down over
16 different periods of time as the glaciers advanced
17 and retreated over that site?

18 A. Yes, they were.

19 Q. And the lower till was laid
20 down earlier?

21 A. Yes, it was.

22 Q. The glaciers then retreated
23 and for some period of time, perhaps hundreds of
24 years, that was the surface of the ground?

25 A. The lower till?



1 Q. The top of the lower till.

2 A. I'm not sure it was the surface
3 of the ground. I suggest it might have been under
4 water.

5 Q. There was a lot of meltwater
6 coming off the glaciers at that time?

7 A. Yes.

8 Q. Flowing over and perhaps
9 covering at times that -- what was then the surface
10 of the ground?

11 A. We are talking the top of the
12 silt till, the lower till unit.

13 Q. Yes.

14 A. Yes, that's right.

15 Q. I suggest that during that time
16 of all of this water flow, that these various granular
17 units were laid down and incorporated in that till?

18 A. We have to go back a bit.
19 There were stages to this because we have several
20 granular units, two granular units within the till
21 and we have a thin -- relatively continuous silt
22 unit on top of the till. So, this would indicate
23 several advances and retreats of the ice sheet
24 being involved in the deposition of the lower till
25 unit.



1 Q. And the reason why these
2 granular units exist, I suggest to you, is because
3 at the various points where this glacier advanced
4 and retreated, water ran off the glaciers, carrying
5 tremendous amounts of dirt, if you like, clay, silt
6 and sand, and this was deposited by, if you like,
7 stream action in various places. That is the origin
8 of those layers, isn't it?

9 A. To some degree. The lower
10 unit, the silt unit would indicate....

11 Q. The silt till unit?

12 A. The silt unit within the till
13 would be deposited in a lower energy environment
14 such as a lake-type deposit.

15 Q. A little lake?

16 A. Yes, and it's relatively
17 uniform and relatively fine-grained, but still
18 having a source nearby where gravel is being perhaps
19 deposited in some other area and the clay is being
20 carried away into deeper water perhaps.

21 Q. So the sand and gravel....

22 A. So the sand and gravel
23 are the units that overlie and the upper granular
24 unit is indicative of a higher energy environment.
25 These materials were able to be deposited or were



1 deposited in places where you had relatively rapidly
2 moving water and it was still able to settle out.

3 Q. In essence a river or a stream
4 that flowed off the glacier and left these deposits
5 behind?

6 A. Or deltas, something of that
7 nature, some form of water coming off the glacier that
8 is carrying the glacial till, washing it out of the
9 ice, and moving the finer grained fraction away from
10 the deposit.

11 Q. These then are subsequently
12 covered up by the later glaciation advances which
13 deposited the upper till?

14 A. We have one more period in
15 there and that would sort of be a period of
16 quiescence where we had this layer of silt laid
17 down generally on top of this lower till unit and
18 finally then a re-advance of the glacier and a
19 deposit then of the upper till sheet.

20 Q. So, looked at in that context,
21 I suggest to you that it is not surprising that
22 these granular units, particularly the more granular
23 gravelly and sandy ones, have a pattern and an
24 extent which is dependent on the pattern of water flow
25 that occurred at the time and is therefore continuous



1 but discontinuous from place to place?

2 A. Yes and no. It's not quite
3 that simple. We have a period where we are depositing
4 this material and then the till is back on top of it
5 again, the same silt till.

6 Q. A different till?

7 A. It may be part of the same
8 thing and it may just be a period of time when the
9 ice has retreated and left us with this type of
10 deposit, but then it comes back again. The ice
11 itself as it readvances can either be erosional
12 or depositional, and it would appear that it is
13 being depositional to some degree because it is laying
14 more silt till down on top, but in some places it
15 can obliterate the lower deposits, the deposits
16 it's riding over and again the sand and gravel could
17 be wiped out in some areas.

18 Q. I suggest it could well be
19 continuous in certain directions for substantial
20 distances and thicknesses and could easily taper
21 out in other directions or in the same direction in
22 terms of thickness?

23 A. Yes.

24 Q. So, when you are trying to
25 understand what is down there by putting in holes



1 at various locations, it's not surprising if you
2 miss it in one location and find it in another and
3 so on?

4 A. That is correct.

5 Q. Are you aware of that fact at
6 what is now known as Site E?

7 A. Site....

8 Q. E. Are you aware that at
9 that site there was extensive hydrogeological
10 investigations carried out by the firm of Gartner Lee
11 and, subsequent to that, further drilling and pump
12 tests identified an overburden aquifer that pumped
13 in the vicinity of 100 gallons a minute and that
14 aquifer was not found by the early extensive work?

15 A. Yes, I am aware of that.

16 Q. That is an overburden aquifer
17 I suggest to you that if one of that type existed
18 at Site D in the overburden, you would not want to
19 have a landfill at Site D?

20 A. Well, we did look into this
21 at Site D as well, and that was one of the reasons
22 for the pumping tests that were carried out, to
23 look at that type of yield and whether it existed
24 or not. We didn't find it. You know, the old Site E
25 was investigated many years ago by older techniques



1 and I believe their sampling interval was 10 feet
2 or so with split spoon samples and the later work
3 done by Morrison Beatty I believe was done with
4 continuous sampling techniques which gave them a
5 better feel for it and that is the type of technique
6 we have used at Site D. We have conducted a pumping
7 test here and we know that upper granular unit is
8 extensive. We know approximately its yield. It isn't,
9 in our opinion, a municipal aquifer. It is capable of
10 sustaining on a long term basis five to ten gallons
11 a minute, but certainly it's not a municipal type
12 aquifer. Mr. Beatty advised me of the pumping test
13 on Site E and he felt he may have a sustained yield
14 in the area of 50 to 100 gallons a minute and it is re-
15 ported on sort of indirectly in our assessment of
16 Site E, that that unit lies between the two till
17 sheets, that it may be capable of yielding municipal
18 supplies.

19 Q. That was, I suggest to you,
20 a major reason why you ended up discounting the
21 viability of Site E?

22 A. It was a good part of it.
23 Here we have a little different situation. This
24 until we have here between the two till sheets here,
25 is in fact about ten centimetres of a silty material



1 and these lower units appear to be somewhat different
2 than they are at Site E. Site E seemed to have an
3 extensive sand and gravel unit right between the two
4 till sheets that appeared to be extensive and it
5 was picked up and described more as a till-like
6 material and I believe on our maps we had it sort
7 of marked in as being very silty. It wasn't clear
8 from those records, because I suggest of the different
9 techniques that were used over ten years ago.

10 Q. Would you agree though that
11 even in the pumping tests conducted at Site E, three
12 of the four didn't even find this major aquifer?

13 A. I don't know how many pumping
14 tests were conducted there, I really don't. I only
15 know that Morrison Beatty conducted a pumping test
16 and obtained water and I believe it was around 50
17 gallons a minute and Brian advised me that it could
18 perhaps yield up to 100 gallons per minute, but we
19 didn't find anything like that on our site.

20 Q. No, you didn't. I think I
21 would like to turn with you to the comparative
22 analysis you were asked about by Ms. Cronk, H-14,
23 and I would like you to turn to Appendix A and
24 Table 2 in that Appendix A?

25 A. If I might just have a moment



1 to find this.

2 Q. Do you have that?

3 A. I do.

4 Q. Table 2, headed Potential
5 Impacts of Engineered Site Development?

6 A. Yes.

7 Q. This table summarizes the
8 results of the following several pages which give
9 more detail. Is that correct?

10 A. Yes, the "potential impacts,"
11 if I might say what this means, "of engineered
12 site development," is made to recognise or first
13 of all it assumes that nothing is escaping the
14 site at all and that the hydraulic trap is in
15 operation and that the site is functioning as
16 designed.

17 Q. Having regard to our
18 discussion, I would like to refer you to the heading
19 of groundwater resource here?

20 A. Yes.

21 Q. You have two subheadings,
22 quality and quantity?

23 A. Yes.

24 Q. Under the heading of Site F,
25 you have an indication that there is a low impact



1 on the quality of the groundwater resource. I
2 suggest to you that in the light of your evidence
3 there is no groundwater resource at Site F that
4 that should be a nil not a low. Would you agree
5 with that?

6 A. Not really. I would prefer
7 to be conservative and let the Board recognise that
8 this means that the site is engineered and operating
9 and that over periods of extended time there might
10 be small quantities of leachate that might gain
11 access to the resource, and of course it will be
12 picked up, but there is that potential there.

13 Now, because we have 5 per cent right
14 now in the way the assessment has been done, 5 per
15 cent escaping, at Site D with the hydraulic trap
16 operating properly, there is essentially no potential
17 for groundwater to escape and for leachate to escape.
18 So, let me go back to F again. We are trying to
19 recognise and advise the Board that in spite of the
20 fact that everything appears to be very good on that
21 site, there is some small potential because of the
22 5 per cent and if you would like nil to low, maybe
23 that is a better quantitative assessment, but never-
24 theless there is still just a little bit there, just
25 that little bit of uncertainty.



1 Q. Mr. Sobanski, with respect,
2 you have testified already in response to my questions
3 that there is no viable groundwater resource at
4 Site F and you have also read with me the Ministry
5 of the Environment review document which used those
6 same words. Would you not agree with me that before
7 you can have an impact you must have a resource?

8 A. No, you could have an impact
9 without a resource. If you put some nasty toxic in
10 some area, even though the groundwater quality may
11 be bad, you don't want the nasty toxic going into
12 the groundwater. Let's use an extreme case....

13 Q. That's not this situation.

14 A. Fair enough, but there are
15 still organics within landfills and we are trying
16 to recognise that, that 5 per cent leachate escape
17 in our assessment.

18 Q. I will accept your nil to
19 low.

20 Those are all my questions, Mr.
21 Chairman.

22 DR. KINGHAM: I guess that means
23 we could move on to Mr. McQuaid, but perhaps we
24 will take our break for lunch now and start afresh
25 after lunch and we will be looking to wind up a



1 little bit earlier, if possible, around 4:00 o'clock.
2 That would have been early yesterday. So, we will get
3 back as quickly as we can, but I see Mr. Lederer
4 has something.

5 MR. LEDERER: Thank you. My under-
6 standing and recollection is that Mr. Sobanski or
7 Mr. Beechinor, and I can't recall which one, but
8 Mr. Sobanski I think had undertaken to provide some
9 further information with respect to the spacing
10 of the purge wells at Site D and I have a sheet
11 which replicates that information and I will be
12 distributing it to Mr. Estrin and the others and it's
13 a matter of whether he wants to take the matter up
14 with Mr. Sobanski or not at some point.

15 DR. KINGHAM: It's a good idea to
16 distribute those now. Let's try to be back here and
17 ready to go -- let's aim for 1:30.

18 MR. LEDERER: Thank you.

19 MR. GARROD: If you will excuse me,
20 I have to go to deal with another matter this
21 afternoon, so Ms. Nurvo will be here.

22 --- Luncheon Adjournment (12:25 p.m.)

23
24 --- Upon commencing at 1:30 p.m.

25 DR. KINGHAM: Thank you. Please be



1 seated.

2 Mr. Lederer, you had some documents?

3 MR.LEDERER: As I indicated to you,
4 I distributed before lunch some information which
5 Mr. Estrin requested, but it does not seem appropriate
6 to file it. There are two ways it can come before
7 the Board, either Mr. Estrin requests to ask further
8 questions or we do it in reply, assuming it forms
9 the basis of proper re-examination, but I don't think
10 we can give it to you without some form of
11 explanation. Also I am reminded, since I am on
12 my feet, that in order to avoid any difficulty when
13 Mr. Crysler comes to give evidence, there are some
14 typographical errors in his witness statement, at
15 least one of which is a number and we know what
16 kind of confusion that has been causing, but he
17 has prepared a sheet entitled Revised Witness Statement
18 of Ralph Crysler, Errata and Addenda that is simply
19 an appendix to the witness statement and I think that
20 might satisfy everybody.

21 DR. KINGHAM: That witness statement
22 was itself an appendix to H-8B. H-8B1A.

23 --- EXHIBIT No. H-8B1A: Errata to witness
statement of R.Crysler.

24 DR. KINGHAM: Mr. Lancaster brought
25 to my attention an errata on your errata sheet.



1 MR. LEDERER: It is misspelled.

2 DR. KINGHAM: I was thinking of the
3 first correction, page 1, the 2500 is really in
4 fact 25,000 and it should be 2,500.

5 MR. LEDERER: Must I take personal
6 responsibility for all of this?

7 MR. HODGSON: You mean you don't?

8 DR. KINGHAM: Mr. McQuaid.

9 MR. McQUAID: Thank you.

10 CROSS-EXAMINATION BY MR. McQUAID:

11 Q. I have indicated to you that
12 I would like to start asking some questions dealing
13 with your curricula vitae out of Exhibit 7 and then
14 I am going to move from there to Exhibit H-57,
15 which is the Phase 2, Stage 2A final evaluation
16 factor document, and from there to H-10, the final
17 report, Phase 2, Stage 2A.

18 MR. LEDERER: We will have a bit
19 of trouble locating the c.vs.

20 MR. McQUAID: It was filed separately,
21 and I think it's H-7A.

22 Before we get to any of those
23 documents, Mr. Sobanski, you may recall when Mr.
24 Estrin began his cross-examination of you that
25 he got up and asked you whether there were any



1 additional reports, documents, studies, analyses,
2 anything of a prepared nature in documented written
3 form that you had that you had generated over the
4 break with respect to, I think he asked you
5 specifically Site D but I am not certain of that,
6 but I am particularly interested in Site F. I am
7 asking you what additional documents you have
8 produced. This morning Mr. Lederer gave us a document
9 which I have not even had a chance to do anything
10 about other than leaf through and we will look at it,
11 but I am led to understand from a discussion with
12 Mr. Lederer that he has learned there is an additional
13 model or something of that nature which you have done?

14 MR. SOBANSKI: A. That is correct.

15 Q. We know there is at least that
16 document or documents?

17 A. It isn't necessarily a
18 document. We have run throughout -- not throughout the
19 summer, but from time to time questions or thoughts
20 have come to our mind and we have tried to refine
21 the model and we have come up with what our modeller
22 feels is a better-fit case for this site, using
23 in general the same principles we have used all the
24 way through, but with looking at the data in a
25 different way.

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1 Q . You will also be aware or
2 will recall that throughout the cross-examinations
3 you have been asked about responses to interrogatories,
4 whether they be from our firm, on behalf of
5 Burlington or CELA on behalf of their clients, and I
6 won't take the time to go through every item, but
7 you may recall you were asked at a fairly early stage
8 to produce all the iterations or models, runs you
9 had produced and you produced a number of them back
10 then. Do I understand from what you are saying you
11 have others that you have produced?

12 A. Yes.

13 Q. When can we see those?

14 A. We could probably put it
15 together tomorrow.

16 Q. When will we get a chance to
17 see it and consider it?

18 A. The same day and hopefully
19 we can get it out tomorrow.

20 MR. LEDERER: I indicated to Mr.
21 McQuaid that what we proposed to do is have these
22 things put in some form which is easily distributed
23 that we will have delivered to our office and we
24 will copy them and if I can say this to the principal
25 players, we will have them by the end of tomorrow



1 and that is our intention.

2 DR. KINGHAM: The intent is to have
3 them out tomorrow?

4 MR. LEDERER: Yes.

5 MR. McQUAID: I should say this as
6 a word of caution to Mr. Lederer, that the earliest
7 it gets to us the better because if it's complicated
8 and is something new and difficult to digest, we
9 will be at a disadvantage in terms of cross-
10 examining and it may lead to a request for an adjourn-
11 ment.

12 MR. LEDERER: I can appreciate that
13 risk, although Mr. McQuaid has warned me he expects
14 to be three or four days, so that will take us into
15 the following week and that will give everyone a
16 week to look at it, and I will hope that Mr. McQuaid
17 will confirm that I gave him this information as
18 soon as I am aware of it and there is no effort to
19 hold it back or inconvenience anyone, and I under-
20 stand the hearing is to be full and complete and
21 if Mr. McQuaid feels disadvantaged he will make
22 a request, but I am sure that he and all parties
23 will attempt to move this along as quickly as
24 possible and such an adjournment would not be
25 necessary and that is my expectation.



1 MR. MCQUAID: I am sounding a warning
2 and saying that if we had had it today or yesterday,
3 we would be that much better off and if it has to be
4 tomorrow, it must be tomorrow. I am just alerting
5 Mr. Lederer that this is a very technical area and
6 difficult for everybody to pass on and come up with
7 some meaningful assessment.

8 In addition to that document this
9 morning and what will be coming tomorrow, what else is
10 there about Site F that you have just generated upon
11 which you would be relying?

12 MR. SOBANSKI: A. That is it,
13 Mr. McQuaid. We provided the chemical data the
14 other day.

15 Q. Then, let's turn to first of
16 all, Mr. Sobanski, to your experience as outlined
17 in your curriculum vitae. What I would like to
18 discuss with you is sort of parallel to, I think,
19 a general series of questions that were put to you
20 somewhat earlier, and that is what has been
21 developing in the hydrogeological field with respect
22 to landfills over the past ten or fifteen years,
23 and perhaps even longer.

24 Now, let me start if I could so we
25 could put it in perspective, your curriculum vitae,



1 and talk about the development of landfill develop-
2 ment. I think you told us, you think it was about
3 fifteen years ago that real attention was being
4 generated from a hydrogeological point of view to
5 the location of landfills, or maybe it's a longer
6 period, I don't know.

7 A. It's somewhat longer. In
8 Ontario, when I joined the Ontario Water Resources
9 Commission, the bulk of the work that was being
10 done with landfill at that time was being done by
11 the Ministry of Health and the health inspectors,
12 in fact, were locating many of the landfill sites
13 in the province by examining field conditions and
14 judging then what they felt to be the suitability
15 of the ~~lands for waste disposal~~, and they were
16 usually damaged lands of some sort.

17 ~~Following my~~

18 Q. Can I stop you? Would those
19 Ministry of Health employees at that point be
20 provincial or local municipal employees?

21 A. I really couldn't tell you
22 what they were at that time.

23 Q. Just looking at your c.v.,
24 you joined the OWRC as it was then in 1967?

25 A. Yes.



1 Q. Is that correct? We are
2 going back effectively twenty years?

3 A. Twenty-one years.

4 Q. Twenty-one years in terms
5 of what we are talking about. When you joined them,
6 were you involved at that point in time while you
7 were with the OWRC with landfill sites?

8 A. We were involved only
9 periodically. It was a program that started to
10 grow a few years after I joined the Ministry -- I
11 am sorry, I kept forgetting -- the Ontario Water
12 Resources Commission, and at about that time we
13 were receiving some requests for assistance from
14 the medical people and in fact it might even have
15 gone on longer. There weren't a lot of them. There
16 were some. At that time the first consultant came
17 into being, about 1966, and the Waste Management
18 Branch at that time was not part of the Ontario
19 Water Resources Commission. But they commissioned
20 some work from the consultant, or sole practitioner
21 in the province, and he began the first consulting
22 practice in the province and that happens to be my
23 boss, John Noonan. His history goes back to 1966
24 and consulting in this province on landfills goes
25 back to somewhere in that order, 1966, 1967.



1 There was a bit of work being done
2 by a firm called Hydrology Consultants at that time,
3 but they weren't too actively involved in groundwater.
4 That is my recollection.

5 Following that it started to grow
6 and there was a reorganization and the Ontario Water
7 Resources Commission disappeared and I am really
8 stretching my memory back, which is not always the
9 greatest --

10 Q. Looking at your c.v., you
11 note in 1970 to '73 you were with the Ontario
12 Ministry of the Environment?

13 A. Yes. I don't recall the
14 exact date, but that would be about it, and at that
15 time the Waste Management Branch was also
16 incorporated into the Ministry of the Environment
17 and hydrogeology in Ontario became more active in
18 the field of waste management, and still not all
19 sites, it wasn't as formalized as it is today and
20 there were more of the major sites. We had very
21 little power or control at that time and more
22 difficult cases were referred to us, more for
23 comment and it wasn't as formalized a system as
24 it is today. There were letters that would go back
25 and forth of opinion on the suitability of these



1 landfill sites and generally from my supervisor,
2 Mr. Yakachuk, sometimes myself, and prepared by our staff,
3 but it did start to grow at about the time I became
4 what is known as a program engineer in c.v. and
5 at that stage we had about four people working
6 in pollution and three working in groundwater supply,
7 somewhere in that area. The four working in
8 pollution were still not all on landfill and these were
9 salt contamination problems, gasoline, but then
10 the structure has grown from there and partly as
11 a result of more effort being put into it at various
12 university levels and Dr. Farboeden started a course
13 in the University of Waterloo in groundwater and,
14 as everyone knows, that has grown in a university
15 of some excellence in the groundwater field and
16 has many of the top names in the field of hydro-
17 geology.

18 Q. Just stopping at that point
19 and trying to summarize it, if we can, the experience
20 that you were encountering at that point, we have
21 had some history or some indication of history given
22 with respect to the Bayview Park, or what was the
23 Bayview Park case, and I think as a result of the
24 evidence that has come out, it was started in
25 about 1957. I think you said yesterday or the day



1 before.

2 A. I can check the Conestoga-
3 Rovers report, but I think that that is what they
4 said.

5 Q. Do you know if that was started
6 by the former township or by the City of Burlington
7 or do you know anything about that, who actually
8 started it?

9 A. I don't recall. I would have
10 to look at some literature and perhaps you could
11 advise me.

12 Q. We don't need to at this point,
13 but I want to just get a general picture. I am
14 curious in a way. Is it important to you when you
15 are analyzing say Site F or in particular Site F,
16 to know what the history was of landfilling at that
17 site and what type of refuse was being put in there?
18 If, for example, some of the refuse had been
19 incinerated previously or incinerated at the site,
20 would that not give you -- would that not be
21 important in assessing the background quality of
22 the leachate that may be generated from that site
23 now?

24 A. I am not saying that that
25 might not be of interest. We didn't do it in this



1 particular case. We do have leachate collection
2 systems in there and wells in the Bayview site in
3 which we can measure leachate quality. We didn't go
4 into the history of garbage production at the site.

5 Q. I guess I am saying -- the
6 answer probably being a scientist, you would agree
7 that it would have some relevance obviously?

8 A. I am not a scientist but an
9 engineer.

10 Q. All right. Being an engineer,
11 if you want to be very specific with me, would it
12 not also have some relevance? I guess what I am
13 getting at, and I am not trying to trap you or
14 anything of that nature and please be at ease...

15 A. I don't take it that way.

16 Q. I am saying to you that we
17 have heard a lot over the last couple of days about
18 leachate?

19 A. Yes.

20 Q. And plumes. We are looking
21 in some cases in some of the leachate coming out
22 of Site F, at a plume as it were or indications of
23 a plume of a site that was closed in 1972, I think
24 you said earlier. It may have been started in 1957,
25 and accordingly there may be qualities both in terms



1 of the time and the production of the leachate and
2 what has been happening over that period of time
3 together with what was originally put in there that
4 might have some bearing on the figures we have been
5 hearing about in the last little while. Isn't that
6 the case?

7 A. Yes, it could.

8 Q. Leave that for now. I don't
9 want to get into any detail on it, but I want to get
10 back to sort of the history, and I'm sorry, I
11 wasn't able to take down the expression you indicated,
12 but when you first joined the OWMC, you indicated...

13
14
15 A. The OWRC.

16 Q. That will happen again and
17 I apologise for all the times it might, but the OWRC,
18 when you joined there you indicated that some of the
19 sites you looked at were put on you said damaged
20 sites or words of that nature, places of
21 convenience, the closest spot, quarries or whatever?

22 A. [There were many sites
23 fathered in those areas in abandoned sand pits and
24 this is an observation from me as opposed to some
25 sort of a scientific thing and many of the sites we

19.B



1 looked at which were established at about that time
2 may have been put into swamplier land or something not
3 useful for agriculture. Not all sites, but many
4 of them. They looked for a natural hole in the ground
5 to fill and many times it is beside a stream or some
6 sort of valley fill and they were fairly common
7 in most cities.

8 Q. We will come back to this
9 if we need to in more detail when we get further
10 on, but let me go back to your c.v. and if I look
11 at page 2 of your c.v. it is noted in the period
12 1970 to '73 that you were a program engineer for
13 the Ministry of the Environment during this period.
14 I realize this may be taxing your memory, but were
15 you working on a few landfill site problems at that
16 point or what number can you give us?

17 A. I couldn't put a number on it
18 and we would have to look at one of the annual
19 reports to see how many of them were landfills.

20 Q. Were you looking at
21 community water systems, landfills, anything to do
22 with groundwater at that point?

23 A. We were, and this was before
24 the Ministry regionalized and put people into the
25 field, so it was all being handled out of Toronto.



1 I have had -- at hearings I have been faced with
2 some of my own decisions from the past and found
3 my signature on letters that set out policies.

4 Q. I'll bet you couldn't remember
5 having written some of them?

6 A. I couldn't.

7 Q. I've had the same experience
8 and it comes with age!

9 A. I am trying to come to some
10 sort of a number and it's difficult to say because
11 we were dealing with that group in something in
12 excess of one hundred projects a year, but I don't
13 really recall. Maybe it was twenty five per cent
14 or so or something in that order, twenty to twenty-
15 five per cent might have been landfills.

16 Q. Let me turn to 1974 and to
17 the present, the last thirteen years of your
18 professional experience. You have listed in your
19 c.v. some landfill projects that you have been
20 involved in and I see specifically the Region of
21 Halton, the very bottom of the page; the assessment
22 of the large existing sanitary landfill at Beare
23 Road and that is in Scarborough, is it?

24 A. Yes.

25 Q. And Brock West, which you



1 referred to a little earlier, and is that in Pickering?

2 A. Yes.

3 Q. The assessment and conceptual
4 design of Tricil's liquid disposal site near Sarnia
5 which you have referred to?

6 A. Yes.

7 Q. The design of leachate
8 control systems for sanitary landfills, and there is
9 just a comment and I guess I would like you to
10 indicate to the Board, if you could, specifically and
11 as detailed as you can, how many landfill sites have
12 you actually been involved in the design of? You
13 can start from recent history and go back?

14 A. It won't be inordinately
15 extensive because it takes time to do these things.
16 I have been a somewhat one-man operation in the
17 company for some time. We were involved with the
18 design and control and installation of control systems
19 at the Eldorado Nuclear site out in Port
20 Granby and this is their existing site and I was
21 involved to some degree with the concepts that
22 were involved in their proposed expansion.

23 Q. Eldorado Mining?

24 A. Eldorado Nuclear. Now, when
25 I say I was involved, I am not saying I was the prime



1 on some of these. I am trying to go through this in
2 some manner.

3 Q. Are you having trouble because
4 I used the word design as opposed to hydrogeologic
5 consultant?

6 A. Partially -- yes and no.
7 I am trying to put --

8 Q. Combine the two. I want to
9 know what landfill sites you have been involved in
10 the design of or done consulting work of the nature
11 you are doing for Mr. Hiraishi here, where you do
12 the hydrogeology and you hand over the design to him?

13 A. Metro-Toronto; we have dealt
14 with Brock West, Brock North, Brock South...

15 Q. Is we the royal we, meaning
16 Alfred Sobanski?

17 A. Alfred Sobanski --- Hydrology
18 Consultants and jobs I have worked on in some way.

19 Q. As much as possible keep it
20 to your specific involvement?

21 A. I don't know what you mean
22 by specific involvement.

23 Q. Projects you have worked on
24 yourself?

25 A. I have worked on these.



1 Q. As opposed to Mr. Noonan?

2 A. In many of these cases we
3 have worked together and he worked on this one as
4 well. There is the Metro Beare Road site and I worked
5 on the Maple landfill site, or Keele Valley it is
6 called now, and we worked on Georgetown from time to
7 time and we have worked on the Oakville site.

8 We worked on the inter-Metro site
9 in Oshawa you are aware of, the Tricil, Sarnia site
10 of course, both the old and the new, the Owen Sound
11 landfill site, and I am trying to think my way around
12 geographically, the Tricil site in Kingston, this
13 side of Kingston, in Storrington Township.

14 Q. Sorry?

15 A. Storrington Township.

16 Q. Is that in Storrington?

17 A. The Township of Storrington, the
18 Northumberland landfill site. We looked at existing
19 sites there in Baltimore and an expansion to that
20 site. [We looked at and located a site in the
21 Campbellford area for the County of Northumberland.
22 I worked from time to time, and this was just --
23 that wasn't major enough an involvement, I don't
24 think, to mention.

25 I was involved peripherally on the



1 Highway 48 site at York Sanitation with Mr. Rovers,
2 but that was a very light involvement and similarly
3 with West Gwillenbury. I was involved in the
4 Hanover sanitary landfill site. We are involved
5 currently with West Gwillenbury. I have
6 investigated the large landfill site, Barrell and
7 Trustrum site in Mississauga. I have examined
8 hydrogeologically the Preston site outside of
9 Preston. We are currently and have in the past
10 examined the Paris landfill site. I could probably
11 think of a half a dozen or so more.

12 Q. Let's stop at that point.

13 A. Of course these sites as
14 well.

15 Q. I will give you a chance to
16 come back on this if you want.

17 A. I think that's enough.

18 Q. When you hear this next one,
19 you may want to come back. (How many of these
20 sites you have indicated would be design and
21 hydrological consulting for a new site in accordance
22 with the standards we have been hearing over the
23 course of this hearing as opposed to going back say
24 at Brock West, for example, where we heard some
25 evidence from you about the fact that that was



1 installed by someone else prior and you were going
2 back in to do some remedial work or something?

3 A. Brock West was done by our
4 firm and I am involved or have been involved on that
5 on an annual basis from the point of view of
6 monitoring the installation of the liner. When
7 I say monitoring, we provide Metro with staff who
8 go out and there and supervise the installation of
9 the liner and it has been my job to keep track of
10 that to make sure that tests are run on it and
11 I can certify as a professional engineer that the
12 liner indeed was installed as

13 Q. Are you finished? Let me
14 be more specific so you know what it is I am trying
15 to elicit from you and that is this; [in this
16 particular process, as I understand it, you have been
17 involved from the very early stages if we were to
18 look at the Phase 1 documentation, the chart and
19 so on, you have been involved in the very early
20 stages in locating, as it has turned out, Sites D
21 and F out of the 55 plus sites that were looked at?

22 A. Yes.

23 Q. How many other selection
24 processes and follow-throughs that we are at at
25 this point have you been involved in, among this



1 number we have just been going through?

2 A. A selection process of this
3 type is again relatively new. We have certainly
4 been involved in this one as we know and Owen Sound
5 went through a less detailed site selection process
6 as well. We searched for the Campbellford site which
7 went through a site selection process. The search
8 for the new regional site for the County of
9 Northumberland went through a site selection process.
10 I believe in terms of site selection processes,
11 that would be about it for me over the past few years.
12 It is a fairly new area.

13 Q. Okay.

14 A. We would certainly like to
15 do all the work in the province, but we only get a
16 share.

17 Q. Site selection leads then
18 to the actual construction of a new facility. If
19 I ask you to add the next layer, and without having
20 a site selection process, how many new sites have
21 you been involved in in that list we are going through,
22 complete start-up, new sites?

23 A. Are we talking about the new
24 style site?

25 Q. Yes.



1 A. Of sites that are found and
2 then engineered, et cetera?

3 Q. Sites that are started from
4 scratch under current thinking.

5 A. Those three would be the three
6 I have been involved in, and again that's Owen Sound
7 and this study, and my mind just went blank. The
8 two sites, actually two sites for the County of
9 Northumberland and one of those went through and
10 one is still now caught in the EA process, which is
11 more involved than it was at that time, but in terms
12 of the EA process, this is the only one.

13 The other two were similar to the
14 extent that we weren't just handed a piece of land
15 and told how does this look for a landfill and do
16 something with it.

17 Q. Owen Sound and Campbellford
18 and two in the County of Northumberland?

19 A. Owen Sound and Campbellford
20 as Campbellford is in Northumberland and this study.

21 Q. Now, to pick up just while
22 were are at this and I will then go to Mr. Beechinor,
23 but if we were to turn for example, and let me ask
24 you to turn to H-58, which I guess -- H-57, which
25 is the general overview analysis?



1 A. That is the 2B report.

2 Q. 2, 2A.

3 DR. KINGHAM: Final Evaluation Factors,
4 Phase 2, Stage 2A, General Overview Analysis is H-57.

5 MR. SOBANSKI: Could you redirect me?

6 MR. McQUAID: Q. Page 10 of H-57.

7 A. I don't have the full report.

8 Q. You will see at this point
9 in the process, Mr. Sobanski, and we are back in
10 August of 1983, but general physical factors were
11 being discussed at this point in the document, and
12 this is page 10 and over at the top of page 11,
13 and as I understand it, if we look under Section 8.1,
14 you will see that there are three subheadings being
15 discussed, attenuation capability, overburden
16 thickness and agricultural capability. Under the
17 first one, attenuation capability, at that point
18 the search was indicating that the examination of
19 soil types was to identify and rank the attenuating
20 capabilities of the various soil materials in
21 Halton and thereby determine the degree of
22 protection they afford groundwater and surface
23 water resources. In general, the finer grained soils
24 are better attenuators than the coarser grained
25 soils and therefore the potential impact for ground-



1 water contamination is lower for silt and clay and
2 it goes on to indicate the type, composition and
3 sequence of underlying and adjacent soils or
4 geologic materials influences the extent to
5 which groundwater may be contaminated and the
6 hydraulic conductivity of the geologic materials
7 is of considerable importance, as well as the types
8 of openings, fractures or intergranular pores through
9 which groundwater moves. Then over at the top of
10 page 11 we see they are rated as to attenuation
11 capability, glacial outwash, sand and gravel deposits,
12 plasticine geologic complexes and till and clay
13 planes.

14 If we go to the impact we see that
15 till and clay planes have the lowest impact and are
16 generally more favoured, as I understand it.

17 A. Yes.

18 Q. We will come back to the
19 criteria being discussed there and later on in the
20 report and the fact that you are looking at soil
21 types for these attenuating and other protective
22 aspects, but of the various sites you have worked
23 on, first of all for locating an actual construction,
24 would I be correct in assuming that they have
25 generally been in till and clay planes? First of



1 all, I would go to the Owen Sound, Campbellford and
2 I guess Baltimore was the other, the Township of
3 Baltimore in Northumberland?

4 A. Campbellford is in glacial
5 till. The site at Baltimore we were looking at which
6 is sort of gone into limbo is generally glacial till
7 and there are some sand interfingers similar to what
8 we are dealing with at Site D and the other one...

9 Q. Owen Sound.

10 A. Owen Sound is also in glacial
11 till.

12 Q. When you say glacial till,
13 does that fall within the till and clay planes
14 category defined as opposed to glacial outwash?

15 A. Yes.

16 Q. Going back to that big long
17 list which I tried to take down, and I think I
18 got most of them, but we will get the transcript in
19 due course, but would I be correct that the others
20 that you generally worked on have also been in these
21 till and clay planes, or let me put it more
22 specifically, are there any in that list that were
23 on fractured shale?

24 A. (Nothing in the list on
25 fractured shale. Some of the sites that were



1 mentioned though are not in the most suitable
2 environment and some of them were in sand and gravel
3 pits, that type of a site; in other words in these
4 moderate to high impact areas.

5 Q. Let me take you to that.
6 You say some were in sand and gravel and were there
7 any in fractured shale specifically?

8 A. No. Oh, to some extent one
9 of the sites was, and that would be the Oakville
10 site. Also I believe the Burlington site may have
11 bottomed in the upper weathered shale unit. I am
12 sorry, not the Burlington site but the Georgetown
13 site.

14 Q. Georgetown may have
15 bottomed....

16 A. In weathered shale.

17 Q. In weathered shale?

18 A. Yes.

19 Q. Just so I am sure I understand
20 where that one is, is that one that was put in by
21 the current -- Georgetown is now in Halton Hills,
22 so was it put in by the old Town of Georgetown?

23 A. I believe so but I am not
24 absolutely sure of the ownership. I just worked on
25 it from time to time on some of the monitoring.



1 Q. Would that be an older type
2 of facility?

3 A. Yes, it was the side of a
4 valley near a river.

5 Q. How long ago was it started
6 and closed, operated?

7 A. I don't know, I don't recall.

8 Q. How long did you work on it?

9 A. Oh, that would have been eight
10 or ten years ago, I guess.

11 Q. The Oakville site, the
12 Oakville site so we are clear on that?

13 A. At Highway 5 and whatever river
14 that is. I am sorry to put it in those terms. We
15 did some monitoring on that site and there was some
16 remedial action required. It started sort of as a
17 glacial till site but they dug through the glacial
18 till onto the shale in places and it's a combination
19 glacial till and shale site, similar to what we
20 have here.

21 Q. I have heard reference to a
22 closed site in Oakville, and I think it closed in
23 1980 and is that the site?

24 A. That would probably be it.

25 Q. Started by the Town of



1 Oakville and taken over by the Region when the
2 Region of Halton was formed?

3 A. That could be. We haven't
4 done work on that site in some time.

5 Q. To be specific and to get
6 back to the question, you have done some work on those
7 two sites which were touched in some respects on
8 fractured shale?

9 A. Yes.

10 Q. But you weren't involved in
11 the locating of either of those sites?

12 A. No, we were not.

13 Q. Let me give you a rest for
14 a second and I will ask Mr. Beechinor. Could we
15 turn to your curriculum vitae, Exhibit H-7A.
16 Could you give me a starting point? I see you
17 graduated from earth sciences in 1977 at the
18 University of Waterloo and then you worked with
19 Ecologistics until 1980?

20 MR. BEECHINOR: A. That's right.

21 Q. I'm not sure, but it looks
22 like you might have gone to another company and
23 maybe you were taking a course or courses for
24 further study; is that what was happening?

25 A. After Ecologistics? After



1 Ecologistics I formed my own company and at the
2 same time I was at the university.

3 Q. The University of Waterloo?

4 A. And York University.

5 Q. When did you first get into
6 what we can call the hydrogeologic -- do you
7 consider yourself a hydrogeologist?

8 A. Yes.

9 Q. Hydrogeology for landfill
10 sites, specifically of the type we are discussing
11 at this hearing?

12 A. I would say from the time
13 I started at Trow Limited, working under Mr.
14 Sobanski.

15 Q. Can you --- I see actually
16 on page 2 of your report, or your c.v. sorry,
17 you have actually listed a number of hydrogeologic
18 studies and impact assessments of landfills,
19 Uxbridge, Peterborough, Metro Toronto, Hamilton
20 and Brantford?

21 A. Yes.

22 Q. Is that list comprehensive?

23 A. No.

24 Q. Are there any others that
25 you can recall right now that you would add to that



1 list?

2 A. Well, we just put out a
3 report on the Paris landfill and last year we did
4 the report on the landfill for the Township of
5 Brantford and recently, based on a report I put
6 out, on the West Gwillenbury landfill and the
7 Ministry of the Environment has approved the extension
8 of that landfill. I am thinking of a few others.
9 Monitoring reports; we have done a number of
10 monitoring reports at landfill sites.

11 Q. We will leave monitoring for
12 a moment, but are these reports we have here that
13 I have brought to your attention and the Board's
14 attention, the hydrogeologic studies and impact
15 assessment of landfills, are these new facilities?

16 A. No, they are not.

17 Q. Are any of them new?

18 A. No, I don't believe so.
19 Most of them are expansions of existing sites.

20 Q. Would this project be the
21 first site selection process and contemplated
22 or proposed new construction landfill facility
23 you have been involved in?

24 A. Environmental assessment?

25 Q. I think it's probably the



1 first environmental assessment for a lot of us in
2 the room.

3 A. I think it is. I think it's
4 the first site selection study with respect to
5 landfills that has gone through an environmental
6 assessment process.

7 Q. So this would be the first
8 EA?

9 A. For anyone.

10 Q. That you have been involved
11 in. I guess I am really saying or trying to
12 determine if you have been involved either with
13 Mr. Sobanski or anyone else in actually starting a
14 new facility from a brand new site?

15 A. I can't think of any.

16 Q. All right. Are you in
17 a position to say, and first of all would I be
18 right that most of the sites you are working on
19 in these other municipalities, are they on till and
20 clay planes? Or, put it the other way....

21 A. I think you are almost
22 repeating the response. I worked under Mr. Sobanski
23 on many of the sites he has already indicated and
24 so my response would be the same as his.

25 Q. I see there are others here



1 such as Hamilton, Peterborough, Uxbridge, which he
2 didn't mention and I thought you might have worked
3 with someone else?

4 A. No.

5 Q. My question was, were any
6 of these on fractured shale or do you know?

7 A. None of them were.

8 Q. All right, I will go back to
9 Mr. Sobanski if you don't mind. Let me pick up
10 while we are at Exhibit 57, H-57 pages 10 and 11,
11 and bearing with your experience, and that seems to be
12 confirmed with Mr. Beechinor's experience, would I
13 be correct that certainly since your involvement in
14 locating of landfill sites with Trow Hydrology
15 that hydrogeologists look for the locating of these
16 sites initially in these till and clay planes?

17 MR. SOBANSKI: A. They are usually
18 in most areas a primary type of target.

19 Q. That, just to go back to the
20 general principles that are being discussed under
21 the attenuation capability, is because of the fact,
22 as the notice indicates, the finer grained soils
23 are better attenuaters and so you are looking for
24 the finer-grained soils and the potential impact
25 for groundwater contamination is lowest if you can



1 locate in silt and clay; correct? That is why you
2 are looking?

3 A. Yes, you are looking for the
4 finer-grained soils.

5 Q. As a matter of fact I think
6 in this report, if we go over to page 15, you will
7 actually see, beginning at page 15, the bottom of
8 that page, 8.5.3, there is a comment with respect to
9 landfilling in quarries and on page 16 it ends with
10 a paragraph that says:

11 "Since the philosophy for siting a
12 landfill in a quarry differs from
13 the objective of natural attenuation,
14 landfilling in quarries will be
15 considered on a site-specific basis."

16 Now, that is a comment -- were you
17 involved in the preparation of this document, Mr.
18 Sobanski? I guess I should ask you if you would
19 agree with the comments as it's a different
20 philosophy?

21 A. Yes, I was involved in the
22 preparation of all these reports.

23 Q. They went out under your
24 direction?

25 A. Yes, they were under my



1 direction, but in some cases the statements are a
2 composite of a lot of people's opinions on this
3 within the firm. I have no problem with that myself.

4 Q. If we pick up, going to the
5 next document in the series which is the H-10 docu-
6 ment dated October, 1983, this is the final report,
7 H-10 at pages 29 to 32 -- actually page 33 is the
8 sources of information. Page 29, Mr. Sobanski.
9 If you look at page 29 and take a moment and glance
10 through it, pages 29 and 30, particularly on page 31,
11 you will see the same section, attenuation
12 capability, and we don't need to take the time to
13 go through it, but it looks like much the same
14 discussion occurs in this document and repeating
15 even the ratings over at the top of page 32, as
16 to attenuation capability and the impact ratings?

17 A. Yes.

18 Q. I think, Mr. Sobanski, it
19 can be summarized, the general observations that
20 are made, and I think Mr. Tidball when he was asking
21 you questions put to you various criteria as to
22 whether you would agree that they should be
23 examined and he asked whether the criteria would
24 be such that, (1), the leachate should not impair
25 groundwater and adjoining property and you agreed



1 and whether, (2), a monitoring program could be
2 established and you agreed that was a legitimate
3 criteria and, (3), whether feasible contingency measures
4 would be available and you agreed with that one also.

5 What it seems to come down to, as we
6 sort of summarize it, would I be correct that you
7 are looking as you try and understand the ground you
8 are going to locate these sites in, you are looking
9 for, (1), predictability, and would you agree with that,
10 and trying to get as much predictability and
11 certainty as you can.

12 A. Yes.

13 Q. You are looking at -- from
14 that flows the ability to monitor?

15 A. Yes.

16 Q. From that flows as well the
17 feasibility of contingency plans working?

18 A. Yes.

19 Q. So, when we go to your report
20 we can talk about the objective, but to summarize
21 it for the Board at an early stage while we are
22 talking, as I am initially about Site D, the
23 bottom line is you are trying to determine as you
24 study it from a hydrogeological perspective and an
25 engineering perspective, is the site really going



1 to be secure, will it be safe?

2 A. Yes, that's right.

3 Q. Those reports I have just
4 referred you to, we know there was a Stage 2B
5 and other stages and so on, but the general
6 philosophy of what you were looking at, particularly
7 with respect to Site D, we have highlighted for
8 the Board what generally you are looking at in till
9 and clay planes?

10 A. Yes.

11 Q. I would like to turn with
12 you now to your report on Site D?

13 A. The main report?

14 Q. H-39, the main report.

15 I am going to refer you to page 1, not in the
16 executive summary but the actual main body of
17 the report, Arabic 1. Just picking up on the
18 discussion we were having, at page 1 at 1.2,
19 Scope of the Study, you have set out for the Board
20 in this report the principal objectives of the
21 study and there are four zeros or four dots?

22 A. Yes.

23 Q. Going over to the top of page
24 3, the last sentence prior to Section 1.5, I note
25 you say:



1 "It is the aim of this investigation
2 to provide hydrogeologic information
3 necessary to design an environmentally
4 safe landfill that minimizes potential
5 impacts on public health and safety."

6 A. Yes.

7 Q. Then you set out on that page
8 as well the reference to the two studies of Hydrology
9 Consultants, your earlier study on this site, and
10 actually if we look over at page 6 in this document,
11 you actually summarized --- I am sorry, I guess it's
12 page 4, you actually summarize that report at pages
13 4,5 and the conclusion is at the top of page 6?

14 A. Yes, that is correct.

15 Q. Similarly, the second entry
16 on page 3, the Gartner Lee report, you have
17 summarized that beginning at page 6 and 7 and going
18 over to, I guess the conclusions of that report
19 which are found at 9, just before your general
20 comments on that report?

21 A. Yes.

22 Q. Just to give the Board the
23 background and the time in which this report was
24 being done, I think if we were to look at it, it
25 is September of 1985, and I can check the exhibit,



1 but it was in September of 1985 that the OWMC
2 process was ongoing?

3 A. Yes, it was.

4 Q. Could you stop for a
5 moment and give to the Board from your understanding
6 what it was the OWMC was looking at and how it came
7 to be they were also looking at Site D?

8 A. It's been a long time since
9 I read that or reviewed that document, but they were
10 looking of course through the Golden Horseshoe for
11 two sites, one for a treatment type facility where
12 they could deal with chemical physical treatment,
13 incineration and whatever other methods they might
14 choose to use to detoxify the wastes they were
15 receiving, and, secondly, they were also looking for a
16 landfill site in which they could bury these wastes.
17 Several sites were selected and this general area
18 was identified as having, to my recollection,
19 potential for a landfill site on what would be our
20 Site E, which is located to the northwest of D,
21 and they looked at this particular site for the
22 point of view of establishing a treatment facility
23 on this property. I believe this property was
24 slated for the treatment facility, and heaven knows
25 what they will ultimately come up with that they



1 want to put in.

2 Q. All right. Was the hydrogeology
3 and the soils, the clay and till planes and clay and
4 till features of the site of some significance as
5 well for the location of that treatment facility?

6 A. Yes. It is my recollection that
7 they had some deep storage type facilities that
8 would be associated with their process and they
9 wanted to be able to protect the environment from
10 spills or leaks from any of the types of works that
11 they would put in.

12 Q. Just to summarize, and I
13 have documents here and you probably have documents...

14 A. It's been a long time since
15 I've read this and I am going strictly from
16 memory.

17 Q. You can doublecheck the
18 documents if you want, but, as I understand it,
19 it came down to the point that the two facilities,
20 and there might even have been a third one in the
21 Town of Milton, I'm not sure...

22 A. There was a third.

23 Q. A third? Anyway, Milton,
24 sites in the City of Niagara Falls proper, in
25 the city, and in West Lincoln in the Region of



1 Niagara, there were three municipal areas that the
2 OWMC finally studied in some detail and currently
3 their processing is that they are proceeding with
4 the site in West Lincoln; is that correct?

5 A. Yes, and there was one too.
6 that sort of magically disappeared and created a
7 political furor at one time, a site in Mississauga
8 also.

9 Q. There are strange goings-on
10 in Mississauga?

11 A. Somewhere around Highway 401
12 or Dixie Road, just under my house.

13 Q. You didn't have anything to
14 with that?

15 A. It's just that that was one
16 that I found -- it sort of just came up and it
17 occurred to me that that was another area they
18 did consider and rejected.

19 Q. If we examine the various
20 phase reports of the OWMC, as I understand it
21 down to the final phase of selection, the three
22 municipalities, Milton, the City of Niagara Falls
23 and West Lincoln were the three candidate areas,
24 as it were, and Mississauga disappeared?

25 A. Mississauga came and went.



1 Q. That was happening in 1985
2 and, as a result, do I understand that you were looking
3 for the data that you could with respect to Site D
4 and that Gartner Lee report was one of that data
5 on Site D?

6 A. That is right. They had
7 drilled several holes on the perimeter of the site
8 and they weren't able to get access to the site
9 itself, I believe, so they put in holes north of
10 the site, east of the site and west of the site on
11 the road allowances.

12 Q. Now, just going through the
13 report, and I will follow the sequence you have
14 here and ask questions as I go so the Board will
15 have some idea or get some semblance of the order,
16 but if we turn over to Section 2 on pages 10 through
17 25, you are describing, as I understand the report,
18 the approach and how you were going to go about it
19 and what field work program, particularly drilling
20 programs you were going to undertake and so on?

21 A. Not so much were going to as
22 I believe we are really referring as well to
23 what we actually did do.

24 Q. If we go over to page 12,
25 we see that while you were doing this work, there



1 was circulation of the data or the field programs
2 that were going to be undertaken to these various
3 parties we see on page 12?

4 A. If I may, I will let Mr.
5 Beechinor take over at this point, as he was
6 directly involved with these discussions and
7 negotiations and I wasn't at this time.

8 Q. Fine. Would you like me to
9 repeat the question?

10 MR. BEECHINOR: A. Could you repeat
11 the question?

12 Q. I am looking at page 12 and
13 could you summarize for the Board what were the
14 circumstances that led to the comments from these
15 various parties?

16 A. What we did was prepare a
17 work program that we were going to carry out in
18 the course of a year of study, and we circulated
19 that work program to the interested parties
20 listed on this table and asked for their comments
21 and input. Their comments were considered and
22 the program was modified accordingly.

23 Q. I see at that point if we
24 look at the first party, it's the Town of Milton,
25 Morrison Beatty Limited, and were Morrison Beatty



1 acting for the Town at that point? Were they also
2 acting for NSP?

3 A. Well, I was definitely
4 involved in meetings with both Morrison Beatty
5 and the Town of Milton with regard to the review
6 of this program.

7 Q. Their comments were as
8 noted by the asterisk, there was a major aquifer in the
9 buried valley and the presence of continuous sand and
10 gravel layers in overburden and was this
11 summarizing the two main points or comments that
12 they were asking you to address in your fieldwork?

13 A. Yes.

14 There was some question
15 as to whether there was an incised buried valley with
16 an aquifer sitting in it and there was also some concern
17 about the possibility of continuous sand units.

18 Q. If we go over to the
19 responses or actions of Hydrology Consultants,
20 we see opposite the major aquifer in buried valley
21 that the Phase 2 work program, and I won't take the
22 time at this point, but you have described it here
23 in this section, but it was undertaken to address
24 that particular comment as well as the others?

25 A. We expanded the program to



1 drill at locations of concern to prove whether or
2 not these features were present or not.

3 Q. Similarly, with respect to
4 the presence of continuous sand and gravel layers
5 in the overburden, again the overburden at the nine
6 drilling sites, is that summarized as Phase 2,
7 the nine drilling sites?

8 A. That would be the combination
9 of both phases.

10 Q. The comment is that they were
11 continuously sampled to address the concern with
12 respect to these sand and gravel layers?

13 A. In order to get a complete
14 record of the overburden, yes.

15 Q. Then, I think if we were
16 to -- perhaps I can ask you to confirm this for me.
17 I took down a summary of the tests you had undertaken
18 on Site D and let me go through them and see if
19 I have taken them down correctly.

20 Going back to page -- I guess pages
21 4 to 5, the first tests of Hydrology Consultants
22 were eight boreholes, HC1 to HC8 as we see outlined
23 on page 4 and the conclusions on page 6?

24 A. That was the 1985 series.

25 Q. Then there is a September '85



1 and December '85 study and this is noted as being
2 June, 1984?

3 A. That's right.

4 Q. Do you see at page 4?

5 A. Yes.

6 Q. Then, going over to page 6
7 we have Gartner Lee's drilling of five boreholes
8 for OWMC, which is noted and that's during 1985?

9 A. Yes.

10 Q. Then, picking up at page 11,
11 we see under Phase 1 that Hydrology Consultants do
12 work on the site and I have a note HC1-85 to HC6-85?

13 A. That is right.

14 Q. The location of the six
15 drilling sites and the nests of boreholes --- nests
16 of wells are referred to specifically at page 13?

17 A. Yes.

18 Q. Then, going over to page 16,
19 we have the pumping well tests in December of 1985?

20 A. That is correct.

21 Q. Then on page 17 there
22 begins the discussion of Phase 2, additional
23 observation wells HC1 to HC3-86?

24 A. That's right.

25 Q. Also there is reference to



1 a second pumping test on the upper granular unit
2 referred to at pages 17 and 18?

3 A. That's right.

4 Q. Then you summarize also on
5 page 18 that the tritium tests were being done
6 for potential leachate migration and there is also
7 reference to soil sampling and grain size analysis?

8 A. Yes.

9 Q. You have heard reference also
10 to the fact that you were also involved in a
11 walk and talk survey to determine wells and so on
12 and we see this over at page 22?

13 A. That is right.

14 Q. If I understand it, what you
15 are doing in conducting all of this data was you
16 wanted to collect the data in order to address --
17 I think there are -- let's see, page 23 to 24
18 (a) through (h), you have listed the hydrogeologic
19 questions you were hoping to get answers for?

20 A. On pages 24 and 25?

21 Q. 23 to 25 and you will see
22 (a) through (h)?

23 A. I think pages 23 through 25
24 generally describes the process we followed to
25 evaluate the hydrogeologic data base and the



1 walk and talk survey was largely to gain an
2 understanding of groundwater use in the vicinity
3 of the site.

4 Q. I want to address this
5 particularly because I want to be sure I understand
6 the process and the methodology. If I direct your
7 attention to page 23, paragraph (a) under 2.6, you
8 will see there that there is reference to the fact
9 that you prepared, and I take it that first of all
10 the initial analysis you were responsible for in
11 preparing this, or did Mr. Sobanski also get into
12 preparing these cross-sections of the sites?

13 A. I think we were both involved.

14 Q. Both involved?

15 A. Yes.

16 Q. All right. Under paragraph
17 (a) on page 23 you see five hyphens which I have
18 numbered one through five?

19 A. Yes.

20 Q. Would you do that for your
21 sake also, the depth to bedrock being one and
22 key hydrostratigraphic units being No. 5. If I
23 were to jump over to page 27 in this report, we
24 see a section entitled geology and running from
25 page 27 over to page 34 where you are addressing,



1 as I understand it, the geology, you are trying
2 to get a handle on the strata or in this particular
3 site?

A. That's right.

4 Q. Is that correct?

5 A. It is.

6 MR. McQUAID: I want to mark some
7 of these units and I don't know what your plans
8 were for a break.

9 DR. KINGHAM: Since we are only going
10 until 4:00 o'clock, perhaps we had better break at
11 this point for ten minutes.

12 --- Recess

13 DR. KINGHAM: Thank you. Please be
14 seated. Mr. McQuaid.

15 MR. McQUAID: Q. Mr. Beechinor, at
16 the break we were at page 27 in H-39 and at the
17 section that begins the discussion of geology.

18 MR. BEECHINOR: A. Yes.

19 Q. Just to summarize, and I
20 am referring back to page 23, but to summarize
21 how you go about examining the geology, if I look
22 at paragraph (a) I see reference to three regional
23 and four local stratigraphic cross-sections being
24 prepared and the text goes on to indicate you were
25 looking for the five points, the depth of bedrock,



1 the composition and thickness of overburden, the
2 potentiometric and water table levels if they would
3 help you, and I realize there is other data as well,
4 but this will help you get to that, the homogeneity
5 and continuity and the key stratigraphic units.
6 I asked you put up on the easel behind you first
7 of all the drawing....

8 A. This long one?

9 Q. Yes.

10 A. Drawing 6.

11 Q. Drawing 6 in the back of the
12 document and we need not take it out, but that
13 typifies one of the three regional stratigraphic
14 cross-sections that were prepared, is that correct?

15 A. That is correct and this
16 is Section A-A shown on Drawing 2, A-A, the line
17 of the section.

18 Q. Drawing 2 is the card marked
19 H39-D2?

20 A. That's right.

21 Q. Can you point to what cross-
22 sectional distance you are looking at when you do
23 a regional cross-section and how far to the northwest
24 were you examining?

25 A. We were looking along a line



1 extending from the Bell School Line, which is
2 approximately two concessions roughly west of Site D,
3 through Site D to Highway 25 and so there is
4 generally a couple of kilometres represented in
5 that section.

6 Q. That is what we see and when
7 we think of cutting through the ground on that
8 cross-section you outlined, that is what we see and is
9 that A-A the regional cross-section?

10 A. Section A-A, that's right,
11 west to east, and Site D is located in this vicinity
12 on the east side of Section A-A.

13 Q. All right. There are three
14 of those, B-B and C-C are the lettered cross-sections
15 and then you note there are four local stratigraphic
16 cross-sections of the site?

17 A. That's right.

18 Q. I have asked you to put up
19 on the easel one of the four local stratigraphic
20 cross-sections?

21 A. Yes, Drawing No. 9,
22 Section E-E.

23 Q. Could you point out Section
24 E-E, where is that cutting through the site?

25 A. Section E-E is generally



1 cutting east, west to east through drilling site
2 HC2-85 through HC3-86 through HC5-84 and HC4-85
3 and HC5-85 and HC1-86.

4 Q. Could you trace that for the
5 Board over on HC39-D2. Take a red marker and
6 put E-E on it and that will give us a picture on
7 that one. All right. You have outlined it in red
8 and it follows pretty much the line we saw for
9 A-A, at least through the site?

10 A. That is right.

11 Q. Then, going to what has been
12 marked as H39-D9, which is the Section E-E, down
13 in the legend we see the six strata which you
14 found and which the legend describes?

15 A. Yes.

16 Q. Would you just go through
17 those? I asked you over the break to in red just
18 number those and for reasons which I won't ask you
19 to describe here, when you do it in the legend, you
20 go from lowest to highest?

21 A. Oldest to youngest.

22 Q. When you do it the way the
23 ground is, it goes in the reverse order?

24 DR. KINGHAM: I think they should
25 find a new convention for hydrogeology so that things



1 on top are on top.

2 MR. McQUAID: I'm with you and you
3 have my seconding of the motion on that.

4 Q. Could I ask you to go down
5 on the legend, starting with what we will call
6 strata 1 and these are actually described at page 29
7 of the text also and could you confirm that for me,
8 Mr. Beechinor, and actually they are summarized there
9 is items (1) through (6)?

10 MR. BEECHINOR: A. They are.

11 Q. Each of them are described
12 later in the document in this very section?

13 A. Yes.

14 Q. I think it would be helpful
15 if we asked the Board and the other counsel here
16 and the other people involved, to go through them and
17 number them and point out for the Board if you would
18 where they are found actually on Section E-E?

19 A. Starting at No. 1, it is
20 described as the gravelly till and it rests directly
21 on the bedrock surface, and the bedrock surface
22 being the Queenston shale which is delineated by
23 the brick-like symbols. No. 2 has been described
24 as the lower till and it is the material we find
25 above the bedrock and below this dashed line.



1 Q. You put on the exhibit that
2 it is actually found in two locations, but it is
3 intersected -- I guess it's the matrix in a way
4 for 3 and 4 or 3 and 4 are found in that till also?

5 A. That is correct and in the
6 lower till which has been generally described as
7 the sandy silt till and there are two granular
8 units contained in it, No. 3 being the lower granular
9 unit and No. 4 being the upper granular unit, and
10 both of those have been interpreted to have lateral
11 extent.

12 Q. Point out would you as well
13 that you put 2 on, both below 3 and above 4?

14 A. That's right, so the lower
15 till, the sandy silt till also occurs above both
16 the granular units and below the granular units.

17 Q. Then we come to the heavily
18 dashed line, the dark dashed line which is unit 5,
19 your thin bed of silt?

20 A. That's right.

21 Q. You put 5 right through the
22 middle of that dashed line?

23 A. That's right and I already
24 have 5 on here, indicating the thin bed of silt
25 and that is the marker bed between the lower and



1 upper tills.

2 Q. Okay. then we come to 6,
3 which on this section, and there is no
4 differentiation made between the weathered and
5 the unweathered, you just have 6 going from the
6 thin bed of silt right to the surface?

7 A. That is right and generally
8 the clayey silt till or silty till.

9 Q. All right. Then, so we are
10 clear on this section, having done these regional
11 strata and the four local strata, and there are
12 three others of the same type we have just been
13 discussing, am I correct that you summarized this
14 local geology over at page 30 and, having done
15 these sections, you are going from the specifics
16 of the borehole logs to summarizing them on the
17 cross-sections we see here and then on Figure 1
18 on page 3?

19 A. That's right.

20 Q. Am I correct you then
21 summarize it in a simplified form and you are
22 moving into your next study, as it were, to
23 study the hydrostratigraphy, but this gives us
24 the geology at page 30?

25 A. It summarizes the strati-



1 graphic information we see on the detailed geologic
2 cross-sections and it was useful for us to use
3 this information to help us prepare a model.

4 Q. I would like you to go to
5 page 30 and by use of the overhead if you can,
6 number for us again 1 through 6, the local geology
7 we see on Figure 1?

8 A. Unit 1 is the gravelly till
9 and I will just denote it on here. That is No. 1,
10 the gravelly till.

11 Q. All right.

12 A. No. 2 is the lower till and
13 again that is found below the two granular units
14 and above the granular units and in fact between
15 the granular units.

16 Q. Put a 2 on each if you would.

17 A. Then, the lower granular
18 unit and the upper granular unit.

19 DR. KINGHAM: Do you mean those
20 numbers to be 3 and 4?

21 MR. BEECHINOR: Am I off?

22 MR. McQUAID: I think 5 is silt,
23 so 3 is lower granular.

24 MR. BEECHINOR: 3 is lower granular
25 and 4 is the upper granular unit.



1 Q. 5 is the dark line?

2 A. 5 is the thin bed of silt and
3 6 is the upper till.

4 Q. Would you put in an arrow
5 going to the top and bottom so it is clear?

6 A. We separated the upper till
7 into two units, a weathered portion and an
8 unweathered portion.

9 Q. If you move your head a
10 little you will see upper till on your line drawing
11 to the right and you can see those through both?

12 A. That's right.

13 Q. There you summarize the local
14 geology and that is one of the key steps in trying
15 to determine where the groundwater and the various
16 actions and so on in the soil are occurring; correct?

17 A. That is right.

18 Q. Just to go back to page 23,
19 which is where you were describing what activities
20 were being carried out, would I be correct that
21 when you get the geology in the form we have just
22 summarized, you are answering under Section (a)
23 or paragraph (a) the depths to bedrock, 1 and 2,
24 and you have some idea of composition and thickness
25 of overburden and I guess you have to go on and



1 study the hydrostratigraphy to answer 3, 4 and 5?

2 A. Well, No. 4 I would say we
3 have now defined the continuity of the overburden,
4 although the groundwater interpretation, such as
5 the pumping tests assisted in that, and now we are
6 beginning to establish what the hydrostratigraphic
7 units are, but again we are looking at groundwater
8 information to help us further understand that.

9 Q. Would I be correct then,
10 just to go into the sections of the report, but
11 beginning at the next section, 5.0 on page 35 and
12 6.0 on page 38, but by looking at surface water
13 and groundwater you are turning your attention to
14 the hydrostratigraphic assessment of the study?

15 A. In Section 5 we are defining
16 both regional and local drainage and we want to
17 understand what the surface water is doing at the
18 site, it's a potential pathway for contaminant
19 migration.

20 In Section 6 we are looking at the
21 recurrence and use of groundwater and surface water
22 resources in the vicinity of the site, again to
23 help us understand what the potential impacts might
24 be and the receptors of the potential impacts.

25 Section 6 and 6.2, we are now into



1 the interpretation and definition of the hydro-
2 stratigraphic units, those hydrostratigraphic units that
3 we consider salient to the interpretation of potential
4 migration of contaminants.

5 Q. Again we see a summary of
6 hydrostratigraphic units, Figure 2 on page 41?

7 A. That is right.

8 Q. This is a summary, if I
9 understand it correctly, of all of the analyses
10 that were undertaken in terms of the Jacob
11 Approximation methods, the Theis recovery analysis
12 and so on that were done on each of the strata we
13 have been defining?

14 A. Here we are bringing all the
15 information together and this is the result of the
16 continuous sampling of the overburden to define
17 the thicknesses of these units and the extent of
18 these units as a result of the installation of
19 monitoring wells, piezometers, and using the
20 Hvorslev tests we are able to come up with what
21 we consider the hydraulic conductivity or the
22 permeability of these materials. We have also
23 done the pumping tests on both the upper and lower
24 granular units in order to establish the hydraulic
25 conductivity of those two units.



1 Q. All right. So, what tests
2 specifically are you summarizing on this figure?

3 A. The Hvorslev tests in order
4 to determine the permeability of the units, the
5 hydraulic conductivity of the units, and the pumping
6 tests conducted on the two granular units to
7 establish the hydraulic conductivity of that, of
8 those units.

9 Q. Could I ask you to take the
10 overhead of Figure 2 and let's mark these units
11 1 through 6 on that so we have got the same
12 terminology and numbering.

13 A. For a start, I will point out
14 now that we haven't considered the gravelly till
15 a hydrostratigraphic unit because it was found to
16 be discontinuous at the bedrock surface, so that
17 unit has No. 1 which we have described on
18 Drawing 9, it is no longer a germane unit on Figure 2
19 and so we start therefore with unit 2, the lower
20 till, and for the lower till we have described a
21 hydraulic conductivity of what is shown here...

22 Q. Draw a line over to the 2 at
23 each location where 2 is found, if you would.

24 A. Well, this area here denotes
25 the length of the lower till and based on our



1 field tests and our examination with the Hvorslev
2 analysis, we determined the hydraulic conductivity
3 of the lower till to be 2×10^{-6} centimetres per
4 second for all of the lower till and for the lower
5 granular unit, unit 3, we determined through the
6 pumping test that the hydraulic conductivity of that
7 unit was 3×10^{-4} centimetres per second and for
8 the upper granular unit, No. 4, again from the
9 pumping test, we determined a hydraulic conductivity
10 of 8×10^{-3} for the upper granular unit and for
11 the thin bed of silt, again as similarly with the
12 gravelly till, we did not consider that a salient
13 hydrogeologic -- hydrostratigraphic unit because
14 it was very thin and of a silt texture.

15 The next relevant hydrogeologic
16 unit or hydrostratigraphic unit was the upper
17 till, and based on our permeability tests conducted
18 on the lower till, we estimated the unweathered
19 portion, or determined the unweathered portion of
20 the upper till had hydraulic conductivity of
21 8×10^{-8} , and that is unit 6.

22 Now we also had within the upper till,
23 we defined a weathered portion of the upper till and
24 we estimated that the permeability or the hydraulic
25 conductivity of that unit was 10^{-5} so you could



1 have a 6A and 6B if you wish.

2 Q. It's at this point that if
3 we were to go back to the local geology on page 30,
4 you had a line there for local limit of weathering,
5 but you had not differentiated it in terms -- I
6 guess differentiated it as to the weathering line?

7 A. Not at that point. The upper
8 till geologically is the upper till.

9 Q. Right.

10 A. From the perspective of
11 hydrogeology, there can be different hydraulic
12 characteristics in portions of the upper till, so
13 we divided the upper till into a weathered portion
14 and an unweathered portion and attributed different
15 hydraulic characteristics for each.

16 Q. These figures we have seen
17 on page 41, your hydrostratigraphic units, they
18 actually were the permeability factor, k or
19 hydraulic conductivity, and that's the same thing
20 as k equals hydraulic conductivity or permeability
21 factor?

22 A. More or less for purposes
23 of the Board.

24 Q. For the Board and for me.

25 A. The ease that fluid moves



1 through the formation is the hydraulic conductivity.

2 Q. These numbers we see on page
3 41. were the numbers taken over to page 88, if
4 I could ask you to turn over to that, Table 10 on
5 page 88, where we see the various factors that had
6 some significance in your calculations of velocities
7 or times and so on in the subsequent equation?

8 A. That is right.

9 Q. You used the same figures as
10 we see on page 41, but I did want to discuss with
11 you the fact that in the tritium analysis, as I
12 understand it, you found that that upper weathered
13 till or the weathered upper till, I'm sorry, that
14 is more accurate, but it in fact indicated that it
15 was a tighter material than in fact you had assumed
16 or found at this particular point.

17 Let me ask you to turn over to page
18 61 and you can comment on that, but if I take you
19 to pages 61 and -- over to page 63. Actually pages
20 62 and 63.

21 A. Yes, we used the tritium
22 information. As Mr. Sobanski has indicated before
23 bomb tritium was introduced to the geologic environ-
24 ment in 1952, and based on the velocity and where
25 that marker bed is, the marker tritium unit is, 2.3,



1 we estimated that the weathered zone may well
2 be a much lower hydraulic conductivity than we used
3 in our calculation of the contaminant.

4 Q. If I look at the bottom of
5 page 62 it reads:

6 "The tritium data indicates that the
7 hydraulic conductivity of the
8 weathered zone is only about one-half
9 order of magnitude higher than the
10 hydraulic conductivity of the unweathered
11 Upper Till, 8×10^{-8} ... "

12 and if we look at Figure 2 behind you, we will see
13 that in your 6A zone you have that 8×10^{-8} there?

14 A. Yes.

15 Q. Is the one-half referred to,
16 going back to page 62, the tritium data and the
17 equation indicates that the k for the unweathered
18 upper till in fact came out at 5×10^{-7} centimetres
19 per second?

20 A. That's right and that is
21 what this interpretation shows.

22 Q. You have rounded that off at
23 one-half rather than five/eighths, one-half?

24 A. Yes.

25 Q. The tritium would indicate



1 that instead of 10^{-5} which we see over on Table 10,
2 that that analysis would indicate that you were
3 extremely conservative two to three orders of
4 magnitude by taking that higher permeability?

5 A. I would agree with that, yes.

6 Q. Now, going back if we could
7 to the documents we have, I want to do one more
8 translation or cross-reference. Would you take the
9 red marker and go back to H39-D9 and quickly, if you
10 would, translate Figure 2 and the ks on there to
11 H39-D9 and forget 1 for the moment, but 2 is
12 2×10^{-6} and put the ks on there quickly so we
13 have them summarized and then I will try and remember
14 where they are in the strata. Are you using the
15 scale....

16 A. I am trying to estimate where
17 the line between the weathered and the unweathered
18 might be.

19 Q. Just after the Figure
20 1×10^{-5} for the weathered upper till would you
21 put in brackets 5×10^{-7} ; just make a note, 5×10^{-7}
22 (tritium)?

23 A. I have put tritium estimate
24 there.

25 MR. SOBANSKI: A. It should be



1 3×10^{-7} . V is the average linear groundwater velocity.

2 Q. I directed you to the velocity
3 rather than the small k. I am sorry. So, where
4 we talked earlier about five-eighths, it was three-
5 eighths and you rounded it to a half?

6 MR. BEECHINOR: A. That's right.

7 Q. Turning back to page 23
8 and paragraph (a) at this point in the report, am
9 I right you have answered items 1, 2, 4 and 5 and
10 item 3, the potentiometric and water table levels
11 are to be addressed beginning in paragraph (b)?

12 A. That's right.

13 Q. If I ask you to turn over
14 to page 47, Section 6.3, it begins a section of
15 bedrock groundwater flow regime?

16 A. Yes.

17 Q. Is this examining the various
18 water well information so you can address the
19 potentiometric and flow regime in the soils, the
20 strata we have just been summarizing?

21 A. This is the bedrock
22 groundwater flow system and we utilize existing
23 information from water wells and work from other
24 consultants to generate I guess our site as well,
25 but to generate a contour map of the bedrock flow



1 system.

2 Q. Thank you for correcting me.

3 So on page 47, first you look at the bedrock,
4 pages 47 and 48?

5 A. Right.

6 Q. That is summarized on I
7 think it's Drawing 15?

8 A. That's right.

9 Q. Could you put that up quickly
10 for the Board to demonstrate the results of that
11 drawing now that we have found them all, or maybe
12 we didn't?

13 A. Drawing 15 showing the
14 regional bedrock potentiometric groundwater map.

15 Q. This is described at the
16 top of page 48:

17 "With respect to Site D, the regional
18 bedrock potentiometric contour map
19 indicates a general easterly to
20 southerly direction of groundwater
21 movement."

22 And this is across the site itself, is that right?

23 A. We estimated generally the
24 groundwater in the bedrock was moving both from
25 the site and in relation to the site in an easterly



1 and southwesterly direction.

2 Q. That gives you the region
3 just as we had cross-section A-A for the strata
4 and you were looking at the strata geology regionally
5 and this gives you the water movement regionally;
6 is that correct?

7 A. That's right, we generally
8 like to do a regional map first in order to understand
9 what sort of flow system we are dealing with and also
10 it provides us with a check to see whether or not
11 the local flow system makes sense.

12 Q. Then at page 48 there is
13 reference to a local contour map or water contour
14 map being done also?

15 A. That's right.

16 Q. Could you put Drawing 16
17 up and we can look at that quickly.

18 A. I am trying to find No. 16.
19 This is Drawing 16 showing the local bedrock ground-
20 water flow system, and again generally showing the
21 same configuration we saw on the regional map of
22 the bedrock flow system.

23 Q. All right. Now, this is giving
24 you information -- is this from both existing wells
25 and from some of the drilled wells you drilled?



1 A. This information is based on
2 the piezometers we installed on Site D as well as
3 some of the other consultants, because there are a
4 number of wells by other consultants on site.

5 Q. Could you explain how you go
6 from these two drawings to the point which is
7 discussed at page 49 and 50, how you zero in, as
8 it were, that you are looking for dominant lateral
9 groundwater pathways?

10 A. In addition to this we look
11 at the overburden flow system as well, the regional
12 flow system and the local flow system and the water
13 table. From those three water table configurations
14 we are able to, (1), generate lateral gradients at
15 the water table and the direction of movement in
16 the weathered till. We are able to determine the
17 lateral gradients in the gradient units and
18 its direction of groundwater and gradient and, as
19 we just pointed out here, the direction of ground-
20 water movement at the bedrock/overburden
21 contact and the gradient associated with that
22 movement.

23 Q. In the second paragraph
24 under Section 6.4.1 on page 49, and the first
25 paragraph as I understand it is summarizing the



1 number of observation wells that you had, twenty-
2 three observation wells at nine drilling sites and
3 those are identified on Drawing 2 and then 15 at
4 seven drilling sites in 1984 and you refer to the
5 other wells we could also pick up on Drawing 2 if
6 we needed to; is that correct?

7 A. That's right.

8 Q. You say:

9 "In the overburden...."

10 and should this be corrected to 3, because it says....

11 ".... two dominant lateral groundwater
12 pathways for landfill contaminant
13 migration were identified and
14 investigated. These were the shallow
15 weathered zone in the upper till and the
16 upper and lower granular units..."

17 A. We have combined them.

18 Q. You have combined the upper
19 and lower granular into one?

20 A. Yes, and in fact there are
21 three pathways, but we combined them into two.

22 Q. I wrote three there in case
23 we needed -- as we have, I think, throughout the
24 cross-examination, they have been referred to
25 separately from time to time.



1 Then, if I understand it correctly,
2 you actually prepared a water table contour map
3 through these two or three pathways that you identified
4 as a result of your study?

5 A. We prepared a water table
6 contour map for the movement in the weathered portion
7 of the upper till and we prepared potentiometric
8 maps for the movement of groundwater in the upper
9 granular unit.

10 Q. Would you put Drawing 17 for
11 the upper weathered till and 18 for the
12 granular units up, please. You were looking for all
13 of the pathways, as I understand it, but you and
14 Mr. Sobanski had isolated it to these three as being
15 the dominant, is that correct?

16 A. That is right.

17 MR. SOBANSKI: A. Remember we are
18 talking the overburden, not the rock, that is another
19 flow path.

20 Q. We are not talking bedrock?

21 A. We are not talking bedrock,
22 but the granular units in the overburden and the
23 two dominant lateral groundwater pathways are being
24 addressed here and this still excludes the rock which
25 is another pathway.



1 MR. BEECHINOR: A. This is Figure 17
2 and if you recall, Mr. Chairman, this is the one
3 Mr. Estrin and I were having some disagreement on and
4 this defines the direction of groundwater movement
5 in the upper till, reflecting the water table
6 surface.

7 On the reverse is Drawing 18, defining
8 the direction of groundwater movement in the upper
9 granular unit. It was defined as generally in a
10 westerly or southwesterly direction and other
11 information not shown shows that the groundwater
12 flow system in the lower granular unit duplicates
13 what we see in the upper granular unit.

14 Q. All right. Then, at page 50
15 over to page 52 there is a discussion about the
16 interrelationship of the overburden and the bedrock
17 groundwater flow regimes?

18 A. Yes.

19 Q. Mr. Sobanski just indicated
20 we must also address the flow in the bedrock?

21 A. Yes.

22 Q. This is discussing putting
23 them all together?

24 MR. SOBANSKI: A. Yes. The bedrock
25 because of the downward gradient which is taking



1 a substantial portion of the recharge.

2 Q. Now, I am going to ask you
3 just to discuss that downward, downward gradient
4 on the flows in a bit more detail, but would I be
5 correct that if we were to go over to page 66....

6 MR. BEECHINOR: A. Yes.

7 Q. Where we see a schematic
8 of the water balance, we will see a Q_R of 9.6
9 millimetres at the top?

10 A. That's right.

11 Q. And a Q_B at the bedrock and
12 am I right it's at the bedrock?

13 A. That's right.

14 Q. Of 6.9 millimetres?

15 A. That's right.

16 Q. Just as we are at that point,
17 does that summarize, first of all dealing with the
18 overburden vis-à-vis the bedrock, that would
19 summarize how much of the Q_R and what do we call
20 that?

21 A. That is the precipitation
22 entering the system.

23 Q. The precipitation entering
24 the system actually gets to the bedrock in this
25 vertical gradient Mr. Sobanski was just referring to?



1 A. That's right.

2 Q. Then, if we go over to the
3 righthand column, and I am just getting some photostats
4 made, but if we took the Q_H figures as they go down,
5 Q_R being another way of expressing that 9.6
6 millimetres, and we did the percentages going down
7 of those Q_H s, we could come to, or we would arrive
8 at a figure of how much percentagewise at a given
9 point is going vertically and how much is going
10 laterally, is that right?

11 A. That is right.

12 Q. I think yesterday I gave
13 you these calculations and asked you to doublecheck
14 the percentages we had calculated and have you had
15 a chance to do that?

16 A. I have.

17 Q. Are they accurate?

18 A. Yes, they are.

19 MR.McQUAID: I would tender that
20 as the next exhibit, Mr. Chairman.

21 DR.KINGHAM: This will be Exhibit
22 B-207, B for Burlington.

23 --- EXHIBIT No. B-207: Figure 3 with
24 percentages

25 MR. McQUAID: Q. Correct me,



1 Mr. Beechinor or Mr. Sobanski if I have it wrong,
2 but harkening back to my earlier few questions, this
3 water balance or these calculations indicate
4 71.7 per cent, the figure in the lower righthand
5 column, of the water that hits the surface is actually
6 reaching the bedrock at a given point; is that what
7 I understand?

8 MR. BEECHINOR: A. Because of the
9 relatively strong downward gradients, the dominant
10 amount of infiltration tends to move to the bedrock,
11 that is correct.

12 Q. If we go back up into your
13 dominant lateral pathways, could you just point out
14 for us or indicate as we go down, first of all
15 in the weathered upper till, what percentage is
16 moving laterally?

17 A. The percentage of the
18 infiltration moving laterally. Okay. In the
19 weathered zone of the upper till it's 9.2 per cent.

20 Q. Could you put that overhead
21 on that table too and we can mark the 6A or 6B in this
22 case for that one. Is it there?

23 All right, so the 6B is 0.92
24 per cent?

25 A. Yes, that is right.



1 Q. And 6(a), write that down?

2 A. Shall I write this down?

3 Q. Write that down. 6(a) would
4 be 1.1 per cent?

5 A. That is right, the lower
6 portion of the upper till, and the upper granular
7 unit -- it will get confusing here now.

8 Q. I see the problem.

9 A. It's just going to be confusing.

10 Q. What number is assigned to it?

11 A. Perhaps the overlay for that
12 particular figure.

13 Q. Do you have the overlay?

14 A. Here it is.

15 Q. All right. I have some
16 difficulty, Mr. Beechinor, and you might help me
17 out. When you come down to the 22.8 per cent in
18 the upper granular and so on, could you relate those
19 in the case -- we know the silt is 5 as we have
20 described it and the first one below the 5 is part
21 -- not the lower granular but the lower till and
22 it's 2 and the upper granular unit is No. 4 and
23 where do you relate the 22.8 per cent to?

24 A. 22.8 per cent is....

25 Q. The upper granular?



1 A. I believe that's the upper
2 granular unit, yes.

3 DR.KINGHAM: Just for our clarify on
4 that point, is your 1.1 per cent everything from
5 the 11 metre depth up to the 4 metre depth?

6 MR. BEECHINOR: All right. I'll put
7 the same numbers on.

8 MR. McQUAID: Q. Yes, put the numbers
9 on and we will have the same scale.

10 DR. KINGHAM: That is not the
11 clarification I was seeking. You just clarified for
12 Mr. McQuaid the 22.8 per cent was the lateral
13 movement in the upper granular unit and I was asking
14 you whether similarly we are to understand that
15 the 1.1 per cent above it is from that entire zone
16 from 4 metres to 11 metres down?

17 MR. BEECHINOR: 4 metres to 8 metres
18 down.

19 MR. McQUAID: Q. That is 6(a), the
20 unweathered upper till.

21 MR. BEECHINOR: A. So this is 6(a).

22 MR. SOBANSKI: A. Let me confer
23 here for just a second.

24 DR. KINGHAM: In light of the time,
25 perhaps you would like to consider that?



1 MR. McQUAID: We can fix that up
2 over the break, but assuming we get these numbers,
3 and we have gone through some of the drawings, but
4 this part of the report is answering back to page
5 23, your potentiometric and water table levels, and
6 the items referred to, I guess in paragraphs (b), (c)
7 and (d) and you are getting the dominant lateral
8 pathways that are working in the overburden and
9 the bedrock and you are getting, as it were, a
10 conclusion or opinion as to how they are operating?

11 MR. BEECHINOR: A. That is right.

12 Q. At that point we go into
13 the chemical analysis and so on that is following
14 and we can pick that up quickly on Monday. We will
15 check this up over the weekend.

16 DR. KINGHAM: Since you are clarifying
17 that for us, could you also consider clarifying for
18 us whether the Q_R is that which penetrates the
19 ground after whatever runoff takes place. Is that
20 some fraction of the twelve inches you told us a
21 couple of months ago was the rainfall?

22 MR. BEECHINOR: I will check.

23 DR. KINGHAM: You don't have to answer
24 now.

25 MR. SOBANSKI: This is a balance



1 run through by Darcy's Law as to what will move
2 laterally and vertically and the twelve inches we
3 refer to is after we have disturbed the site and
4 chewed the ground up and put a waste mound on it.

5 DR. KINGHAM: I understand, but I
6 am asking you of the twelve inches that fall, some
7 of it runs off the ground?

8 MR. SOBANSKI: Actually we get about
9 32 inches here.

10 DR. KINGHAM: Thirty-two falls and
11 12 goes in?

12 MR. McQUAID: I don't want to keep
13 the Board, but if you refer to page 65, you had
14 actually split, as I understood it, after looking
15 at the meteorological data, how much the total
16 precipitation went into evapotranspiration and surface
17 runoff and so on and the groundwater recharge,
18 that 10 millimetres per annum, and is that referable
19 to the Q_R .

20 MR. SOBANSKI: Yes.

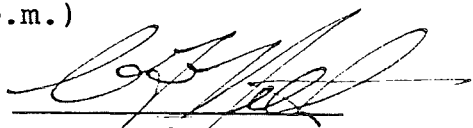
21 MR. BEECHINOR: That is right.

22 DR. KINGHAM: Thank you very much.

23 We will resume at 9:30 on Monday morning.

24 --- Adjournment (4:00 p.m.)

25 --- CERTIFIED CORRECT:


C.F. Nethercut, CVR

