

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;

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

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

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

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

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;

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;

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;

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;

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;

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;

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

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.

VOLUME: 18

HELD AT: Oakville, Ontario

DATE: Monday, June 8, 1987

OFFICIAL REPORTERS

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Toronto, Ontario

I N D E X

1	<u>Witnesses</u>	<u>Page No.</u>
2	<u>SCHIFF</u> , Dr. Myra (resumed)	
3	Cross-examination by Ms Vigod (cont'd)	4005
4	Re-examination by Mr. Hodgson	4027
5	<u>SOBANSKI</u> , Alfred A.	
6	<u>BEECHINOR</u> , James	
7	Examination in chief by Mr. Lederer	4052
8		
9		
10		
11		
12		
13		
14	<u>E X H I B I T S</u>	
15	<u>No.</u> <u>Description</u>	<u>Page No.</u>
16	H-29B Response to question on TSP measurements by Dr. Koczkur	4004
17	H-7A Curriculum vitae of James Beechinor	4052
18		
19	H-10A Map re overburden thickness from H-10	4065
20	H-10B Map re agricultural capability from H-10	4066
21		
22	H-10C Map re Niagara Escarpment from H-10	4066
23	H-10D Map re drainage from H-10	4066
24	H-10E Map re distribution of overburden aquifers from H-10	4066
25		



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E X H I B I T S

(ii)

<u>1</u>	<u>No.</u>	<u>Description</u>	<u>Page No.</u>
2	H-10F	Map re infiltration from H-10	4066
3	H-10G	Map re buried valley, aquifer complexes from H-10	4066
4			
5	H-10H	Map re distribution of bedrock aquifers from H-10	4066
6	H-10I	Map re soil attenuation capability from H-10	4066
7			
8	H-10-FIG-6:	Larger form of Map - Figure 6 from H-10	4093
9	H-38D	Table entitled "Range of Value of Hydraulic Conductivity and Permeability"	4146
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			



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BEFORE:	H. H. Lancaster, Q.C.	-	Chairman
	Dr. D.J. Kingham	-	Member
	S. Tanner	-	Member



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Toronto, Ontario

Hearing conducted at The Oakville
Granary Commercial Centre, 105 Robinson
Street, Oakville, Ontario, on
Monday, June 8, 1987

VOLUME 18

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



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APPEARANCES (Cont'd):

1	C. Stevenson	for Framgard Holdings,
2	P. Hancock	Fosseri Investments
3		Limited, Seriphos
4		Investments Limited and
5		Topic Investments
6		
7	J.H. Olah	for the Halton Region
8		Conservation Authority
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Per: C. F. Nethercut, C.V.R.



1 --- Upon commencing at 10:00 a.m.

2 THE CHAIRMAN: Good morning, thank you.
3 Please be seated. Ms Vigod, I guess you are still ...

4 MR. HODGSON: Before we start, over the
5 weekend Dr. Koczker worked up a response to a question
6 put to him by Dr. Kingham about the relationship between
7 air quality measurements taken at Sites D and F.
8 Dr. Koczkur developed answers with some appendices, and
9 I have given copies to my friends, but I thought I would
10 file it with the Board and if it satisfies or provides
11 an answer, fine, and if it doesn't provide an answer
12 Dr. Koczkur can be brought back at your convenience to
13 respond to any questions.

14 THE CHAIRMAN: Thank you.

15 MR. HODGSON: Perhaps we should give it
16 a number and it could be viewed as an addendum to his
17 report, but I don't remember the number of his report.

18 THE CHAIRMAN: I was thinking that that
19 is what it should be.

20 MR. HODGSON: His report would have been
21 air quality, H-29, and we have an H-29A already, so let's
22 make it H-29B and it will be called response to question
23 on TSP measurements by Dr. Koczkur.

24 --- EXHIBIT NO. H-29B: Response to question on TSP
25 measurements by Dr. Koczkur



1 DR. MYRA SCHIFF, (resumed):

2 CROSS-EXAMINATION BY MS VIGOD, (continued):

3 Q. Dr. Schiff, where we left off on
4 Thursday I guess is we had been discussing the Aldershot
5 High School meeting in February of 1985 and the subse-
6 quent letters the public filed after that meeting. Can
7 we discuss that at Aldershot High there were approximately
8 around 700 people who were in attendance?

9 A. Yes.

10 Q. I would like to know how many of
11 those people were either interviewed by you or received
12 questionnaires.

13 A. Well, questionnaires were sent to
14 14 households including 39 people and there were approxi-
15 mately 40 people at each of the two sets of workshops
16 that I completed and, as well, I may have spoken to some
17 of the other people on particular occasions.

18 Q. But in reference to the high
19 school public meeting, where there were 700 people in
20 attendance, how many of those people did you do follow-up
21 work?

22 A. Oh, I see. I'm not sure in fact
23 and could you clarify your question?

24 Q. My understanding was that there
25 was a meeting to discuss your draft report held in



1 February, 1985; is that correct?

2 A. Correct.

3 Q. At Aldershot High School?

4 A. Yes.

5 Q. Approximately 700 people were in
6 attendance at that meeting?

7 A. Approximately, yes.

8 Q. My question to you was how many
9 of those people were either interviewed by you or
10 received questionnaires?

11 A. Subsequent to the meeting?

12 Q. Yes.

13 A. I don't believe that I undertook
14 that exercise at any of the sites subsequent to the
15 preparation of the draft report.

16 Q. Did you take down the details of
17 the people's complaints at that meeting?

18 A. I believe that minutes were taken.
19 I didn't do that.

20 Q. At this point was part of this
21 meeting's purpose to in fact get a response from the
22 public to the draft report and there would be at least
23 an implication that concerns could still be taken into
24 account by you in your subsequent final report?

25 A. Yes, and concerns were taken into



1 account in the final report. For example, the informa-
2 tion about the Park Avenue Church was not obtained until
3 after the preparation of the draft report and, as well, the
4 extension of the southern limits of the study area
5 boundary were undertaken following preparation of the
6 draft report.

7 Q. In terms of people's identification
8 of concerns such as visual, noise, odour and other
9 impacts, how were these then evaluated in terms of the
10 people that might be disrupted by this site?

11 A. These were taken into account in
12 the preparation of the reports by other consultants.
13 While I listened very carefully, I should point out at
14 that meeting, I don't believe I heard anything that I
15 had not already heard before during the various workshops
16 and previous public meetings that had taken place on
17 this project.

18 Q. So, in other words, would you say
19 that the issues raised by the people at the Burlington
20 meetings were consistent with earlier issues raised at
21 the workshops and their concerns as far as impacts they
22 might be experiencing, either with the existing site or
23 that they considered would be potential impacts?

24 A. In general I would say that that
25 was the case.



1 Q. I would just like to turn to one or
2 two of these submissions, and this will be Exhibit H-72,
3 and I would ask you to turn to page 417.

4 A. Yes.

5 Q. Let me ask you generally about
6 the submission book. It is my understanding that you
7 had not seen this entire book until last week; is that
8 correct?

9 A. I don't recall seeing this book in
10 this form, but that's not to say that I have not seen
11 much or probably most of the contents of the book.

12 Q. As we discussed last week, there
13 were certain of these submissions, and I believe you
14 indicated the Cumis submission and others, that you had
15 not seen?

16 A. To the best of my memory I had
17 not seen them, that is correct.

18 Q. I would ask you in relation to
19 the submission on page 417 by Mr. Adam, Mr. Simpson and
20 Mr. Coppack, three residents of the Burlington or
21 Aldershot area; first of all, have you seen this sub-
22 mission before?

23 A. I have not seen this submission.
24 I would like to clarify that in some cases submissions --
25 all submissions I believe at this point in the process



1 were forwarded to Walker, Wright, Young and in some
2 cases photocopies of the complete submission were
3 forwarded to me and I assume to other consultants working
4 on this project, depending on the types of issues that
5 were raised, and yet in other cases again, aspects of
6 the submission were either quoted or summarized and so
7 I may not have seen the entire submission, but I may
8 have seen parts of it. With respect to this particular
9 submission, I don't remember seeing it verbatim and I
10 can't say for sure whether I received a summary of these
11 comments.

12 Q. My understanding though was that
13 as well as your social impact work you were also in
14 charge or part of the public participation process; is
15 that correct?

16 A. I was responsible for only certain
17 portions of the public participation process, and this
18 was a portion I was not responsible for.

19 Q. I would ask you to turn, beginning
20 at page 421 where you will see a section called "Social
21 Environment."

22 A. Yes.

23 Q. I would ask you again on page 422,
24 the first paragraph, and you will see there are comments
25 made about the defining of the data collection to the



1 0.8 kilometre area and the concern that thousands of
2 concerned and affected Burlington residents would be
3 eliminated?

4 A. Yes.

5 Q. And again if you see down at the
6 conclusion of that section, the comment that only Site F
7 is extremely sensitive to the decision of the study
8 area. I guess my question is do you agree that your
9 choice of the 0.8 kilometre study area may have excluded
10 many people in the Burlington area who regarded them-
11 selves as adversely affected by the proposed landfill?

12 A. It may have excluded people at
13 Site F who felt they were potentially to experience
14 impacts of the study area, and I suspect in the other
15 communities as well people would have raised the same
16 issue, that the study area didn't include people who
17 they thought should be included or might be affected.
18 I don't think that the issue is particular to Site F and,
19 as well, I would point out again that it was my feeling
20 then and it is now that the open lands south of the site
21 form a barrier.

22 Q. But you did no investigations of
23 the complaints. For example, with regard to the Milton
24 District Hospital we heard that people went out and
25 established that there was no visual impact from that



1 site, and did you do any investigations on any of the
2 concerns raised in the Aldershot area to in fact see
3 if they could in fact see the site or hear the site or
4 have problems with odours?

5 A. Again I did not because they are
6 beyond my area of technical expertise. I incorporated
7 the data from those consultants who have the technical
8 expertise to do that.

9 Q. But do you agree in terms of the
10 social impacts that Site F, being on the fringe of the
11 residential area, in terms of your quantifying everything
12 as linked to your numbers, the numbers of people within
13 your disruption category, that this would have quite an
14 impact on your ranking, had this community been incor-
15 porated?

16 A. If the community south of the 403
17 had been incorporated, yes, it would have affected the
18 outcome or it might have. On the other hand, I did not
19 include it because it did not seem appropriate to do so.
20 If I might, I would also add or point out that Site F
21 still has to my mind the advantage that there is no one
22 living on site and therefore there is no need to dis-
23 locate people if it is selected, and I feel that that is
24 a very important issue, given what the literature
25 indicates on the issue of forced relocation, both for



1 the elderly and the non-elderly as well.

2 Q. I will get to that in a moment.

3 Just one question on your determination of your study
4 area in H-37, your report. On page 2-4 you state that
5 you continued to use the half-mile limit partially
6 because you could not identify precedence in environ-
7 mental studies and you could not find complaints, records
8 of complaints from landfill operators; is that correct?

9 A. That is correct.

10 Q. First of all, would you agree that
11 there is a relationship between complaints and social
12 impact generally and that is what you were attempting
13 to discover?

14 A. Yes.

15 Q. What landfill operators did you
16 make enquiries of?

17 A. I myself did not undertake this
18 work. I was in touch with someone at Walker, Wright,
19 Young who made a number of phone calls and I don't know
20 which ones.

21 Q. Did you make enquiries of the
22 Minister of the Environment as to complaints they had
23 received generally about landfills?

24 A. I don't remember doing so, no.

25 Q. In other words, I take it you did



1 not investigate any complaints that the Ministry of the
2 Environment would have had in relation to the existing site?

3 A. I don't recall doing so.

4 Q. Would this have been a useful
5 course to pursue, in other words, that landfill operators
6 may not keep these kind of records whereas the Ministry
7 would probably keep complaint records on file?

8 A. Yes, I suppose it's true.

9 Q. Would it be relevant to your social
10 impact study if you knew that residents in the area south
11 of the railway tracks and in the Plains Road area had
12 been complaining for a number of years about various
13 aspects of the existing site? Would that have been
14 relevant to your considerations?

15 A. It would have, I think, but it
16 would have been difficult to know how to deal with it in
17 the sense that one would then -- well, one would then
18 extend the study area out at all the sites.

19 Q. Well, wouldn't -- if one did in
20 fact and if one did extend the study area to, for example,
21 say, up to two kilometres, and let's just use that,
22 wouldn't it be true that the number of people at every
23 other study area would not increase as much as the area
24 around Site F, in other words, Site F is the most
25 sensitive study area to that kind of approach?



1 A. Well, I notice that site plan area
2 E is or appears to be about two kilometres from the main
3 central area of the Town of Milton sort of thing.

4 Q. Now, I would just like to ask you
5 some final questions about the area of dislocation. Can
6 we agree that for dislocation the length of residency
7 would be an important factor from a psychological point
8 of view?

9 A. Yes, I believe so.

10 Q. At the Stage 2C at Site D we heard
11 that at that point there were three households with ten
12 people potentially to be dislocated and, in your
13 technical report, you indicated that there were four
14 households with 14 people.

15 A. You mean my update?

16 Q. Your update.

17 A. That is correct.

18 Q. In the green report. We have heard
19 under examination by Mr. Leitch that two of the three
20 have original households and which have subsequently
21 changed hands and in fact one of the four new ones in
22 fact would not be expropriated at all. Now, can we agree
23 that really only one household, the Martins, would be
24 facing dislocation in the sense of having lived in the
25 area and having to face, if you like, that upheaval?



1 A. No, I wouldn't agree in the sense
2 that while it is true that the Martins are the ones that
3 have lived there the longest, and I did say that the
4 longer you lived there the more upsetting and disrupting
5 the upheaval can be, nevertheless I believe that even
6 for people who have lived there relatively short periods
7 of time there is emotional impact and upset.

8 Q. But you would agree certainly that
9 this landfill search has been well publicized within
10 Halton and we have heard there are signs up on the
11 property, and did you do any investigation as to the
12 reasons these people might have moved into the area?

13 A. I did ask all of them whether
14 they were aware of the landfill at the time they purchased,
15 and they all said that they were not.

16 Q. Now, how did you reach your con-
17 clusion that the impact of dislocation would be greater
18 at the technical stage when in fact two of the original
19 three households have moved away and in terms of, if
20 you like, in terms of length of residency on the site,
21 it was much less, and the fact that one of these houses
22 would not now be expropriated? How did that enter into
23 your conclusion?

24 A. I don't recall saying at the
25 technical phase that the impact would be greater -- that



1 the impact of dislocation would be greater.

2 Q. Perhaps we could just turn to
3 your letter, Exhibit H-14, and you have concluded the
4 effects on population are more significant and ...

5 MRS. TANNER: What page is this?

6 MS VIGOD: Appendix E of H-14, E2 and E3.

7 Q. You refer to the dislocation
8 impact and you state on page E2 at the top that the
9 number of people in households has increased and in the
10 sub-factor for dislocation, it increased from low to
11 low-moderate.

12 A. Yes.

13 Q. You have stated that that impact
14 has increased.

15 A. Okay.

16 Q. My question is how did you reach
17 that conclusion knowing in fact that two of those three
18 households had moved off site and in fact a fourth house-
19 hold would not be expropriated?

20 A. I used the techniques that I had
21 used in the Stage 2C report, that is the division of the
22 range into three, low, moderate and high on each of the
23 individual sub-measures of dislocation and then
24 developed an overall measure for dislocation.

25 Q. In other words, you just counted



1 up the numbers and it was one more household and that
2 was your classification?

3 A. The length of residence issue was
4 addressed under another measure.

5 Q. But, Dr. Schiff, from a psycholo-
6 gist's point of view, and we have mentioned forming
7 social networks in a community, but how can you as a
8 psychologist say that the impact was greater when two
9 of the families have moved off site?

10 A. I did it on the basis that the
11 number of people involved was greater.

12 Q. Last week you said you felt uncom-
13 forttable about taking people out of the study area once
14 they were in it, even though the site plan area was
15 much smaller.

16 A. Yes.

17 Q. Don't you feel uncomfortable about
18 doing a social impact study and leaving out an impacted
19 community?

20 A. That assumes, and we obviously
21 disagree on this, the extent to which the community which
22 is south of the 403 is impacted.

23 MS VIGOD: Those are my questions.

24 THE CHAIRMAN: Thank you.

25 DR. KINGHAM: Dr. Schiff, I have just a



1 few questions for clarification on some of the information
2 we have heard over the last few days. I would like to
3 start with what appears to have been a deciding factor
4 in terms of ranking Sites D and F and it was this
5 business of income from activities in the study area and
6 income from activities on the site. I looked at your
7 question 9E from your questionnaire which we now have
8 in Exhibit H-82 which asks the person responding to
9 circle one answer for their income percentage, zero to
10 ten, 11 to 24 and so on up to 90 to 100. If the
11 respondent had a zero income, would he or she respond
12 by circling the zero to ten per cent?

13 THE WITNESS: Yes, that is correct.

14 DR. KINGHAM: Does that mean if you had
15 19 people in a study area and they circled zero to ten
16 you would assign them each the mid-point of five?

17 THE WITNESS: Yes. It is a standard
18 technique to assign people the mid-point of a range.

19 DR. KINGHAM: So, in that case you would
20 then add up 19 times five to get a score of 95 in total?

21 THE WITNESS: Yes.

22 DR. KINGHAM: Nineteen people with zero
23 income would be equal to one person with 100 per cent
24 of his income from the property. Is that the way it
25 works?



1 THE WITNESS: Approximately but, on the
2 other hand, if ten people had -- if 20 people had ten
3 per cent of their income you would also assign it a
4 value of five.

5 DR. KINGHAM: You don't know within the
6 range and you did not have a question for people who
7 said "I don't make anything from living on the land"?

8 THE WITNESS: I didn't.

9 DR. KINGHAM: You don't know whether the
10 responses you got on the zero to ten category were because
11 they were zero or if they were somewhere else in the
12 range?

13 THE WITNESS: That is right.

14 DR. KINGHAM: That could have an effect
15 on your relative ranking. I am thinking about your
16 Tables 3 and 5 in your main report which we have as
17 Exhibit H-37 where on many counts the two sites came
18 out fairly similar but were ranked different because
19 of the difference from income from activities, and that
20 is following page 2-10 which is Table 3 and there is
21 a clear difference in ranking between F and D on the
22 basis of the income question on both of them but we have
23 no finer breakdown, and that is what you are telling us,
24 in terms of whether people were not making any income
25 at all.



1 THE WITNESS: No, but if you look at
2 Table 3 you will see that the two sites in fact were both
3 rated low and if you look at Table 2 you will notice
4 that it has no score at Site F on any of those factors.

5 DR. KINGHAM: Okay. That leads me while
6 we are looking at those two tables to my second question.
7 You have measures for dislocation and measures for dis-
8 ruption and other measures, and in each of those you
9 used the number of people and number of households.

10 THE WITNESS: Yes.

11 DR. KINGHAM: For each of them you come
12 up with a net overall rating?

13 THE WITNESS: Yes.

14 DR. KINGHAM: I wondered if you can
15 explain to us how you feel about the process of double-
16 counting. You give them a score for how many households
17 and thus give them a relatively high score for disloca-
18 tion and then again count up the number of households
19 and give a high score for disruption?

20 THE WITNESS: I don't believe it is
21 double-counting because I believe I was looking at
22 different types of impacts. I think I suggested earlier
23 that in a sense the whole is greater than the sum of its
24 parts, and that the household as an entity will experience
25 disruption of a lifestyle or the disruption associated



1 with dislocation, which is other than the disruption on
2 particular individuals. So, I don't believe that it is
3 double-counting.

4 MR. HODGSON: May I?

5 DR. KINGHAM: I am seeking information.

6 MR. HODGSON: I can do so in reply, but
7 this is important. I had the impression on your
8 question, and correct me if I am wrong, but whether or
9 not the number of households counted on site was included
10 in the number of houses off site but in the study area,
11 and is that the double-counting?

12 DR. KINGHAM: Yes.

13 THE WITNESS: I'm sorry, thank you. That
14 is not the case. A Household was either on the site and
15 included in the measure of dislocation or it was in the
16 study area and was included in the measure of disruption.
17 It would not be counted both, except in those cases
18 where it is specifically indicated.

19 DR. KINGHAM: Talking about ...

20 THE WITNESS: We never counted for both.

21 DR. KINGHAM: Talking about the number of
22 households on site, what is the situation in terms of
23 the number of households on Site D, because we have heard
24 from evidence that one of the properties has burned down
25 and it presumably is no longer occupied and the Martin



1 property for sure is occupied?

2 THE WITNESS: Yes.

3 DR. KINGHAM: There is a house -- the
4 Reids bought the former Ford farm so there are two
5 properties physically existing and occupied at Site D?

6 THE WITNESS: Correct.

7 DR. KINGHAM: The total is two and there
8 is a third because a third one is being built?

9 THE WITNESS: That is correct.

10 DR. KINGHAM: Two on site and so two
11 families dislocated and the people presumably moving into
12 the new house would be dislocated if they moved in?

13 THE WITNESS: Yes.

14 DR. KINGHAM: Just so we have the numbers
15 right. There was a lot of discussion during your
16 evidence about the hospital situation. You talked about
17 the hospital in Milton and how you felt it would be an
18 impairment to recovery to those on the second floor of
19 that hospital seeing Site D?

20 THE WITNESS: Yes.

21 DR. KINGHAM: I don't recall from the
22 visual impact evidence whether it was concluded that it
23 is visible from the second floor and I would have to
24 check that, but I do recall there was some discussion
25 about knolls between Milton and Site D, and do you know



1 whether the site would be visible from that hospital
2 and did you discuss that with the visual impact person?

3 THE WITNESS: I did discuss it with the
4 visual impact consultant and at the end of the technical
5 study phase when they did some additional work, and it
6 is my understanding that it would not be visible, a land-
7 fill at Site D would not be visible from the hospital and
8 my rating was adjusted accordingly.

9 DR. KINGHAM: But in your report I thought
10 that was one of the deciding factors under community
11 facilities, the deciding factor that had you give it a
12 higher rate was this visibility from the hospital at
13 Milton.

14 THE WITNESS: During Stage 2C. It's true
15 I didn't do any work during the technical study phase,
16 but I did do an update at the end of other people's
17 work.

18 DR. KINGHAM: In a related question
19 somebody asked about the Brant Hospital and I assume
20 that the degree of impairment to patients recovering at
21 either hospital you would consider if the impact was
22 similar and if the visual impact was similar the effect
23 on those people would be similar. Can you enlighten us
24 a bit more on the Brant Hospital which I gather is
25 multi-storey, eight or ten storeys high, and it sees a



1 different view of Site F and would the impact there be
2 the same?

3 THE WITNESS: I did not include the
4 impact, the visual impact at the Brant Hospital, and
5 the reason was that I felt it was -- again it was because
6 of this barrier and the feeling that regardless of the
7 view there was this barrier between the hospital and
8 Site F.

9 DR. KINGHAM: The barrier becomes very
10 significant then in your assessment?

11 THE WITNESS: That is correct, it does.

12 DR. KINGHAM: My last question had to do
13 with that in fact. It appears that had you extended your
14 zone at Site F in a fashion similar to that which you
15 did at Site D, you would have captured a larger number of
16 people but then you explained how the psychological
17 barrier was a mitigating factor in your mind ...

18 THE WITNESS: I believe so.

19 DR. KINGHAM: ... for people in Aldershot.
20 You did, however, add 200 people to a greater or lesser
21 degree in the Aldershot area, but you did not add the
22 600 employees at the two industries on the north side
23 of the North Service Road nor Pollard which I believe is
24 the industry to the south which would total 600 plus
25 200 plus 150, being about 950 people. Would you assign



1 a percentage of impact and would you say they are half
2 as affected or one-quarter as affected or just not
3 affected at all in your professional opinion?

4 THE WITNESS: In general I believe that
5 the impact on those people is very minimal. If I had
6 to put a number on it, there may be some very slight
7 impact. It's very difficult. I could pull a number out
8 of the air and the number I would pull would be intuitive
9 and it would be about five to ten per cent.

10 DR. KINGHAM: I guess the question left
11 hanging in our minds is for people in the workplace at
12 the same time of day as the dumpsite is operating, they
13 see that impact in the day and then go to a home where
14 the dumpsite is not operating at the time they are at
15 home.

16 THE WITNESS: Yes.

17 DR. KINGHAM: Given the working hours
18 correspond at both places. Your assessment is that the
19 existence of the dumpsite at Site D, even when residents
20 are there and it's not operating is a more serious
21 factor than for workers when the dumpsite is operating
22 at the time they are at work?

23 THE WITNESS: Yes.

24 DR. KINGHAM: Thank you.

25 MRS. TANNER: I was interested in the



1 information on stigma. In your report on page 2-19 you
2 said that stigma was included in the ratings and back on
3 2-16 you say there are two main factors which contribute
4 to a site's rating on stigma, and both of these factors are
5 in the top paragraph.

6 THE WITNESS: Yes.

7 MRS. TANNER: Both of these factors are
8 visibility factors. Did you get information from the
9 visual expert and then put that in your ratings?

10 THE WITNESS: That is correct.

11 MRS. TANNER: That is not reflected in
12 your report.

13 THE WITNESS: It is recorded on the bottom
14 line of Table 7.

15 MRS. TANNER: The information about how
16 far away they were from entrances to the community is not
17 written up anywhere, is it?

18 THE WITNESS: No, apparently not.

19 MRS. TANNER: Did you consider other
20 factors other than those two visual ones when you were
21 talking about stigma; the length of time of having a
22 dumpsite in the area and therefore general knowledge,
23 did that come into your thinking?

24 THE WITNESS: No, it didn't.

25 MRS. TANNER: It did not?



1 THE WITNESS: With respect to the length
2 of time, I viewed that as primarily an issue of social
3 equity and with respect to other factors I felt that
4 each of the three communities would argue that it was
5 "a stigma" to have a landfill in their community and at
6 a base level it was the same in all three communities
7 and I couldn't differentiate on that basis.

8 MRS. TANNER: Thank you.

9 THE CHAIRMAN: Mr. Hodgson, re-examination?

10 MR. HODGSON: Yes, thank you, Mr. Chairman.

11 RE-EXAMINATION BY MR. HODGSON:

12 Q. Dr. Schiff, first I would like you
13 to turn if you would to Exhibit H-70. You were asked
14 this morning by my friend Ms Vigod about a letter that
15 was received from Messrs. Adam, Simpson and Coppack of
16 the City of Burlington which appears at page 417 of H-70.
17 First I would ask you in H-70 to turn to the third page
18 inside the cover where there is a list of names, the
19 name of the respondent and at C27 we have listed A. Adam,
20 R.H. Simpson, J.D. Coppack; do you see that?

21 A. Yes.

22 Q. Then there is a reference in the
23 left-hand column to respondent key, C27?

24 A. Yes.

25 Q. If I could ask you to turn, please,



1 to about halfway, or a little more than halfway through
2 this report beginning at -- it says page 1 of 1, and
3 this is an amazingly-numbered report, Mr. Chairman, but
4 about two-thirds of the way through the report there is
5 a page at the top which says "Draft Stage 2C Report No. 1
6 Comments from Individual Submissions - Burlington" and
7 page 1 of 1, 1 of 2, et cetera.

8 A. Yes.

9 Q. At the top we have respondents in
10 the right-hand column and we have 2C7 C27 in the top --
11 on the left-hand page, page 1-1. The C27, does that
12 indicate a response to the letter from -- the report
13 from Adam, Simpson and Coppack?

14 A. I believe so.

15 Q. Before you answer any more I would
16 like you to turn over to page 3 of 3.

17 A. Yes.

18 Q. We have some references to C27 and
19 is that a reference to the letter from Adam, Simpson and
20 Coppack?

21 A. Yes.

22 Q. Would you turn to page 5-11 and in
23 the middle of page 5-11 the response to item 23, the
24 social impact of removal of buffers on Site F should
25 have been evaluated and on the right-hand side it says



1 C27?

2 A. Yes.

3 Q. Is that an excerpt of a comment
4 from Adam, Simpson and Coppack?

5 A. Yes, I believe so.

6 Q. Is the response in that response
7 prepared by you?

8 A. Yes, I believe so.

9 Q. Item 24, there is no objective
10 measurement of stress imposed on the population and
11 again a response to C27?

12 A. Yes.

13 Q. And a response which is:

14 "Research on stress indicates that the
15 major sources of stress are events in
16 our individual and family lives (e.g.,
17 death of a spouse or other close family
18 member, divorce or separation, major
19 personal illness or injury, etc.). If
20 measures of individual stress had been
21 taken, it would not have been possible
22 to determine what portion of the stress
23 was attributable to such personal and
24 family events, and what portion was
25 attributable to a landfill."



1 Did you prepare that response?

2 A. Yes, I did.

3 Q. Was it your opinion at the time
4 you wrote that?

5 A. Yes.

6 Q. Is it your opinion now?

7 A. Indeed it is.

8 Q. The next item:

9 "A social analysis serves only to justify
10 a preconceived conclusion."

11 And that is a comment from C27?

12 A. Yes.

13 Q. Messrs. Adam, Simpson and Coppack
14 and the response:

15 "The assessment of a preferred location was
16 carried out on many different factors, of which
17 social impact was only one. Each analysis
18 was carried out independently and it was
19 not known how the sites would be ranked by
20 the other consultants."

21 Did you prepare that response?

22 A. Yes.

23 Q. Was it your opinion at the time
24 you prepared it?

25 A. Yes.



1 Q. Is it your opinion now?

2 A. Absolutely.

3 Q. Did these responses in items 23,
4 24 and 25 assist you in responding to the question that
5 came from Ms Vigod as to whether or not you had seen
6 the letter with the attachment from Messrs. Adam, Simpson
7 and Coppack?

8 A. I am still not certain that I saw
9 the letter, but I certainly saw these comments in this
10 form.

11 Q. You saw the comments on social
12 impact?

13 A. Yes.

14 Q. And you responded to them?

15 A. Yes.

16 Q. Now, could you turn up, please,
17 B4-1 in this same document which is earlier on in the
18 document? You will recall on Thursday Ms Vigod showed
19 you in Exhibit H-72 a letter from the Park Avenue Church
20 making certain comments about this site. Could you
21 review B4-1 and tell us whether you are responsible for
22 anything on that page?

23 A. I believe I prepared this response.

24 Q. Does it assist you in responding
25 to Ms Vigod's question about whether or not you were



1 aware of the comments of the Park Avenue Church at the
2 time the 2C reports were being circulated for public
3 comment?

4 A. Yes, I was aware of that, of their
5 comments and they were in fact incorporated.

6 Q. Could I ask you to turn back in
7 H-70 to page 2-2, and perhaps before you turn to 2-2 I
8 could have you turn to the fourth page of this volume,
9 the third item from the bottom of the list which is
10 Burlington Golf and Country Club Limited and then the
11 respondent key C53?

12 A. Yes.

13 Q. Then if you would turn to page 2-2
14 you will see in the response at the bottom of the page
15 2-2, C53 beside the comment:

16 "Little consideration has been given to
17 the potential effect on existing water-
18 courses in the Aldershot area."

19 And your response is:

20 "The one permanently-flowing tributary
21 of Indian Creek has poor water quality,
22 and aquatic habitat capability is there-
23 fore very low. Water quality would be
24 improved by future surface water manage-
25 ment on Site F."



1 Do you know if you are responsible for that comment?

2 A. I don't believe I am.

3 Q. Does that assist you as to whether
4 or not someone on the study team responded to the
5 concerns raised by the Burlington Golf Club?

6 A. Absolutely, and I believe that I
7 was aware of that comment.

8 Q. While Ms Vigod was cross-examining
9 you she asked you about the water quality in the streams
10 running through Brooklin -- Brooklin, yes -- Burlington,
11 I have the wrong hearing and the wrong country and the
12 wrong everything. She asked you about the water quality
13 of the streams running through Burlington?

14 A. Yes.

15 Q. She suggested to you in her
16 question that that water quality might be somewhat
17 degraded by the possibility that leachate is reaching
18 that water and she asked you if that wasn't a potential
19 disruption factor and whether the people in Burlington
20 might experience it as such. I would ask you to turn
21 to Exhibit H-13 at page 13-B.

22 A. Which exhibit?

23 Q. H-13 which is the evaluation and
24 summary report Stage 2C. Page 13-B is two pages past
25 page 13 and in the lower right-hand corner we have on



1 the right-hand side of 13-B a column for Site F, and
2 this is under the subject "Hydrology/Hydrogeology" and
3 the last set of columns on the page is entitled
4 "Complexities to Engineer Site" and under Site F you
5 find the following comment:

6 "Complex leachate drains required; seepage
7 from abandoned Bayview Landfill Site is
8 to be collected; ..."

9 Would you also turn over to page 16-A in the same report
10 and we find, and again these are comments on hydrology
11 and hydrogeology, and under Site F, the second last
12 comment in the column on the left reads:

13 "The installation of the leachate collec-
14 tion system for Site F will have a
15 beneficial effect on existing surface
16 water quality."

17 First of all, does that assist you as to whether or not
18 someone on the study team addressed the question of the
19 degradation of the streams in Burlington as a result of
20 leachate leaching from the existing Bayview Landfill
21 Site?

22 A. It reminds me of what I already
23 knew which is that indeed these issues were being
24 addressed if not by me, then by someone else.

25 Q. Did you at the time think that this



1 leachate and this problem with the surface water quality
2 in Burlington was "a disruption factor"?

3 A. At the time a disruption factor
4 from Site F, no, certainly not.

5 Q. I would ask you in Exhibit H-72 to
6 turn to page 5-3 and with your finger in page 5-3 would
7 you also turn back ...

8 DR. KINGHAM: H-72?

9 MR. HODGSON: H-70, I apologize; H-70,
10 page 5-3.

11 Q. With your finger in that page turn
12 to the third page in the document where we have a list
13 of respondents to -- these are comments addressed to
14 the study team by persons who had received copies of
15 the draft Stage 2C report and we have one from C&R
16 Pollard, Burlington.

17 A. Yes.

18 Q. C34?

19 A. Yes.

20 Q. Can you assist the Board as to who
21 C&R Pollard are?

22 A. C&R Pollard are the owners of Pollard
23 Windows which is located here (indicating).

24 Q. What happens at Pollard Windows,
25 do you know, what kind of business is it?



1 A. I believe -- no, I am not certain
2 but I believe -- I'm not certain.

3 Q. At page 5-3 it says, or there is a
4 comment at the top:

5 "No calculation of impact on working
6 conditions of nearby employees."

7 Then we have cited four comments or four responses and
8 one is C2 which is Ms Ellen Barr, C34 which is C&R
9 Pollard, Burlington, C54 which is Tridon North America
10 and C55 which is Ms Betty Harse, Office and Professional
11 Employees Union, and are you aware of which company
12 Ms Betty Harse is associated with?

13 A. I believe she is with Tridon.

14 Q. With Tridon, thank you.

15 A. I believe so.

16 Q. The comment is:

17 "No calculation of impact on working
18 conditions of nearby employees."

19 And then there is a very lengthy answer. First of all,
20 could you tell the Board who is responsible for the
21 preparation of this answer?

22 A. I am.

23 Q. Does this answer assist you in
24 responding to the questions which came from Ms Vigod as
25 to whether or not you were aware of comments that came



1 from the persons responsible for the letters coded C2,
2 C34, C54 and C55?

3 A. I was aware of these comments.

4 Q. Before we look at this document can
5 you assist the Board, first with respect to Cumis. What
6 kind of a business is that?

7 A. Cumis is an insurance company.

8 Q. Do you know what kind of work is
9 done at the particular site located here?

10 A. No.

11

12 Q. Did you ever have an interview
13 with Cumis?

14 A. I didn't.

15 Q. Do you know if the building they
16 occupy is centrally air conditioned?

17 A. I don't.

18 Q. Do you know whether the building
19 has any windows that look to the north or to the east?

20 A. No.

21 Q. Now, Tridon. Do you know what is
22 manufactured at the Tridon plant on the North Service
23 Road?

24 A. No, I'm afraid I don't.

25 Q. Do you know if it's a manufacturing



1 facility?

2 A. No, I don't.

3 Q. Do you know whether it is centrally
4 air conditioned?

5 A. No.

6 Q. Turning over to page 5-4, at the
7 end of this lengthy response to the concerns raised by
8 the four "respondents" we have the following paragraph:

9 "The argument has been made that the impact
10 of a landfill on individuals working in
11 the study area should be included under
12 the Disruption sub-factor of Population
13 Impacts, in the same way this has been
14 done for residents living in the study
15 area. We disagreed, noting that while it
16 is true the workers may spend 40 hours
17 working in facilities in the vicinity of
18 a landfill site, they spend the vast
19 majority of that time indoors, where
20 possible impacts of a landfill do not
21 penetrate. As well, we would argue that
22 their lives do not have the potential to
23 be disrupted in the same way as those who
24 live near a site, and may find the enjoy-
25 ment of their property diminished by the



1 proximity to a landfill."

2 Was that your opinion at the time you prepared that?

3 A. Yes.

4 Q. Is that your opinion now?

5 A. Yes.

6 Q. Ms Vigod was interested to know
7 your taking into account the concerns of her clients
8 the Burlington West Ratepayers Group and she took you
9 in Exhibit H-72 to the concerns raised by her clients and
10 I had the impression during the course of Mr. McQuaid's
11 cross-examination that he was concerned whether or not
12 any double-counting had occurred in your Exhibit H-37
13 and I had the impression as well during the course of
14 the cross-examination by Ms. Vigod that you had not done
15 enough double-counting. I want to first of all ask you,
16 would you turn to page 376 of Exhibit H-72? Ms Vigod
17 wanted to know whether or not her clients living near
18 the railway tracks in the north of the Aldershot
19 community could see the site, and whether that was not
20 a social impact as well as a visual impact. Would you
21 review the list for me on page 376 of -- these are
22 the topic headings for comments received from Ms. Vigod's
23 clients back in 1985 and they are hydrogeologic/hydro-
24 logic; two is transportation; three, air quality; four,
25 noise; five, social impact; six, cultural environment and



1 seven, draft summary report. Do you see in that list
2 comments about the visual problems experienced by her
3 clients?

4 A. No, I don't.

5 Q. Can I ask you now to turn to H-37,
6 your summary report, and on page 1-1 and 1-2 we find a
7 list of the seven major evaluation factors under the
8 category of "Social Environment"?

9 A. Yes.

10 Q. You indicated in your evidence in
11 chief and confirmed subsequently that you were responsible
12 for population impact, social equity and community
13 facilities and social equity was something that was either
14 a draw or you were no more equipped and perhaps less
15 equipped to respond to that than the Board would be?

16 A. Yes.

17 Q. In effect you have limited your
18 evidence to impacts on population impact and community
19 facilities?

20 A. Yes.

21 Q. Under these evaluation factors we
22 also find airborne contaminants who was Dr. Koczur,
23 noise who was Mr. Coulter, visual ...

24 A. Yes.

25 Q. Who is visual? That's Mr. Wright,



1 and land use compatibility. Do you know who will give
2 the evidence on land use compatibility?

3 A. Mr. Walker will do that.

4 Q. Is there any overlap in the
5 evidence -- is there any overlap in the concerns that
6 you and Mr. Walker addressed? Is there any overlap
7 between land use compatibility and, for example, population
8 impact?

9 A. Overlap in terms of the assessment,
10 no.

11 Q. Is there overlap in terms of the
12 subject matter?

13 A. Yes.

14 Q. Could you just go over to Exhibit
15 M-103 and, starting -- going to Waterdown Road which is
16 the north-south street to the west of the landfill, and
17 coming down Waterdown Road below Highway 403, and first
18 of all there is an exit off Highway 403 onto Waterdown
19 Road?

20 A. Yes.

21 Q. Then Waterdown Road crosses or
22 goes under or does something with the railway tracks.
23 Can you see that?

24 A. Yes, it crosses.

25 Q. In the southeast quadrant at



1 Waterdown Road and the railway tracks there are some
2 facilities. Can you from the photograph assist the
3 Board as to the nature of those facilities? What I am
4 trying to draw is a distinction between on the one hand
5 residential and on the other hand commercial/industrial
6 and could you indicate coming across the railway track
7 and south of the railway tracks the kinds of uses we
8 find in the area?

9 A. Yes. There are commercial and
10 industrial uses.

11 Q. Would you point to the Board the
12 commercial? That area you are pointing to now in the
13 southeast corner of Waterdown Road and the tracks is
14 commercial/industrial?

15 A. Yes.

16 Q. Would you go across the railway
17 tracks with your finger and indicate for the Board as
18 you go the uses you find along the railway tracks to
19 the south, between Waterdown Road on the one hand and
20 King Road on the other?

21 A. This is commercial/industrial and
22 this appears to be open space, this is commercial ...

23 Q. You are now pointing to the green-
24 houses?

25 A. Yes. This appears to be some



1 residential and then this is industrial, light industrial
2 in this area here.

3 Q. So at about the middle of Site F
4 or directly south of Site F and south of the railway
5 tracks there is a large commercial/industrial development?

6 A. That is correct.

7 Q. And then continue.

8 A. There is some residential, open
9 space and then this is commercial and industrial.

10 Q. At the corner of King Road -- on
11 the four quadrants at the intersection of the CNR tracks
12 and King Road, what uses do we find?

13 A. This is the hydro corridor and
14 this I believe is industrial, this is commercial/
15 industrial and this is commercial and industrial.

16 Q. Can you help the Board as to
17 exactly where is the hydro corridor?

18 A. Well, the hydro corridor is in here
19 and the transformer is in here (indicating). There is a
20 transformer station in this area.

21 Q. Is that a large transmission line
22 and visually ...

23 A. Yes, it's quite large. Great, big
24 pylons.

25 Q. Pointing to the houses in the



1 Aldershot community and to the extent there is housing
2 to the south of the tracks in there, in your view what
3 is the orientation of those homes? Is the orientation
4 towards the south or towards the north?

5 A. The orientation is either towards
6 the south or on some east-west and much of it is east-
7 west orientation.

8 Q. If the people in that area have
9 the time to go for a stroll in the evening, are they more
10 or less likely to go to the north or south?

11 A. Definitely to the south.

12 Q. Why is that?

13 A. Because there is this barrier, the
14 railway tracks, and there is nothing to stroll to up here.
15 If you stroll south you either stroll into the residen-
16 tial area or, as many people enjoy doing, walking along
17 commercial strips.

18 Q. What is the area of King Road to
19 the north of the railway tracks, between the railway
20 tracks and Highway 403?

21 A. This area here is all industrial.

22 Q. Is that an area that one would
23 take an evening stroll through?

24 A. I wouldn't.

25 Q. Now, do you know first of all how



1 long the railway tracks have been where they are?

2 A. No, but I would assume they have
3 been there for a long time.

4 Q. Do you think they have been there
5 longer than the housing that exists just to the south
6 of them?

7 A. Yes.

8 Q. The hydroelectric transmission
9 corridor which cuts across in the area where 403 is
10 located, do you know how long that corridor has been
11 there?

12 A. No, but again I would assume it
13 has been there quite a while, many years.

14 Q. And Highway 403. Do you know how
15 long Highway 403 has cut across this community?

16 A. No, no, I don't.

17 Q. Can you give the Board a range or
18 an indication?

19 A. I believe that Highway 403 -- for
20 sure it is newer than the railway tracks and I would
21 guess it has been there about 15 years or so.

22 Q. Fifteen years. Now, you were
23 asked by Ms Vigod as to whether or not you had investi-
24 gated the historical context of the area around Site F.

25 A. Yes.



1 Q. Her reason for asking you about
2 whether or not you had investigated the historical con-
3 text is that she gave a little evidence to the effect
4 that the people of Aldershot have always viewed their
5 community as extending from the bay up to the escarpment.

6 A. Yes.

7 Q. Now, keeping in mind the railway
8 tracks, and by the way how many railway tracks are there?

9 A. I am not sure, but at least two and
10 possibly more.

11 Q. Just to the north of the area you
12 identified as a commercial/industrial area in the middle
13 of Site F and to the south of the tracks, and in
14 examining that air photo can you indicate whether there
15 is a switching yard there?

16 A. It would appear that there is a
17 switching yard right here (indicating).

18 Q. Given the combination of the railway
19 tracks, the hydroelectric corridor, Highway 403 and what
20 appears from this air photo to be a substantial quantity
21 of abandoned land, have you a view as to whether or not
22 it is important now to consider the historical context
23 of Aldershot or whether the history matters in light of
24 the developments in that area?

25 A. Well, I don't believe that this



1 area is very historic. It is a fairly new area, mostly
2 of a suburban/residential nature. It is not one of
3 those areas which goes back 60 or 80 years or longer.

4 Q. Does an examination of the histori-
5 cal context matter to you as a social impact consultant
6 doing an analysis of the social impacts that might exist
7 at Site F should Site F be constructed as a landfill?

8 A. Not at Site F.

9 Q. My final question to you arises
10 out of expressions of concern from both Mr. McQuaid and
11 Ms Vigod about the expressions of discomfort and
12 anxiety that were communicated directly or indirectly by
13 people living in the area of Site F. I just wanted you
14 to assist the Board. In Stage 2C there were six sites
15 in consideration, three in Oakville, two in Milton and
16 one in Burlington.

17 A. Yes.

18 Q. Did you hold workshops in connec-
19 tion with all six sites?

20 A. Yes, I did.

21 Q. Did you attend public meetings in
22 connection with all six sites?

23 A. Yes.

24 Q. Did you encounter during the course
25 of your workshops and meetings in Oakville a well-organized



1 local group?

2 A. Yes, I did.

3 Q. Do you remember the name of the
4 group?

5 A. Yes, the name of the group was
6 CROW, I believe it stood for Concerned Residents Over
7 Waste.

8 Q. Can you assist the Board with some
9 indication as to the size of that community group?

10 A. I believe that that group included
11 several hundred people.

12 Q. In the course of reviewing all of
13 the written comments you received which are now in
14 evidence in the proceedings, as are your responses, and
15 in the course of attending all of the workshops in
16 connection with all of the six sites and in connection
17 with attending public meetings on all of the six sites,
18 could you assist the Board as to whether through that
19 experience you gained the impression that someone in
20 the Region of Halton wanted this landfill located
21 somewhere in the Region of Halton?

22 A. That the landfill should be located
23 somewhere in the Region of Halton, certainly.

24 Q. Did anyone want it in their
25 community?



1 A. No, absolutely not.

2 Q. Were there any exceptions to that
3 and did you ever meet anyone from any community who
4 felt the landfill should be in their community as
5 opposed to someone else's community?

6 A. I wish that I had, but no.

7 Q. You told us you had never previous-
8 ly done this kind of study.

9 A. Yes.

10 Q. Before you did the study had you
11 read this kind of study done by somebody else?

12 A. I had read social impact studies
13 but not on a landfill.

14 Q. Not on landfills. Since you did
15 this study have you read social impact studies done in
16 the context of environmental assessments for landfills?

17 A. Yes, I have.

18 Q. Did you during the course of pre-
19 paring your social impact assessment, meeting in
20 workshops and in public meetings and responding to public
21 criticisms; was this a learning experience for you?

22 A. Every job I work on is a learning
23 experience, yes.

24 Q. Were you in any way surprised by
25 the kind of responses that were made to the kinds of



1 concerns that you addressed?

2 A. In general, no. I expected that
3 people would not want a landfill in any of their
4 communities and that while the reasons would vary
5 depending upon the nature of the community, there were
6 no profound surprises, no.

7 MR. HODGSON: Thank you. Those are all
8 my questions, Mr. Chairman.

9 THE CHAIRMAN: Thank you, Mr. Hodgson,
10 and thank you, Dr. Schiff. We will adjourn for about
11 15 minutes.

12 MR. HODGSON: Thank you.

13 --- Recess

14 THE CHAIRMAN: Mr. Lederer?

15 MR. LEDERER: Thank you, Mr. Chairman.

16 Before we introduce the next two witnesses to you, I was
17 asked on Thursday what had happened to my promise to
18 provide sheets reviewing the process for you and I
19 indicated I was given the drafts on Thursday and over
20 the weekend I reviewed them with a member of Mr. Walker's
21 staff and they are being finalized today and I hope to
22 have them for you tomorrow morning.

23 THE CHAIRMAN: Thank you very much.

24 MR. LEDERER: Mr. Smith has put in front
25 of you the rather large number of reports this evidence



1 will ultimately deal with. I should indicate to you
2 that for those of us who have been working on this for
3 a long time this is historic evidence because it takes
4 us out of 8A and takes us into 8B. It seems like a
5 small thing, but I can assure you that it isn't. The
6 two witnesses we present to you today to present our
7 hydrogeologic evidence are Mr. Al Sobanski and Mr. Jim
8 Beechinor and if they could be sworn to give evidence
9 then we can proceed.

10 ALFRED A. SOBANSKI, (sworn):

11 JAMES BEECHINOR, (sworn):

12 MR. LEDERER: I should indicate to you
13 or confirm something which I believe you were advised
14 of earlier, and that is during the course of preparing
15 this evidence it became evident to us that it was
16 really too much for one individual to handle and at
17 that point we determined we would introduce Mr. Beechinor
18 into the witness list. It will be evident that
19 Mr. Beechinor has been involved in this work virtually
20 since its outset. However, because of the rather late
21 decision to include him, no curriculum vitae appears in
22 the book, Exhibit H-7, I believe, and so I have just given
23 you a copy of that now.

24 THE CHAIRMAN: Shall we mark the
25 curriculum vitae as H-7A?



1 MR. LEDERER: That would be appropriate.

2 --- EXHIBIT NO. H-7A: Curriculum vitae of James
3 Beechinor

4 EXAMINATION IN CHIEF BY MR. LEDERER:

5 Q. If I could review these and if we
6 could start with you, Mr. Sobanski, and I will be brief
7 following your request. First of all, have you a copy
8 of your curriculum vitae in front of you?

9 MR. SOBANSKI: A. Yes, I do.

10 Q. You will find this curriculum
11 vitae under tab 14 of Exhibit H-7. I understand you
12 obtained a Degree in Geological Engineering from the
13 University of Toronto, a Bachelor of Science Degree in
14 1960?

15 A. That is correct.

16 Q. I understand that at present you
17 are a professional engineer with the Association of
18 Professional Engineers of Ontario?

19 A. Yes.

20 Q. You are a designated consulting
21 engineer with the Association of Professional Engineers
22 of Ontario?

23 A. I am.

24 Q. What is a designated consulting
25 engineer?



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A. When you work in the consulting engineering field, you can have yourself designated as a consulting engineer as opposed to a professional engineer and, if one likes, another level of professional engineering.

Q. You have that designation?

A. I do.

Q. You are also a member of the National Waterwell Association?

A. Yes.

Q. A member of the International Association of Hydrogeologists?

A. Yes.

Q. The remainder of the curriculum vitae lists in summary form your professional experience?

A. It does.

Q. Could I summarize it by saying you have now spent 20 years as a professional hydrogeologist?

A. That is correct.

Q. If I could turn to Mr. Beechinor; Mr. Beechinor, as I understand it you have a Masters of Science, Management Science of the Faculty of Engineering at the University of Waterloo?

MR. BEECHINOR: A. Yes, convocation is



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Sobanski, Beechinor,
ex (Lederer)

1 in the fall.

2 Q. I understand you have earned the
3 degree but you are yet to be presented with it?

4 A. Yes.

5 Q. Convocation is in the fall of this year?

6 A. Yes, it is.

7 Q. You also have a Bachelor of Science
8 and Honours Earth Science from the University of Waterloo
9 which you obtained in 1977?

10 A. That is correct.

11 Q. You are a fellow of the Geological
12 Association of Canada?

13 A. I am.

14 Q. A member of the International
15 Association of Hydrogeologists?

16 A. I am.

17 Q. A member of the Canadian Water
18 Resources Association?

19 A. I am.

20 Q. We have listed here your profes-
21 sional experience?

22 A. I have.

23 Q. What area do you work in?

24 A. I worked in the section of
25 environmental hydrogeology for the last four or five



1 years and have worked under the direct supervision of
2 Mr. Sobanski in connection with the study and assessment
3 of sanitary landfill sites.

4 MR. LEDERER: I would like to have both
5 of these gentlemen accepted as experts in the field of
6 hydrogeology in order that they may give opinion
7 evidence.

8 THE CHAIRMAN: They will be so considered.

9 MR. LEDERER: Thank you.

10 Q. In case it isn't clear, could you
11 please indicate to the Board the firm or the name of
12 the firm with which you are associated?

13 MR. SOBANSKI: A. The firm is called
14 Trow Hydrology Consultants.

15 Q. Could you review the role and
16 responsibilities your firm undertook as part of this
17 project with respect to investigations concerning
18 hydrogeology?

19 A. Yes. We were engaged as a sub-
20 contractor to Walker, Wright, Young for the Phase 1 and
21 Phase 2 works of the project. Phase 2 is broken into
22 Stages 2A, 2B and 2C. Following that work we acted as
23 consultant to the Regional Municipality of Halton for
24 the technical study component of the Environmental
25 Assessment which are the blue reports, blue-bound reports.



1 All of the work that has been undertaken, including the
2 planning of the investigative programs, the interpretation
3 and preparation of reports, the conceptualization of
4 leachate control systems was either done by me or has
5 been done under my supervision.

6 Q. Mr. Sobanski, if I could refer you
7 to what has become known as H-9, and this is the Stage 1
8 waste needs and systems analysis, consolidation report.
9 Mr. Sobanski, did your firm participate in this level
10 of study with respect to the area of hydrogeology?

11 A. Yes, we did.

12 Q. Would you review with the Board in
13 a summary fashion the areas that you undertook to
14 investigate or inform the other members of the study team
15 about?

16 A. Yes, Mr. Chairman. We provided the
17 study team with four items and the ¹first was a general
18 overview of the state of the art of landfilling technology.
19 ²The second was an overview of general siting requirements
20 in terms of hydrogeologic-type factors. ³The third was
21 we provided the team with rough cost estimates whereby
22 they could start costing some of the components of a
23 landfill and, ⁴finally, we gave them a preliminary review
24 of engineering of engineering and leachate control
25 requirements which would be required.



1 Q. Can you now describe for the Board,
2 please, the information you provided with respect to the
3 state of the art of landfilling as you found it at that
4 time? I might just indicate that the answer to this
5 question is generally on pages 51 to 53 of the report.

6 A. We described to the team a broad
7 definition of sanitary landfill, that it is a controlled
8 dumping of wastes, both solid and liquid, in a favourable
9 environment where the wastes are immediately covered
10 with soil to prevent blowing debris, odours and vectors,
11 vectors being defined as, as I'm sure you know now, flies and rats
12 and the like. We indicated to them that sanitary
13 engineering technology in North America has undergone
14 significant changes in the past few years and as a result
15 of two causes and one is as a result of public concern
16 for the environment and the other is that we are dealing
17 with larger, more complex operations. Until recently
18 the objective has been to locate sanitary landfill sites
19 in favourable hydrogeologic environments. We do this
20 with the expectation that the environment will attenuate
21 the contaminants and so prevent environmental pollution,
22 but there is now a decreasing tendency to rely on the
23 [natural environment and an increasing tendency on
24 [engineering sites and providing containment for leachate.

25 We also indicated to the team that there



1 may be some problems with existing sites, but leachate
2 and gas control need not be a problem in new operations
3 as we are learning more about landfills all the time.
4 We found that despite efforts to move away from land-
5 filling, there have been concerted efforts on the part
6 of government and the private sector to try to change
7 this and the public is certainly concerned, but still
8 over 95 per cent or above 95 per cent of the waste in
9 Ontario is landfilled. Most authorities responsible for
10 landfill disposal, and the people who work in the business
11 like myself, waste management engineers and hydrogeolo-
12 gists, recognize the need for some landfill component
13 in an integrated waste management system.

14 A commitment to landfilling still leaves
15 us, leaves the door open to other technologies being
16 developed because the landfill component can serve as a
17 backup to the other systems and since it is always needed
18 by going the landfill route, it doesn't hurt us if new
19 things come onstream, the landfill is still required
20 and so we have to proceed with landfilling in any event.

21 Q. Mr. Sobanski, can you indicate to
22 the Board, sir, at this early stage, did your firm give
23 the study team any advice as to the hydrogeologic
24 environment or environments you might expect to find in
25 Halton and that might be suitable for landfilling?



1 A. Yes. We felt from our general
2 knowledge of the area that there were two environments
3 in Halton we could consider for landfilling. One would
4 be the glacial tills of the area and the other would be
5 the pits and quarries which occur within Halton. The
6 quarries can be divided basically into two types and
7 these are the dolostone quarries above the Niagara
8 Escarpment and the second is the shale pits just below
9 the escarpment.

10 Q. Can you indicate to the Board what
11 was the purpose, or what the purpose was in including
12 this material in the Stage 1 phase of the process?

13 A. Yes, it was twofold. We wanted to
14 introduce the study team to general hydrogeologic
15 principles and we wanted our work in Stage I to act as
16 a starting point for more substantive work.

17 Q. At what stage of the study did your
18 firm begin its substantive work in locating a new site
19 for landfilling in Halton?

20 A. This was undertaken in the Phase 2,
21 Stage 2A study which followed.

22 Q. With that, if I could refer you to
23 Exhibit H-10, which is in fact the Phase 2, Stage 2A study.
24 Mr. Sobanski, could you please refer to Section 3 of
25 that study which begins on page 29? Are you familiar



1 with this section of the report, Mr. Sobanski?

2 A. I am.

3 Q. Who was responsible for its
4 preparation?

5 A. It was prepared by representatives
6 of Trow Hydrology Consultants Limited under my supervi-
7 sion.

8 Q. Could you indicate to the Board
9 what the purpose was of this level of study, what were
10 you attempting to do?

11 A. The purpose of the first phase was
12 to undertake a general overview of the entire Region
13 from the hydrogeologic perspective, and it was to assist
14 in a first level screening out of areas that we felt
15 were likely to be unsuitable for landfilling.

16 Q. In conducting your work at this
17 level of detail, what methodology did you adopt?

18 A. The methodology, Mr. Chairman, is
19 on pages 29 and 30 and I can precis this for you.
20 Firstly, we selected evaluation factors that reflect
21 current concepts in siting landfill sites in environ-
22 mentally suitable areas, and this was done specifically
23 as it refers to the Region of Halton. Secondly, we
24 collected data and reviewed the site selection process
25 that had been used by Garner Lee and Dillon in 1976.



1 We found that Gartner Lee's mapping was helpful in
2 helping us define the overburden thickness, aquifer
3 distributions and buried valley aquifer complex locations.
4 We then updated this information with Ministry of the
5 Environment waterwell records that were recorded sub-
6 sequent to 1976 and we looked at published and unpublished
7 reports and we have prepared many reports for the Region
8 of Halton and they are contained in our files.

9 We next analyzed the data in light of
10 the evaluation factors we had selected and, from these
11 analyses, we made judgments as to the potential level of
12 impact that a sanitary landfill could have on the natural
13 environment and, in that way, it helped us to develop a
14 ranking system for the environmental impact. Finally,
15 we mapped the individual factorson a series of over-
16 lay maps.

17 Q. Now, Mr. Sobanski, I want to
18 return you for a moment to your reference to the Gartner
19 Lee study. Can you indicate to the Board the context
20 in which Gartner Lee and M.M. Dillon undertook their
21 work?

22 A. Gartner Lee and Dillon had done
23 an extensive study in the Region of Halton and had
24 established through their studies that a location called
25 Site F, which is Britannia Road and the Bell School line



1 area, was the favourable location from their analysis and
2 as our starting point we felt that we would use their
3 data base to assist us in reassessing the area. We
4 felt the work they had done was valuable and should be
5 used as opposed to going back to square one.

6 Q. Now, can you describe for the
7 Board each of the evaluation factors that you used at
8 this level of study and can you indicate for each of
9 them, please, the rating system you applied and, perhaps,
10 review with them the results as mapped on the overlay
11 maps to which you have referred?

12 A. Yes. Mr. Chairman, in the report
13 I would refer you to pages 31 through 49 where we
14 summarize our thinking on the factors. ① The first factor
15 that we considered was attenuation capability of the
16 earth materials that we were dealing with. We were
17 trying to determine the degree of protection that various
18 soils would offer to the leachate to protect the
19 environment from leachate migration and the protection
20 that they would afford groundwater and surface water
21 resources. The significance of this factor is that the
22 type of soil material that these leachates pass through
23 will affect the extent to which groundwater or surface
24 water may be contaminated and generally the finer-
25 grained soils are better attenuators than the coarser-



1 grained soils. In developing a rating system we
2 employed two concepts, ⁽¹⁾ first, that the finer-grained
3 soils are better attenuators, and therefore for the
4 Region of Halton the glacial till plains in general
5 offered good attenuating capability because they tend to
6 be fine grained containing silts and clays. So, we
7 rated the impact for that factor to be low in terms of
8 its affect on the groundwater and surface water. The
9 sand and gravel areas on the other hand possess low to
10 moderate attenuating capabilities and consequently we
11 rated those areas as having a high to moderate potential
12 impact on the environment. When I talk "environment"
13 I am talking my area of groundwater and surface water.

14 ⁽²⁾ We found also or secondly that it is
15 desirable to locate sites in areas that have a predict-
16 able geology at this screening level and so we considered
17 the geologic complexes such as moraines would have a
18 more complicated geology and we decided these to have
19 a moderate attenuation capability and some unknown
20 factor in their attenuating capability.

21 So, on page 32 we can see a summary of
22 the soil attenuation capability factors. On the left-
23 hand side we have attenuation capability and on the
24 right-hand side our judgment as to the impacts and, as I
25 have described, the glacial outwash, the sand and



1 gravel deposits have a moderate to high impact rating,
2 the Plasticine complexes such as the moraines have a
3 moderate impact rating and, finally, the till and clay
4 plain areas where the soils are fine grained have a low
5 impact rating. We plotted this information which was
6 obtained from various sources on to the 1:50,000 map
7 which we have in front of us.

8 Q. If I can just interrupt to say
9 that this group of maps is found as Appendix 3 to the
10 report. It may be you may wish to exhibit them because
11 they are bigger, but I'm in your hands as to what you
12 think would be the appropriate thing to do.

13 A. I could point out that the quality
14 of these large-scale maps is considerably better than in
15 the reports where they were reduced to page size.

16 THE CHAIRMAN: Perhaps we had better file
17 them as exhibits. Now, can we relate them to the
18 exhibit? This will be Exhibit H-10 -- are they Map A
19 and Map B?

20 MR. LEDERER: Unfortunately they are not.

21 THE CHAIRMAN: Is there only one set of
22 maps?

23 MR. LEDERER: In this report I believe
24 that is so.

25 THE CHAIRMAN: Perhaps we could still use



1 that system, H-10A for the first map.

2 MR. LEDERER: Please. The difficulty is
3 that you may want to include -- perhaps I should say
4 that everyone should be careful because we in fact will
5 not review these maps in the same order they appear
6 in the appendix.

7 THE CHAIRMAN: We might be able to put
8 them in as we did with some of the other reports.

9 DR. KINGHAM: We might letter them H-10
10 sequentially and whichever one this is ...

11 MR. LEDERER: Yes, and if my friends
12 could follow with me and if I could give you the order
13 I have them in.

14 MRS. TANNER: Let's do them sequentially
15 here because we know what order they are in here.

16 MR. LEDERER: That is exactly what I
17 propose to do. Overburden thickness will be H-10A.
18 Agricultural capability will be H-10B. Drainage will
19 be H-10D -- Niagara Escarpment will be H-10C. Drainage
20 will be H-10D. Type and distribution of aquifers,
21 overburden aquifers, is H-10E. Infiltration is H-10F.
22 Buried valley, aquifer complexes will be H-10G. Type
23 and distribution of aquifers, bedrock aquifers, is H-10H
24 and then soil attenuation capability is H-10I.

25 --- EXHIBIT NO. H-10A: Map re overburden thickness
from H-10



- 1 --- EXHIBIT NO. H-10B: Map re agricultural capability
2 from H-10
3 --- EXHIBIT NO. H-10C: Map re Niagara Escarpment from
4 H-10
5 --- EXHIBIT NO. H-10D: Map re drainage from H-10
6 --- EXHIBIT NO. H-10E: Map re distribution of overburden
7 aquifers from H-10
8 --- EXHIBIT NO. H-10F: Map re infiltration from H-10
9 --- EXHIBIT NO. H-10G: Map re buried valley, aquifer
10 complexes from H-10
11 --- EXHIBIT NO. H-10H: Map re distribution of bedrock
12 aquifers from H-10
13 --- EXHIBIT NO. H-10I: Map re soil attenuation
14 capability from H-10

12 MR. LEDERER: Q. This will be H-10I.

13 Now, can you review with the Board by reference to what
14 is now H-10I, your Stage 2A conclusions with respect to
15 the factor soil attenuation capability?

16 MR. SOBANSKI: A. On the side of the
17 figure we have a legend and the legend says "Potential
18 environmental impact from sanitary landfilling," and
19 this is broken into three categories, a moderate to high
20 impact where we have considered the following kinds of
21 deposit, sand and gravel deposits and coarse-grained
22 glacial lacustrine deposits, glacial lacustrine which is
23 a fancy term for glacial lake deposits and you will hear
24 the word "lacustrine," alluvial sands, gravels, beach
25 gravels, outwash sands and gravels, kames and eskers and



1 bedrock outcrops or outcrop areas are put in as having
2 a moderate to high impact on groundwater.

3 Now, we will first follow that through
4 and the high impact areas are generally along the
5 Niagara Escarpment area where we have rock that lies
6 relatively near the surface and the area along the lake-
7 shore where we have beach sands of Lake Iroquois deposited,
8 and again a potentially high impact area, and those
9 really comprise the two major ones and then we have some
10 outliers of various geologic material such as sands and
11 gravels.

12 Moderate impact areas, the Plasticine
13 geological complexes which are stratified clay, sands
14 and silts were identified and also moraine crests and
15 they are shown in the cross-hatching as running at the
16 north end of Oakville and at various other places in
17 the municipality.

18 We can see from this also the low impact
19 areas and they are the areas which are clear and they
20 comprise an area in the northwest of the study area
21 which is an area of the Wentworth till, which is a sandy
22 silt till, and they comprise also the area generally
23 below the escarpment where the surfacial deposits are
24 basically the Halton Till, which in this case is a clayey
25 silt till to a silty clayey till. So it is quite a broad area



1 below the escarpment identified as having suitable
2 attenuation properties and another area in the northwest
3 part of the Town of Milton being identified as having
4 good soil attenuation capability.

5 The sources of the information we used
6 to prepare this map are summarized on pages 33 and 34
7 of the report 2A.

8 The next factor we considered was over-
9 burden thickness.

10 (2) Q. While the map is being located,
11 this would be H-10A, overburden thickness?

12 A. The overburden thickness relates
13 to the distance that landfill contaminants will migrate
14 in the subsurface, and therefore to how much attenuation
15 the soils in the area will afford. The thicker
16 sequences of overburden provide better environmental
17 integrity to surface water and groundwater than areas
18 where we have thin sequences of overburden. I should --
19 if we go into the rating system, we chose factors that
20 we felt were appropriate to screen the Region of Halton
21 and the overburden thickness sequence we have selected
22 for rating purposes reflects conditions in Halton as we
23 saw them as we started this study. In the table on
24 page 34 we have a small table that rates overburden
25 thickness against its potential impact on groundwater



1 and surface water. First we selected zero to five metres
2 as having a high impact, five to 15 metres as having a
3 moderate impact and 15 metres as having a low impact.
4 I would like to point out here that 15 metres is not an
5 absolute standard. It is an assumption that we have
6 made and it is based on our knowledge of the overburden
7 thickness in Halton. It is a general screening thick-
8 ness and it is not a site-specific factor. You can
9 landfill safely at thinner thicknesses of overburden and
10 some people do. However, this is appropriate for
11 Halton. It allows us to eliminate some areas from
12 consideration. As an example of thinner overburden,
13 in Peel where they have thinner overburden, their screen-
14 ing factor for acceptability is seven metres.

15 This is the map of overburden prepared
16 basically from Ministry of the Environment waterwell
17 records, and again we have prepared an overlay map, and
18 it was a transparency originally, all of these maps were
19 transparencies that we could look through and see these
20 various features when we ultimately come to look at an
21 overlay system. We find that the overburden, or where
22 we have overburden thickness exceeding 15 metres in
23 thickness, they are again found generally east of the
24 Niagara Escarpment in the Halton Till plain area. There
25 is another area in the northwest corner again where the



1 Wentworth Till achieves thicknesses of over 15 metres.
2 Our sources of information, Mr. Chairman, are shown on
3 page 35 and you can see there are quite a few reports
4 from various authors we used to prepare this map.

5 The next factor we considered was
6 agricultural capability.

7 MR. LEDERER: Mr. Chairman, this will be
8 Exhibit H-10B, the agricultural capability.

9 Q. Did you use this factor as a
10 hydrogeologic factor?

11 MR. SOBANSKI: A. Obviously not. This
12 is a secondary factor that we prepared at this time and
13 it doesn't relate to public health and safety. We just
14 undertook to prepare it for the team. We had not
15 considered it as a hydrogeologic factor in our screening
16 process at all. The purpose of mapping this factor was
17 to identify low agricultural capability lands and to
18 assess the feasibility of using these lands for waste
19 disposal as opposed to having to use good lands, good
20 agricultural lands for waste disposal.

2A 21 The soil capability for agriculture map
22 groups soils of the Region into their several classes
23 based on their capability to produce good field crops,
24 and the higher the soil capability the better productive
25 capability of the soil and so the impact in this case to



1 to us then refers to a reversal, where high impact on
2 agriculture and moderate impact on agriculture or
3 moderate to low impact on agriculture are considered,
4 and high impacts belong to the best lands and the low
5 impacts belong to the poorest lands. So, if we look
6 then at the rating system on page 36, we have the
7 agricultural capability of Classes 1, 2, 3 and 4 and
8 the impact we rated high, the high impact on agriculture
9 if we chose to put landfill on one of these sites. The
10 second class was 5, 6 and 7 and we lumped those into
11 having a low to moderate impact on agriculture.

12 Q. Mr. Sobanski, just before you go
13 to the map and so it is clear, and the Chairman may wish
14 to refer to the source of information, but can you
15 indicate which inventory system was being used for this
16 generalized classification?

17 A. The Canada Land Inventory maps
18 and they are mapped on a broad scale of 1:50,000 so one
19 takes what one gets when one maps on 1:50,000 and they
20 are not precise and ultimately you have to get down to
21 having a qualified person look in the field of what
22 the capability is of those lands. But, on a broad level
23 of mapping, as we do in geology, this gives us a general
24 indication of what the soil capability for the Region is.
25 We found in general that the areas we had seen thus far



1 as giving us a good potential for landfilling and which
2 so far are the soil thickness we have looked at and the
3 attenuation capability, and we find that from the
4 agricultural point of view they ranked as being poor
5 because the better soils are usually the soils that are
6 best for landfilling. So, east of the escarpment we
7 find that we have a high impact on agriculture rating .

8 Above the escarpment the impact is lower
9 and we have some sandier soils and we also have quite
10 a bit of bedrock outcrop area, which is not too suitable
11 for agriculture, so generally above the escarpment we
12 find a moderate to low impact on agriculture.

13 The sources we used for this are shown
14 on page 37, and this was a first look at agriculture
15 in the area.

16 The next factor we considered was the
17 Niagara Escarpment and this map in fact is going to
18 combine the next two factors we will discuss which is
19 the Niagara Escarpment face and slope limitations.

20 MR. LEDERER: This would be H-10C.

21 THE CHAIRMAN: Thank you.

22 MR. SOBANSKI: I would ask you to keep in
23 mind that this is in fact two factors being considered
24 on one because they are both related to slope . This
25 factor of Niagara Escarpment face is not a hydrogeologic



1 factor either.. It is a factor that is meant to preserve
2 the aesthetic characteristics of this prominent rock face
3 that occurs in this Region. We in rating this felt
4 that these slopes are of course unique to our southern
5 Ontario landscape. There is only one Niagara
6 Escarpment and it is used for a variety of recreational
7 purposes and we simply say that it is -- that for the
8 Niagara Escarpment we did not really rate it, we said
9 we would exclude these areas and would not put waste
10 against the Niagara Escarpment. So, in fact it is not
11 a rating system, in this case it is exclusion, we will
12 not fill against the escarpment face. Again these
13 features were mapped on the 1:50,000 and we see prominent
14 rock faces that occur within the City of Burlington and
15 within the Towns of Milton and Halton Hills where we
16 have these vertical rock faces which we are all familiar
17 with.

18 The second factor we considered was slope
19 and associated -- in some areas often high slopes and these
20 again aren't strictly a hydrogeologic factor, they are
21 a factor that relates to the operation of landfills and
22 we felt it was more difficult to operate equipment and
23 more costly to operate equipment on steep slopes, so we
24 put in a factor to consider operations of landfills at
25 this stage. Now, as you can see not a great deal of land



1 was eliminated by this procedure. For slopes, we rated
2 slopes greater than 20 per cent, and that is one in five,
3 as having a high impact on operations and a low to
4 moderate impact would be slopes of less than 20 per cent.
5 So, again in general we find that it offers some restric-
6 tions to operations and they generally occur along
7 the trend of the Niagara Escarpment. Our sources of
8 information are shown on page 39 of the report.

9 The next factor we considered,
10 Mr. Chairman, was drainage.

11 MR. LEDERER: This map will be H-10D.

12 THE CHAIRMAN: Thank you.

13 MR. SOBANSKI: This was a very general
14 factor to allow us to avoid serious problems with
15 surface water. From the overview analysis we have
16 considered that perennial streams are the factor that
17 we are going to assess, and so there is always a
18 potential for contaminants to reach streams, either from
19 overland flow or through the sub-surface, and they could
20 contaminate surface water. Thus, it is desirable to
21 locate landfills that we may have at a suitable setback
22 distance from a watercourse. In deciding a suitable
23 setback distance, we considered a number of factors and
24 one was that we would want to have room for monitoring
25 and, two, we would like to have room between the landfill



1 and the stream in which we can install corrective
2 measures if they are required and, thirdly, we want some
3 distance between the site and the stream so that if
4 anything were to escape through the sub-surface there
5 would be some attenuation. We consulted with the
6 Ministry of the Environment on this matter and as a
7 result we set a setback distance of 100 metres. Again
8 this became an exclusion-type of factor. In the table
9 on page 41 we see that if the setback distance is less
10 than 100 metres we rated it as being unacceptable and
11 if it is more than 100 metres we have a low to moderate
12 potential impact.

13 Now, the overlay that we have is based
14 on the major watercourses that are identified on the
15 Regional Municipality of Halton base map, and it gives us
16 this worm tube effect that runs over the entire Region,
17 except for in a few areas, a fairly large area up in
18 the northwest corner of the municipality.

19 The next factor we considered was infil-
20 tration areas.

21 MR. LEDERER: Mr. Chairman, this will be
22 Exhibit H-10F.

23 MR. SOBANSKI: Infiltration is the esti-
24 mate of how much of the rainfall that falls on the land
25 will actually enter the groundwater flow systems.



1 MR. LEDERER: I won't even ask whose
2 child did the colouring on this.

3 MS CRONK: That's Picasso.

4 MR. LEDERER: Ms Cronk has put in her
5 bid. She think's it's Picasso.

6 MR. SOBANSKI: Golly!

7 MR. LEDERER: Q. Perhaps you can clarify,
8 because I take it that has been added.

9 MR. SOBANSKI: A. It has. The original
10 of this I believe was prepared in pencil and we were
11 unable to get a real clear reproduction of it, and this
12 morning in looking over the exhibits just before we
13 started we thought that this one was not too clear, and
14 I'm not too sure it is now either, but at least it is
15 artistic. As I mentioned, this is an estimate of how
16 much groundwater or how much precipitation will enter
17 into the groundwater flow systems from the surface and
18 in areas of high infiltration, high groundwater recharge
19 areas, which is another way to put it, we can expect
20 more pollutants to be leached out of the solid waste,
21 or at least faster, and this could create greater ground-
22 water and surface water impacts locally. The interpre-
23 tated infiltration categories are based on experience
24 and a literature review of water budgets for the area
25 and the general soil and geologic conditions in the



1 Region. The high rates of infiltration will occur in
2 the sand and gravel areas, the moderate rates in the
3 sandy tills and dolomite rock areas, and the low rates
4 we believe in the silt till and shale outcrop areas
5 where the permeability of the soils is lower.

6 So, again in terms of high impact we have
7 now -- and I should go back to my table here, but the
8 rating system is on page 42 and there we have a table
9 of infiltration versus environmental impact, and infiltra-
10 tion rates greater than 25 centimetres per year, which
11 is about ten inches, would have a high impact.
12 Infiltration rates in the 15 to 25 centimetre per year
13 range would have a moderate impact and, finally, infiltra-
14 tion rates of less than 15 centimetres per year are
15 judged to have a low impact, and again we are talking
16 comparative judgment values. High impact areas occur
17 again in our sand and gravel areas, in our sand areas
18 along the lakeshore and in other outlying areas where
19 we have sand deposits deposited between rock outcroppings
20 of the Niagara Escarpment. The moderate impact
21 infiltration areas are generally associated with the
22 dolostones, the dolomites above the Niagara Escarpment,
23 and also with the sandy and siltier tills which occur
24 in this area. Our low impact areas are again east of
25 the Niagara Escarpment in the Halton Till areas where



1 we have clayier sediments. The sources of information
2 that we used for this are on pages 43 and 44 of the
3 report.

4 The next factor we considered were the
5 buried valley, aquifer complexes.

6 MR. LEDERER: This will be H-10G.

7 MR. SOBANSKI: These buried valley, aquifer
8 complexes are known to the hydrogeologic community,
9 those of us who work in this general area, and they
10 occur in the Region of Halton and they also occur in
11 the Region of Peel. These valleys can take the form of
12 steep-walled gorges incised into the rock by glacial
13 meltwaters or, in some cases, they are more shallow
14 depressions within the bedrock, but frequently they
15 contain sand and gravel deposits; in other words, after
16 erosion and glacial withdrawal, sands and gravels were
17 deposited and washed into these low-lying areas and they
18 formed some rather significant aquifers. These are
19 aquifers which can yield 1,000 gallons a minute to wells
20 in places like the Georgetown area and in Halton -- and
21 in Peel the same sort of yields, up to 1,000 gallons per
22 minute, and Milton has the aquifer running under the
23 Town of Milton. So, these reveal for the purposes of
24 this study, we decided to avoid these areas and would
25 not put a landfill at this stage and would not consider



1 putting it over one of these buried valley, aquifer
2 complexes.

3 DR. KINGHAM: I would like to interrupt
4 the flow for just a minute, but we are bound to hear
5 the terms "groundwater", "water table" and "aquifer"
6 many times over the next few days and it might be useful
7 if you gave us a fundamental lesson on what you mean
8 when you are using aquifer as opposed to water table as
9 opposed to groundwater. Could you do that for us?

10 MR. SOBANSKI: I sure can. Well, ground-
11 water I think is a self-explanatory description, it
12 carries its own connotation. It's the water that is
13 moving in the soil or in the rock under saturated flow
14 conditions. It moves in three dimensions and what we
15 will look at are maps that show it in two dimensions
16 because that is the way we can visualize it in terms of
17 a map but, in fact, groundwater moves under the influence
18 of gravity. It is not a particularly -- I shouldn't say
19 it isn't a complicated field, it's complicated enough,
20 but, simply put, how to describe it. It's like a
21 bathtub, you pull a plug and you create a low potential
22 and that is where the water wants to move and so if we
23 look at a generalized section of land and we have a
24 stream and the stream flows to a lake and the lake goes
25 to another big river and finally we reach the ocean. The



1 driving force basically is the difference in head
2 between any ground surface and the ocean which ultimately
3 receives the groundwater.

4 So, precipitation falls on the land and
5 some goes back into the air by evaporation and evapotrans-
6 piration and the two are nearly the same and the evapora-
7 tion of a water body we can all understand, but evapotrans-
8 piration is how much the plants use and they are about
9 the same for Ontario, they are a very similar value.
10 Evaporation from an open water body is similar to
11 evapotranspiration from plants. Now, what happens to
12 the water? Some of it is going to run off and what
13 we are looking at is a basic water balance. Some will
14 run off and it will arrive via the streams in a direct
15 route towards its ultimate discharge point in the
16 oceans. Now, one step backwards. The powering source
17 for all of this is the sun. So, the heat from the sun
18 causes water to evaporate from the oceans and brings it
19 back to the land and it falls on the land and then it
20 comes into the hydrologic cycle.

21 Now, here we have runoff. We will
22 simplify this, but in the ground itself, since gravity
23 is the driving force, usually in topographically high
24 areas we will have a high water table situation and
25 the water table in Ontario where we have an excess



1 of precipitation over evapotranspiration, and it's not
2 like a desert area where evaporation would take every-
3 thing away or most of the water, here the water that
4 falls is not all used up by evaporation and evapotrans-
5 piration and here we have two other factors, the runoff
6 and the next is the groundwater which will recharge into
7 the ground. So, we have usually a water table that
8 would form, and we are generalizing this, but it comes
9 down like so and usually roughly paralleling the ground
10 surface and being usually somewhat lower in high areas
11 and near streams it is very close. So, the general
12 groundwater flow path which would occur in the situation
13 I have drawn would look something like this (indicating).
14 The water table is the free water surface and it's
15 where the groundwater is at atmospheric pressure. We
16 normally find out where that is by putting in a shallow
17 slotted standpipe, and Mr. Beechinor will describe these
18 in more detail later, but shallow devices to find out
19 where this free water zone is because, as I said to you,
20 the water is moving in three dimensions and what we
21 would find in a groundwater recharge area, if we were
22 to put a well deeper we would actually find that we
23 have a lower hydraulic head or hydraulic potential in
24 this zone. Here we would measure the water level here
25 and in here in a piezometer which is screened just at



1 the bottom we find a much lower water level but why?
2 We said it's recharged because the water has to move
3 from areas of high head, the initial head being at the
4 water table, to areas of low head which are here. Without
5 trying to get too complicated, these are flow lines that
6 we have drawn on in the first case and now just briefly
7 I will draw on some equipotential lines, if I can remember
8 how this is done. These are dashed and these are lines
9 of equal hydraulic head and the groundwater moves at
10 right angles to these lines of equal hydraulic head.

11 So, as we go down this section we are
12 actually running into different potential levels within
13 the unit which cause us to get these lower heads. Now,
14 at the stream -- in between if we put a piezometer in
15 and a standpipe, we would likely find that the hydraulic
16 head is about the same in both zones, indicating the
17 water is moving laterally. At the discharge point,
18 at the stream, we have upward flow and here if we put in
19 a well near the stream and if it's a shallow well we
20 will get a water level that's about the same as in the
21 stream but a deep well, however, put in at the same
22 location may flow and this reflects the fact that the
23 hydraulic heads are getting higher with depth and so
24 the definition of a recharge area is decreasing hydraulic
25 head with depth and the definition of a discharge zone is



1 increasing hydraulic head with depth.

2 Now, when we get into the flow system
3 it's a bit complicated, but if we work with this on a
4 rational level where we put wells in, what will we do
5 with them? Assessing a flow system is a three-point
6 problem in trigonometry.

7 DR. KINGHAM: That may be more than we
8 need and perhaps what we must understand, although I
9 will defer to the Chairman, but is groundwater which
10 you have described, water table where you have free-
11 standing water and that is to say you put the well down
12 in and aquifer which you are talking about now?

13 MR. SOBANSKI: Let's talk about aquifer
14 and define that term. The term aquifer is non-definable
15 unfortunately, but an aquifer means different things to
16 different people. There are several definitions and
17 one can pull the textbooks and they all say something
18 a little different. The one that I remember that may
19 explain it the best is that it is a zone that will
20 provide water in useable quantities. Now, if you use
21 that type of definition, then an aquifer to an individual
22 is a well that would yield about one gallon per minute
23 on a sustained basis whereas an aquifer to a municipality
24 might be in the range of 50 gallons per minute and up.
25 So, a municipality has to service many houses and wouldn't



1 be interested in a one-gallon-per-minute well, but that
2 is an aquifer to an individual farmer for example who
3 has to get a water supply and that would serve his
4 needs.

5 DR. KINGHAM: Are you telling us an
6 aquifer is an area of groundwater where you can pump
7 enough water to use it without drying it up?

8 MR. SOBANSKI: Without drying it out.

9 DR. KINGHAM: When you use "aquifer" in
10 H-10G you have a definition for us?

11 MR. SOBANSKI: In H-10G our concern is
12 for the municipal type of aquifer. First of all
13 aquifers occur everywhere and in Ontario there are few
14 places where you won't get some groundwater. In other
15 words, we can find almost anywhere in Ontario an aquifer
16 that is suitable for domestic purposes, but for
17 municipal purposes they are far more scarce and where
18 these zones occur where you can extract large quantities
19 of water. So, this was a factor of considerable
20 importance to us as groundwater hydrogeologists and
21 in avoiding these because you can imagine the enormity
22 of the situation if you were to contaminate a municipal
23 supply. It's one thing to restore an individual's well,
24 and I don't want to appear to be cavalier, but it's a
25 problem -- one problem to restore a single, individual,



1 small domestic supply, where we can deepen the well or
2 move farther away from a source of contaminant, but it's
3 another thing if you wipe out an entire community. That
4 solution isn't quite so easy and it would involve the
5 installation of costly treatment systems perhaps or
6 bringing in a pipeline from Lake Ontario.

7
8 DR. KINGHAM: Thank you very much and,
9 thank you, Mr. Lederer.

10 MR. LEDERER: Thank you, Dr. Kingham.

11 Q. Since we have now introduced the
12 concepts of discharge and recharge and for those who
13 think in simpler concepts like up and down, in a recharge
14 zone is water going up or down and in a discharge zone is it
15 going up or down?

16 MR. SOBANSKI: A. In recharge it is
17 down and discharge it is up. Keep in mind this discharge
18 concept is one thing I didn't -- one thing I didn't say
19 is that that groundwater is what sustains your stream
20 flow during dry seasons and it is showing that the
21 groundwater is moving to the streams and the streams
22 don't dry up after rains, they keep flowing, flowing
23 and flowing although the amount of water they carry
24 declines with time if there is no more rain, but that
25 flow you are seeing is in fact the seepage of groundwater
coming from the higher ground areas towards discharge



1 at the stream.

2 Q. All right, if we could turn to
3 H-10G and if you could complete your evidence with
4 respect to the buried valley, aquifer complexes.

5 A. We identified four possible buried
6 valley, aquifer complexes and they were in the Bronte
7 Creek area in the southwest quadrant of the area, they
8 were the Georgetown area located in the northwest --
9 sorry -- the northeast, a small possible buried valley,
10 bedrock complex in the vicinity of Drumquin and then
11 the results on page 45 also list Campbellville and Kelso/
12 Hornby, in fact this is the single complex that occurs
13 in the centre of the map area. Now, I would refer to
14 our sources of information on pages 45 and 46 which were
15 used to construct this map.

16 Q. What is this factor?

17 A. This factor is labelled "Type
18 and distribution of aquifer-overburden aquifers."

19 Q. This map is H-10H.

20 A. The objective of this again is to
21 avoid degradation of major municipal water supply aquifers.
22 It is a different type of overburden aquifer and it
23 isn't necessarily associated with the bedrock valley,
24 aquifer type of complex, but these are zones which may
25 be laid nearer to surface in a different type of



1 environment. So, within this type and distribution of
2 aquifers we are going to consider two types and one is
3 the overburden which is prepared on a separate drawing,
4 H-10H, and then we will consider the bedrock aquifers
5 which are on H-10I.

6 Q. Excuse me, but I made an error.
7 This is not H-10H but is H-10E.

8 THE CHAIRMAN: The overburden?

9 MR. LEDERER: The overburden thickness
10 I believe was H-10A. It is H-10E.

11 MR. SOBANSKI: I think we have already
12 covered a bit of this, the description and the signifi-
13 cance of this which are that within the Region ground-
14 water supplies are derived from a variety of types of
15 aquifers and they include the sand and gravel aquifers
16 and sand and gravel lenses that may occur within the
17 glacial tills. They also occur in the weathered and
18 fractured rocks both in the dolomites above the
19 escarpment and in the shales of the Georgian Bay and
20 Queenston formations that occur below the escarpment.
21 The overburden deposits containing the core sort of
22 materials such as the sands and gravels are the most
23 important aquifers from which high capacity wells are
24 developed in Halton. The yields from the rock wells,
25 and it's difficult dealing with two subjects at once,



1 but the yields from the rock wells are also pretty good
2 but we will discuss that in a moment. Our analysis on
3 the overburden was that we considered disposal again on
4 these municipal aquifers to be an unacceptable impact
5 and, consequently, they have been eliminated. The
6 Georgetown aquifer is similar in some ways to the shape
7 of the buried valley complex we talked about, but these
8 are higher sediments as well that feed that aquifer
9 zone, and Georgetown relies exclusively on groundwater
10 as does the Town of Milton which obtains its supply from
11 the buried valley complex as well as probably being
12 fed by extensions of that aquifer zone.

13 In terms of the bedrock ...

14 MR. LEDERER: This is H-10H.

15 MR. SOBANSKI: The best bedrock aquifers
16 occur above the Niagara Escarpment in the Amabel
17 formation, and this is probably the best rock aquifer in
18 the province and it yields high -- you get high yield
19 wells in it and it serves cities like the City of Guelph
20 which obtain part of their supply from this aquifer and
21 it is a very good aquifer. Below the escarpment we are
22 into the shale units and now we are into lower yields,
23 lower supplies, probably in the zero to ten-gallons-per-
24 minute range. Within the shales there are areas where
25 you can't get a water supply and several wells may have



1 to be drilled on a farm to find an adequate supply. So,
2 this is a fairly poor groundwater area in the municipa-
3 lity. We have rated certain zones you can see as
4 unacceptable for landfill above the escarpment. General
5 planning in the Region I don't believe calls for
6 extensive development above the escarpment, but there
7 are municipalities served by this aquifer zone.
8 Consequently, we set out distances around these municipa-
9 lities and I believe that this one is Acton, setting
10 the setback distance and we will not dispose anywhere
11 within the circle so this becomes a restrictive criterion
12 for us in siting a landfill site. Our sources of
13 information are considerable on this and they are shown
14 on pages 47, 48 and 49.

15 THE CHAIRMAN: Mr. Lederer, might this
16 be a good point to break for lunch?

17 MR. LEDERER: If I could ask one more
18 question to get this information consolidated and then
19 I think it would be a better time, if that's all right.

20 Q. Mr. Sobanski, could you indicate
21 what you did or what was done with this information as
22 mapped on these various exhibits?

23 MR. SOBANSKI: A. Yes. The individual
24 maps were overlaid and they were combined to form
25 Figure 6 in the report which follows page 114. Figure 6



1 is entitled "Areas Hydrogeologically Suitable for Sanitary
2 Landfilling" and if you like and if you were to darken
3 these various factors up, the constraints and lay them
4 all on top of one another and put them over a light
5 table, the resulting map is the map where the light shows
6 through and these are the areas of least constraint from
7 the hydrogeologic point of view and therefore those areas
8 which are the most hydrogeologically favourable for
9 sanitary landfilling. Again this is mapped on a
10 1:50,000 scale and the legend reads low impact, areas
11 interpreted to be hydrogeologically favourable for
12 sanitary landfilling.

13 Q. Did you include the agricultural
14 information on that map?

15 A. No, we did not. The agriculture
16 as we said was not a hydrogeologic factor and conse-
17 quently it isn't a factor related to public health and
18 safety.

19 Q. Could you generally describe for
20 the Board what you see on this map?

21 A. We broke the map into several
22 districts and with hindsight we used a wrong factor
23 because we have a District F which one must immediately
24 remember is not the same as Site F which is being con-
25 sidered, down in the southwest corner of the site.



1 District F in this case is up in the northeast corner of
2 the site and while District D generally does contain
3 Site D. So, that is a bit of confusion. These are
4 the areas where we saw the least number of constraints
5 based on the mapping and these are the areas of
6 relatively low infiltration, relatively thick overburden,
7 in the 15-metre range, and all of the other factors. We
8 can see the worm tube effect showing up for the stream
9 setbacks and we have several districts. One is
10 District A which we have assigned three or four little
11 pieces of property, and we see that it is cut in the
12 north part of District A and this would be one of the
13 moraine areas where we found there was a constraint
14 with respect to some complexities due to geology, but
15 you see that trend carry through District B and right
16 into District C. That is one of the constraints you
17 can actually see on the map.

18 In District B we grouped together half a
19 dozen pieces of property that occur on the boundary of
20 Oakville, Burlington and Milton. District C is an area
21 that occurs on the east side of the map sheets and is
22 generally centred around Burnhamthorpe Road, I believe,
23 and with sections of the suitable area both in the Town
24 of Milton and in the Town of Oakville. District B is
25 quite a broad area generally centred in the south part



1 of Milton and District E is a very broad piece of several
2 pieces of land that have been put together, little bits
3 and patches that occur generally in the south end of
4 Halton Hills. District F is in the vicinity of the
5 Town of Georgetown and comprises several small areas.
6 District G was another small area that occurred, quite
7 small, just about the right size for a landfill, and it
8 shows up on the west side of the City of Burlington and
9 up in the northern quadrant.

10 MR. LEDERER: This map is in fact marked
11 as Figure 6 in the report, so it might be wise to mark
12 the larger form H-10-Figure-6 and I think the word
13 "figure" is necessary because there are tables and if
14 you wish we would be in a position to break for lunch.

15 DR. KINGHAM: It looks very much like
16 the candidate sub-areas map.

17 MR. LEDERER: That's on the next page.

18 DR. KINGHAM: This appears to be the
19 driving factor for the candidate sub-areas.

20 MR. LEDERER: If you recall and if you go
21 to page 150, if I remember correctly or 151 of this
22 report, and I may be on the wrong report, just one
23 moment. You will recall that the decision tree if you
24 like in this started with this as the first factor and
25 then following that urban settlement areas were applied



1 and then biophysical was applied and following that
2 agricultural was applied and when you applied agriculture
3 everything disappeared and that was laid back in so what
4 you have in Figure 7 is this map with the added conside-
5 rations of impact arising from urban settlement areas
6 and biophysical and then the addition of the pits and
7 quarries which we will get to immediately after lunch.

8 --- EXHIBIT NO. H-10-FIG-6: Larger form of Map -
9 Figure 6 from H-10

10 THE CHAIRMAN: Until 2:30.

11 --- Luncheon recess (1:00 p.m.)

12 --- Upon resuming at 2:30 p.m.

13 THE CHAIRMAN: Please be seated.

14 MR. LEDERER: Mr. Chairman, if I could
15 advise the Board, the next series of answers to the
16 next series of questions can be found generally at pages
17 52 to 58 of Exhibit H-10.

18 Q. Mr. Sobanski, we reviewed the
19 screening process that took place with respect to the
20 Region of Halton, and I am wondering whether if at this
21 preliminary stage did you do any analysis of pits and
22 quarry sites?

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

24 Q. Can you indicate to the Board why
25 that was or what motivated those studies being undertaken?



1 A. Yes. This option was taken,
2 Mr. Chairman, in response to strong objections from the
3 agricultural community that we were using or potentially
4 using agricultural land for waste disposal, and we wanted
5 to recognize at this stage that general concern that
6 high-grade agricultural land is being taken out of
7 production in Ontario for a variety of non-agricultural
8 uses.

9 Q. Could you review with the Board
10 what work was done with respect to the assessment of
11 pits and quarry sites in the 2A phase of the study?

12 A. If I could refer the Board to
13 Appendix 4 of the main report; to summarize Appendix 4,
14 we looked at a total of 55 pits and quarries and we
15 inventoried them and considered them on a reconnaissance
16 basis. On the basis of our analysis, we rejected 48 of
17 these sites and the major reasons for the rejection
18 of the 48 was the site size was too small, perhaps only
19 a few hectares, they were located now in built-up areas
20 and in one case we found it was being used as a swimming
21 pond by a local resident, a very small pit, and in other
22 cases they were rejected because they were located over
23 major municipal supply aquifers.

24 Q. You said there were 55 and you said
25 you rejected 48 basically for those reasons, so that



1 leaves seven. Could you identify for the Board and
2 generally describe those seven remaining sites. I may
3 say that I am not aware that this particular depiction
4 of the seven sites appears directly in the report and
5 of course they are the seven sites which you eventually
6 see on Map 7 -- Figure 7 which is part of the report
7 and immediately follows Figure 6 which follows page 114.
8 I'm not sure whether you need to have this exhibited
9 since you have the sites located on that other figure,
10 but I am in the Board's hands..

11 THE CHAIRMAN: As long as they are located
12 on Figure 7 that should be sufficient.

13 MR. LEDERER: Q. Perhaps you can use
14 this map however, Mr. Sobanski, and locate for us,
15 identify and describe each of the seven sites.

16 MR. SOBANSKI: Q. The text reference
17 to this is from page 53 to page 57 and I will be
18 following my notes. The first site we considered was
19 the National Sewer Pipe property which is being con-
20 sidered as part of this application at Site F and it
21 is located in the southwest part of the City of
22 Burlington. It is located in the vicinity of King Road
23 and the North Service Road of Highway 403. The site
24 has been the subject of several intensive hydrogeologic
25 investigations to assess its suitability as a landfill



1 site. The site is underlain by the red shales of the
2 Queenston formation and the site is cut by several
3 stream beds that are deeply incised into the shale.
4 The groundwater may lie near the surface in some of the
5 quarried areas which have been used for brick and tile
6 in the past. At this level of detail, we were not aware
7 of any down-gradient groundwater users south of this site,
8 down slope, because the area south of the site is
9 serviced with municipal water supplies so we hadn't
10 really expected to find any surface water users at this
11 level.

12 This shale weathers to a clayey consis-
13 tency and we felt it would be suitable for cover
14 material. We felt we would require an engineering
15 system here to collect surface water resources and
16 sanitary sewers are present right beside the site to
17 accept the leachate.

18 2 The second site we considered was the
19 Canada Brick property which is located on the west side
20 of the City of Burlington about halfway between the
21 south boundary and the north boundary and it is near
22 Dundas Street and Appleby Line and it is located right
23 up against Bronte Creek which flows down past the site
24 from the northwest to the southeast.

25 The Queenston shale is mined at this site,



1 it is an active site, and currently it has an area of
2 around 15 hectares and it is about 15 metres deep on
3 the west side and about zero metres deep on the east
4 side where it opens onto Bronte Creek. There are no
5 surface watercourses on the site itself, but Bronte Creek
6 is within the 100-metre setback distance we had set and
7 we felt that this would be a constraint that would
8 require careful engineering to collect leachate if this
9 site were to be used. We saw no significant groundwater
10 inflows into the site by examining the site walls,
11 nor were there any down-gradient groundwater uses, with
12 the down-gradient side being bounded by Bronte Creek.
13 Currently there are not, I don't believe, any sewer
14 services in the area. It is a small industrial area,
15 a small industrial park, but from my own visits I do not
16 believe they are on sewers, but they are probably planned
17 for the future.

18 There was we felt sufficient cover material
19 on site. There is quite a bit of wasted shale that has
20 been left lying around and we felt we could find cover
21 material here for the waste. The main environmental
22 constraint we saw on the site was its proximity to
23 Bronte Creek.

24 (3) The Nelson Quarry is the third site we
25 considered and it is located at Rattlesnake Point. This



1 is I believe called, and I may have it backwards, but
2 the Mount Nemo area, and it is quite a large quarry.
3 It currently covers or at that time covered about 100
4 hectares and is ten to 20 metres deep. They use this
5 site to extract and crush dolostone for building
6 materials. There is no surface water egress from the
7 pit and everything flows in fact towards the pit and
8 we anticipated there would be fairly large
9 quantities of groundwater to collect, intercept and
10 discharge, and if they came in contact with the waste
11 they would become leachate. We felt we would need a
12 sophisticated engineering system here to collect and
13 treat leachate and it would have to be provided in order
14 to protect groundwater quality. The cover material at
15 this level of investigation seemed to be available in
16 limited quantities.

17 (4) The fourth site we considered was a
18 consortium of owners on a large sand and gravel pit
19 located near Rattlesnake Point. This covered at that
20 time several tens of hectares and it is quite a large
21 sand and gravel pit which is at least 20 metres deep.
22 The sediments are sand and gravel partially cemented
23 with calcite. We didn't feel of course in that type
24 of environment we would have any problem getting cover
25 material. We felt, however, we would have to collect



1 leachate at this site as well in order to protect ground-
2 water and surface water resources in the area.

3 Milton Limestone is located -- in this
4 context it would be a bit southwest of the Town of
5 Milton, the urban area of Milton. It is a large,
6 active quarry that again extracts, crushes-- crushes
7 limestone or dolomite rather for use in the construction
8 industry. It's about 25 hectares in size and it's about
9 30 metres deep. We saw limited cover material available
10 at this site, it is near the crest of the Niagara
11 Escarpment, and there is essentially no overburden over-
12 lying this area. There are no surface watercourses
13 immediately nearby, but groundwater would require
14 protection in this area.

15 6. The sixth site was Milton Brick, identi-
16 fied in the report in Section 3.4.6 as RDB Building
17 Products Ltd. These are a series of shale pits that
18 occur around the edge of the Niagara Escarpment and
19 you can see them from Highway 401 if you know where to
20 look and they are relatively small in size, they use
21 them to extract the Queenston shale, or did at one time,
22 and they cover an area of about eight hectares and are
23 up to about 15 metres deep. There are no significant
24 groundwater resources in this area that we could see
25 and the Town of Milton obtains its water from the



1 overburden further north, around the Kelso reservoir.

2 The pits, however, are located near a tributary of

3 Sixteen Mile Creek and we believe leachate controls will

4 be required to protect the surface water in that area.

5 The cover material could likely be obtained by using

6 weathered shale from the shale ridges that presently

7 exist between the pits.

8 Finally, in terms of the quarries, we looked

9 at the Indusmin pit at Acton which is No. 7 on our

10 list. This is also an active dolomite quarry used for

11 construction materials and it covers an area of about

12 160 hectares, it is quite large, and it will be about

13 25 metres deep. We were advised that they were planning

14 an expansion of up to 120 hectares in the future. Some

15 portions of the quarry have been completed. However,

16 we found little on-site cover material; there is some

17 but it seemed to be limited and this might give us some

18 problem. However, there were some sand pits in the

19 general area and perhaps borrow material could be

20 obtained. There are no surface watercourses right on

21 the site, but Black Creek is situated just to the north

22 of the Indusmin quarry. Extensive dewatering is under-

23 taken at this site and they pump around 500 gallons a

24 minute of groundwater out of this site, and consequently

25 leachate production would be high and we felt that we



1 would have to collect leachate and install a good control
2 system to protect both the surface water and groundwater
3 resources.

4 That in general is a brief description of
5 those seven sites.

6 Q. Now, Mr. Sobanski, given the level
7 of study you undertook at this stage, does all of this
8 indicate that these pits and quarries were being
9 identified as suitable for landfill?

10 A. No, no, they weren't. They simply
11 stand out as offering potential given that we were looking
12 at the possibility of using quarries. The characteris-
13 tics of these pits and quarries would have to be examined
14 in more detail at a further level of investigation to
15 determine site-specific properties.

16 Q. What did you do with the results
17 of this work, both the screening process and the pits
18 and quarries analysis?

19 A. We sent the information to Walker,
20 Wright and Young for inclusion in their analysis.

21 Q. Now, if I could refer you to
22 Exhibit H-11, this is the Stage 2B consolidation report,
23 selection of candidate sites. Do you have a copy of
24 that with you?

25 A. Yes, I do.



1 Q. Could I refer you, please, to
2 Section 5 of that report which begins on page 32?

3 A. Yes.

4 Q. Could you indicate to the Board,
5 please, were you or was your firm instructed to do any
6 work during the Phase 2, Stage 2B part of the study?

7 A. Yes, we were. We were instructed
8 to carry out the five tasks listed in Section 5 and the
9 first was to conduct site visits on all candidate areas
10 ① identified in Stage 2A, the general overview analysis, to
11 determine whether any possess hydrogeologic impediments
12 not identified through office studies, and the results
13 of that are shown in Appendix D of the appendices of
14 the report which is the second volume.

15 MR. LEDERER: I should say that that is
16 Exhibit H-68, if I remember correctly.

17 MR. SOBANSKI: ② The second task was to
18 provide broad estimates of site engineering costs to assist
19 in the economic comparison of the candidate sub-areas.

20 ③ These results are shown in Appendix E of the appendices
21 report. The third task was to determine theoretical
22 site waste disposal capacities which are shown in
23 Appendix F. ④ The fourth was to investigate the avail-
24 ability of sewers to receive and treat leachate and the
25 results are shown in Appendix G and, finally, our fifth

⑤



1 task was to conduct a more detailed assessment on the
2 use of pits and quarries for solid waste disposal and
3 the results of this work are generally shown in Appendix
4 B and also in a summary chart on page -- the page
5 following page 34.

6 MR. LEDERER: Q. Of Exhibit H-11?

7 MR. SOBANSKI: A. Yes.

8 Q. Can you take us through those one
9 by one and let's start with task one? Could you review
10 the work you did and the conclusions you drew with
11 respect to that task which was the matter of site visits
12 to identify hydrologic constraints?

13 A. Yes. We refer here to Appendix D,
14 a letter from myself to Ms Bidell, who was the senior
15 planner with Walker, Wright, Young. Mr. Beechinor and
16 I conducted visual inspections of all of the sites, all
17 of the candidate areas in the field, to judge how they
18 measured up to what we found in the overview analysis
19 using desk studies. The purpose of this inspection was
20 to identify in the field any obvious impediments we
21 would have missed from the office studies.

22 Our inspection indicated that the
23 potential or risk of off-site contamination was likely
24 higher at District G which is located, this small piece
25 of property on the west side of Burlington and near its



1 northern boundary, and also District F, Fl, this high
2 area outside of Georgetown. We found that the over-
3 burden at District G which had been mapped as fine grained
4 was a coarser grained soil and it was not clayey but a
5 sand and silt, and this could be told from the way the
6 fields had been ploughed and furrowed and the texture, it
7 was more a sandy material. The other thing is that we
8 found that the area situated quite high topographically
9 with respect to a series of springs and interconnected
10 ponds and a stream that flows past the west side of the
11 site. In addition there were numerous homes using
12 groundwater in that area which had not shown up in the
13 screening process. We felt then there would be a strong
14 potential for groundwater recharge in that area since it
15 was in coarser soils and situated high with respect to
16 the discharge area to the west -- sorry -- to the east.

17 At District F, this site too lies very high
18 topographically with respect to the Credit River and
19 we didn't have too much information on that area, but
20 we suspected there would be strong recharge gradients
21 on that site and it may be a site that would be difficult
22 to control and provide for leachate collection. So, we
23 then advised Walker, Wright and Young that we felt that
24 District D did not meet the criteria set out in the
25 screening process in Stage 2A.



1 Q. District D?

2 A. I'm sorry, G. Therefore it should
3 be eliminated as a candidate area. We didn't -- we
4 felt that we would require a more detailed assessment
5 on District F to determine its suitability. We found
6 too that many of the watercourses that had been identified
7 in the general overview analysis for Districts D and E
8 were ditches and swales in some cases and therefore did
9 not present major impediments with respect to surface
10 water. However, some of them were still major water-
11 courses, but there were some secondary courses which we
12 weren't as concerned about.

13 Q. Can we turn then to the work you
14 did with respect to task two, which is broad estimates
15 of site engineering costs, and can you review that with
16 the Board, please?

17 A. I believe we have an overhead of
18 this.

19 MR. LEDERER: This is in effect a portion
20 of Appendix E, selected engineering costs, which you
21 will find at the end of Exhibit H-68 and since it is
22 there it doesn't seem worthwhile to exhibit it further.

23 MR. SOBANSKI: Our purpose again of doing
24 this work was to provide the consulting team with
25 generic costs. There is no effort being made to compare



1 sites or options on our part, but rather to provide them
2 with some estimates that can be used for generic costing.
3 The costs are based on the information sources that are
4 found in the appendix and they generally reflect current
5 costs at the time the study was undertaken.

6 MR. LEDERER: Q. When you say "in the
7 appendix" am I right that that is the sheet entitled
8 "Source of Information" which is the third page of
9 Appendix E, "Selected Engineering Costs"?

10 MR. SOBANSKI: A. Yes, that's right.

11 Q. Thank you.

12 A. Just as an example, across the top
13 we have a component, a type of cost that it would be in
14 terms of an economist, the unit of measure of whatever
15 item we are looking at, the average cost and a descrip-
16 tion or assumption on the item.

17 Q. If you can be careful we are
18 losing the extreme right-hand side.

19 A. For example, a weigh scale would be
20 a fixed cost, there would be one per landfill, and the
21 average cost would be about \$250,000 and the cost would
22 include reinforced foundation, paving, scale house and
23 electricity. Another example might be the pump house
24 for leachate collection, again a fixed cost, one per
25 landfill, about \$120,000, and this includes the pumps,



1 electrical works and the building. So, that type of
2 broad estimate was given to Walker, Wright and Young.

3 Q. Now, can you take us to the work
4 you did with respect to task three which was to determine
5 the theoretical waste disposal capacities and review
6 that with the Board, please?

7 A. Yes. The results of this work are
8 found in Appendix F of the appendices. Again this is
9 a letter from Mr. Beechinor to Ms Bidell at Walker,
10 Wright and Young and I should go over what we thought
11 of this. The first is the area configuration which may
12 be somewhat confusing, and I hope I can straighten this
13 out...

14 Q. Where do you find this page in the
15 report?

16 A. This would be the tables page
17 following page 2.

18 Q. Of Appendix ...

19 A. ... F. We looked at sample lots
20 in Halton and we found a typical lot in Halton was
21 600 metres by 1,400 metres -- so 600 metres by 1,400
22 metres. A typical farm -- that's about 208 acres or
23 42 hectares. A typical farm is half of that which is
24 600 metres by 700 metres. So, when we look at the
25 table above and start talking about refuse capacity,



1 where you see areas, think of farms. This is how much
2 waste we can put on typically one farm, typically two
3 farms, three farms or four farms.

4 Q. Perhaps you could just wait for
5 a moment. Remember we have that extra bit of back-
6 ground noise so make sure that you can be heard.

7 A. Coming back again, one and two
8 would be a typical lot in Halton Region and any one of
9 the four here then represent two lots and each one of
10 those would be an average farm in terms of size, or
11 about 100 acres. So, with that in mind, we thought how
12 you go about building a landfill and you could purchase
13 one farm or two farms or three farms or four farms, and
14 that was a logical way to proceed in providing yourself
15 with the necessary land to get the disposal capacity
16 you need for the Region for a 20-year period or so.

17 Now, the buffer area we assumed around
18 all of these was 100 metres and so that would leave a
19 100-metre buffer around the site and this is based on
20 Ministry guidelines, and it leaves room for attenuation
21 capabilities, for monitoring, for the installation of
22 roads, for the installation of any control works that
23 may be required to back up your primary engineered
24 system. We then said the side slopes on these landfills
25 would be four to one and this cuts down your capacity of



1 your site on the side slopes and so a four to one side
2 slope is considered to be a stable slope in the long
3 term on a landfill and four to one I should say is one
4 foot of rise to four feet horizontally, so about a 25
5 per cent slope. We assumed that the refuse depth, and
6 this is a misnomer, but this should be height above
7 ground level, so the refuse height above ground level
8 would be in the 15-to-25-metre range at this conceptual
9 stage. We made no allowance for landfill facilities.
10 We did not subtract any acreage for buildings and the
11 gatehouses and weigh scales. At this stage we are just
12 looking at it on a very broad basis.

13 Now, perhaps if I could make a sketch of
14 what we are looking at when we do the estimates, this is
15 a one-farm system and it has dimensions of 600 metres
16 by 700 metres. We are leaving a 100-metre buffer
17 around the site and that reduces then this dimension
18 to 400 metres. If you take 100 metres off that, that
19 reduces this to 500 metres. So, that is the area in the
20 site to be filled. So then within this area we are now
21 going to look at two possible volumes, first of all the
22 concept would be that here is the land and here is the
23 buffer and you will dig a hole which will give you your
24 soil cover and part of your disposal capacity, but
25 basically what comes out of here goes back on top and



1 so it doesn't really make you any volume, and then we
2 will build a landfill something like that on top and
3 this will be a four to one side slope and you can see
4 it isn't drawn to scale, and this height here will vary
5 and there will be two values, 15 metres and 25 metres.
6 So, the final view of this site would look something
7 like that with this representing a slope upward and
8 this being the top of the fill.

9 If we now look at two farms, which is
10 the next stage, the dimensions now change and this buffer
11 area in here now becomes landfill area so that now the
12 site extends down thus and the buffer area that would
13 have occurred between two single farms disappears and
14 now becomes available for waste disposal. So, out of
15 this type of configuration you get a larger capacity
16 than if we used two single farms. So, now we can extend
17 this through like so and then, without going too far
18 beyond, if you use three farms you would do the same
19 thing by extending this area and making it all one large
20 top throughout. That is how the model is constructed
21 and it is a very generic sort of level of investigation
22 to see how much land we would require to dispose of the
23 waste volumes.

24 DR. KINGHAM: You stated that your assump-
25 tion was that the material dug out would be used for top



1 cover finally so there is no net gain in volume and you
2 saw no economic value of other uses for that soil, while
3 at the same time providing value in terms of volume and
4 space that would be available.

5 MR. SOBANSKI: We weren't considering that
6 at this time. Basically we were looking at mainly
7 glacial till sites in this case and normally we try to
8 match the volume we dig out with the volume of earth
9 required to make the fill. We don't normally over-
10 excavate, that means we have earth on hand that we
11 wouldn't know what to do with. We will over-excavate
12 if we need material for berming or if we need material
13 for roads, we can take whatever we need out of the pit,
14 but normally we don't take more than we have to because
15 it's just an added cost factor that need not be spent.
16 Different factors were considered, I believe on the shale
17 pits, but we didn't work on that at this stage. This is
18 just a sort of generic look at the site in terms of
19 how much land we will have to buy so we can start
20 putting some initial costs of a landfill facility.

21 DR. KINGHAM: The reason I asked the
22 question is because the matter did come up in previous
23 testimony that for other sites it would be a problem
24 getting enough soil to cover.

25 MR. SOBANSKI: That is right.



1 DR. KINGHAM: Which suggested there might
2 not be enough soil around for such uses in Halton, but
3 I won't pursue it.

4 MR. SOBANSKI: In fact we will see that
5 that can happen and did happen to us. This makes the
6 assumption that the soil is available and at this level
7 we are at 2B and we are doing some infilling while
8 our partners are doing more detailed work and we are
9 looking at some of these other factors which will affect
10 their work. We have done the bulk of our work in
11 Stage 2A through the screening level and now we are
12 providing them with more input for more detailed studies
13 that they are into.

14 So, if we now look at the figure, we can
15 see that at a refuse height of 15 metres on one farm we
16 can put in about 2.4 million cubic metres and at a refuse
17 height of 25 metres we could put in nearly double that,
18 3.7 million cubic metres and slightly because of the side
19 slopes, and so on up the line until we look at a site
20 where we are using four farms that has a capacity of
21 16.2 million cubic metres at a refuse height of 15 metres
22 and 25.5 million cubic metres at a refuse height of
23 25 metres.

24 MR. LEDERER: Q. Mr. Sobanski, can you
25 take us to the work you undertook with respect to task



1 four which was to investigate the availability of sewers
2 to receive and treat leachate?

3 MR. SOBANSKI: A. Yes, this is shown in
4 Appendix G of the appendices volume. This is a memorandum
5 from Mr. Beechinor to the various members of the study
6 team and, as a working assumption, the first article is
7 landfill height and as a working assumption at this level
8 of investigation, we decided to talk of landfill heights
9 in the order of about 15 metres above ground level. This
10 was a guideline and we didn't consider it to be an
11 absolute because, as I just discussed with you on the
12 previous section, we were dealing also with estimating
13 volumes in terms of heights as high as 25 metres.

14 In terms of the availability of pollution
15 control plants, we were advised that there is little
16 room for expansion of the sewage treatment plants at
17 Milton, in the Milton and Halton Hills urban areas, and
18 this was basically due to the inability of the surface
19 water streams to receive and treat any more effluent
20 than they were receiving presently. We were advised
21 that the water pollution control plants at Oakville and
22 at Burlington have the capability of treating leachate
23 and there was potential as well for plant expansion at
24 these two plants. We were advised also that additional
25 capacity may become available from the mothballed Drury



1 Lane plant and the proposed mid-Halton plant which is
2 due for construction perhaps in 1988. From this,
3 Mr. Chairman, the point I am trying to make is that the
4 available sewage treatment plant capacity for treating
5 leachate is essentially found along the lake as opposed
6 to the internal part of the Region.

7 Q. Mr. Sobanski, what really was the
8 substance of your conclusions with respect to this work?

9 A. This was a preliminary look at
10 the Region's capability to treat leachate. Really what it
11 did is it identified an issue that would have to be
12 considered further in later studies.

13 Q. All right. Now, could we turn to
14 task five which was to conduct a more detailed assess-
15 ment on the use of pits and quarries, and could you
16 indicate to the Board, please, why more studies were
17 done of the seven pits and quarry sites at this stage,
18 at this level of study?

19 A. Yes. You will recall, Mr. Chairman,
20 that in the 2A study we did not conclude that the seven
21 pits were favourable for landfilling. We concluded
22 that they offered some potential for landfilling and
23 so therefore at this level we wanted to investigate the
24 sites in more detail to determine whether or not some
25 of them might offer a feasible alternative to using



1 agricultural land for waste disposal. Now, if I can
2 remind the Board, the screening criteria that we have
3 used to date with the exception of the pits and quarries
4 puts us on the better agricultural lands which are found
5 east of the Niagara Escarpment. So, we felt that it was
6 important because of issues that the public had raised
7 that we look at this again, and I am being somewhat
8 repetitive, but we wanted to look at these pits and
9 quarries to see if there was some way we could avoid
10 using the agricultural lands. Unfortunately it is a
11 fact of life that the better agricultural lands also
12 make better landfill lands when you look at it from the
13 viewpoint of soil types.

14 Q. Could you review with the Board
15 then what methodology you adopted for this part of your
16 work?

17 A. We undertook the study basically
18 in four steps and first we established evaluation factors
19 and secondly collected data, we organized that data and
20 then we evaluated and assessed it to arrive at some
21 conclusions.

22 Now, the evaluation factors that we used
23 are shown on page 33 and firstly we considered ...

24 Q. Page 33 of Exhibit H-11, the
25 actual report?



1 A. Yes. 1 The first factor or
2 evaluation factor we considered was hydrologic constraints.
3 These were the potential for adverse impacts on water
4 resources, and the rating that we used was based on the
5 proximity of the pits and quarries to surface water and
6 the complexity, anticipated complexity of any groundwater
7 flow systems and surface water flow systems, and the
8 importance they had in the area in which the pit was
9 located.

10 2 The second factor we established was
11 leachate generation, and we tried here to recognize the
12 potential of contaminated water, the amount of
13 contaminated water that would be produced from these
14 pits. This could be a major constraint in that these
15 waters would require collection and treatment.

16 We considered also the compatibility of
17 simultaneously landfilling and quarrying. The major
18 constraints within this category included the avail-
19 ability of cover material, the availability of space
20 to simultaneously carry out two operations with trucks
21 coming and going and possibly materials from the land-
22 fill interfering with the product materials that were
23 being produced on site. We also considered the potential
24 impact of the mining operation -- of a landfill operation
25 on the end-use plan sought for the site.



1 The next factor we considered was leachate
2 collection constraints. We wanted to establish whether
3 or not we felt we could maintain a groundwater flow into
4 the quarry so that we could form a containment system
5 that would not contaminate some of these quarry areas,
6 particularly in the dolomite rock where they form good
7 aquifers. We used reports of groundwater level inter-
8 ference to guide us on whether or not the quarry was
9 acting as a trap and was bringing water towards it.
10 We also considered leachate treatment constraints. We
11 looked essentially at the distance between the quarries
12 and the available sewage treatment facilities along the
13 lakeshore and this of course affects costs; although we
14 didn't look at costs at this stage, but kept in mind that
15 a site located near the lakeshore in terms of availability
16 and access to a sewage treatment plant would be more
17 suitable than one located some distance away.

18 We next gathered data and we gathered
19 it from people who we felt were qualified to discuss
20 this matter and discussed it with the pit and quarry
21 operators, visited the sites and discussed it with them
22 and in some cases it had to be by telephone. We dis-
23 cussed it with the Ministry of the Environment and the
24 Ministry of Natural Resources as well as the Region of
25 Halton. A list of contacts we made is given in Appendix



1 C and it can be seen there that we did carry out quite
2 a few discussions with people involved with these pits.
3 We collected additional information on our own and we
4 did look at these sites in some detail and we reviewed
5 available background documentation as well.

6 We next organized these data and we re-
7 recorded them on data sheets which are shown in Appendix
8 B called the appendices volume. Finally, after doing
9 that work we prepared a summary table which is shown
10 after page 34 of the work that we conducted.

11 Perhaps if we could look at Appendix B
12 and look at one of these sites.

13 Q. Did you say Appendix D or B?

14 A. I get these letters mixed up once
15 in a while; D's and F's and B's.

16 Q. What do we have here now? What
17 we have here, so it is clear, is the first page of Appendix
18 D, assessment of pits and quarries, assessment informa-
19 tion tables, and because that is just a repeat of what's
20 in the report it seems unnecessary to exhibit it further.
21 Now, Mr. Sobanski, perhaps what you could do is indicate
22 to the Board how this works by reviewing with them the
23 information contained on the table with respect to P&Q1,
24 pits and quarries 1, National Sewer Pipe and adjacent
25 property, which as we all know now ultimately developed



1 into Site F which is before this Board.

2 A. First of all we have a box number,
3 1,1. This in fact refers to the table or summary chart
4 shown after page 34 of the main report, and so the rating
5 of low to moderate is then transposed to the final table
6 where one can sort of view the sites and make comparisons
7 from one to the other. We would find then if we look
8 at P&Q2 this same box would start out as 2,1, but again
9 the rating would be transposed to the main summary chart.
10 In this box we see a series of titles across the top
11 and one is consideration, the second is our judgment on
12 the rating, the comments and assumptions that have been
13 made by us and the sources of information. So, the
14 first consideration that we were considering on NSP
15 is the potential for adverse impacts on water resources
16 and in the column low to moderate we say that general
17 groundwater flow is southeast with lateral flow to
18 deeply incised valleys. We say that most of the study
19 area is in the Indian Creek watershed and the southwest
20 corner of the NSP property is located in the Falcon Creek
21 watershed. We say there are five intermittent streams
22 found near the northern limit of the property and some
23 impact on local surface water is predicted and we say
24 again that at this level of investigation there are no
25 down-gradient groundwater users. The sources of



1 information are given as Hydrology Consultant's report
2 of 1983 and the solid waste management strategy study
3 by Acres in 1982 for the City of Burlington.

4 The second consideration is the quantity
5 of contaminated water produced based on the mining plan,
6 and here we are concerned again about leachate volumes.
7 We ranked it as low to moderate and say for the Bayview
8 Landfill the average annual exfiltration rate would be
9 0.34 litres per second and the average annual seepage
10 rate would be 80 litres per second or approximately --
11 100,000 litres per day or 22,000 Imperial gallons per
12 day of leachate and the source is Morrison Beatty.

13 We next talk about the availability of
14 cover material which is important in making a sanitary
15 landfill. At this time the waste volume was assumed to
16 be 8.7 times ten to the sixth cubic yards and it has
17 changed, I believe, several times as we have updated
18 studies on the waste volume generation and we say that
19 100 per cent of the cover material is available on site
20 and we note that the shale weathers to a clayey
21 consistency suitable for cover material and that the
22 mined shale will produce the required cover material.
23 Our sources are Mr. Christensen of NSP and Mr. Tait of
24 Proctor & Redfern.

25

We consider next the percentage of landfill



1 requirement that can presently be accommodated on the
2 site, which again is 8.7 million cubic yards and we rate
3 this as 100 per cent as available so it's not a high or
4 low, but 100 per cent is available in this case, and say
5 the licenced quarry area is 30 hectares and the study
6 area is approximately 100 hectares and NSP is prepared
7 to limit their operation to the Burlington waste stream.
8 Our sources of information are again given.

9 Potential adverse impact on the mining
10 operation is low to moderate and the shale resources are
11 relatively abundant in Halton. There is no known
12 proposal to mine shale, except in conjunction with a
13 landfill operation and our sources here were discussions
14 with the Ministry of Natural Resources.

15 The next consideration is the compatibility
16 of the landfill operation with the proposed quarry end
17 use, and they were compatible and we felt at this time
18 that a landfill operation was planned for the site by
19 NSP and again the sources are given, both NSP and
20 Proctor & Redfern.

21 The next consideration is the potential
22 for leachate egress based on the principle of hydraulic
23 containment and again we are going to try to keep the
24 leachate collected within the site so it does not spread
25 outward. We felt it would be low to moderate here and



1 at this stage of our investigation we felt that hydraulic
2 containment could be achieved just as a forewarning and
3 we found out later it was not possible. In box 1.8 we
4 are looking at the difficulty in assessing -- accessing
5 a water pollution control plant and the rating is low
6 because there is a service available within about a
7 mile of the site -- sorry -- a kilometre.

8 DR. KINGHAM: Could we back up to the last
9 one and explain the last one you said, and you got by it
10 quickly, 1.4, NSP is prepared to limit their operation
11 to the Burlington waste stream. What does "limit their
12 operation to the Burlington waste stream" mean?

13 MR. SOBANSKI: At this point NSP would
14 be happy to receive waste from just Burlington as opposed
15 to a regional facility. In other words, their comments
16 to us at that time I believe were if we could get a
17 landfill approved we would, if necessary, just take
18 Burlington and not take the surrounding areas. We are
19 looking at it from the point of view of a potential
20 landfill for the entire Region and NSP was looking at
21 it to a level which would just accommodate Burlington
22 itself.

23 MR. LEDERER: You may wish to hear from
24 Ms Cronk about this, but I think it has already been
25 mentioned, as I recollect it by Mr. Estrin in his opening



1 and I could be wrong, but quite apart from the Region
2 examining Site F for landfill, NSP itself has been
3 investigating that possibility and there is an applica-
4 tion extant under the Environmental Protection Act and
5 what Mr. Sobanski is indicating is that insofar as
6 National Sewer Pipe is itself investigating the possi-
7 bility of use of this site for landfill, they were at
8 that time considering the possibility of merely accepting
9 waste from the Burlington waste stream with respect to
10 what they themselves were or are proposing.

11 MR. SOBANSKI: So, the other tables are
12 similar and there are tables for each of the seven pits
13 and quarries that we looked at, and rather than go
14 through them all, suffice it to say, I believe, that we
15 prepared a summary chart of this, of the various quarries.

16 MR. LEDERER: Q. Perhaps again by way
17 of example perhaps we could centre on P&Q1 and you
18 could review with the Board how this chart works.

19 MR. SOBANSKI: A. Across the top we have
20 the evaluation factors which I should point out are shown
21 down the margin of the page at a 90 degree angle, and
22 these were the basic evaluation factors again which we
23 considered. Following that is a consideration of why
24 we are looking at those evaluation factors and for example
25 under compatibility of simultaneously quarrying and



1 landfilling there are four considerations that we looked
2 at and the others have just one each. Across the top
3 again we go from P&Q1, National Sewer Pipe property;
4 P&Q2, Canada Brick; P&Q3, Nelson Quarry; P&Q4, the
5 Springbank Sand and Gravel and other owners at that
6 property; P&Q5, the Milton Limestone quarry; P&Q6,
7 Milton Brick and finally P&Q7, Indusmin Action. Now,
8 again the consideration was carried in the table and
9 they are shown down the side, the impact on water
10 resources, quantity ...

11 Q. If I could interrupt you and to
12 make this quite clear, and you may have done this
13 already, but the words which appear at right angles along
14 the side and can you relate those to the evaluation
15 factors you reviewed with the Board earlier?

16 A. These are the evaluation factors
17 we talked about, and they start on page 33 of the report
18 and 34, and again there were five general factors and
19 they were hydrological constraints, leachate generation,
20 compatibility of the two operations, leachate collection
21 constraints and the leachate treatment constraints. As
22 I mentioned, the one item which is the compatibility and
23 is an operations look at the sites, it is broken into
24 four sub-categories.

25 So, if we go back then, the rankings that



1 we have, low to moderate, low to moderate, 100 per cent
2 available on site in terms of cover material, et cetera,
3 comes from the tables we looked at in the appendices.
4 They are just transposed to this point so we can look
5 at the sites and compare them.

6 If I might just summarize one more on
7 NSP to show again how it works, just to look at it one
8 more time, a low to moderate impact is expected on
9 water resources; low to moderate quantity of contaminated
10 water being produced based on the mining plan; we have
11 the cover available on the site; we can accommodate 100
12 per cent of the landfill volume; we have low to moderate
13 adverse impacts on the mining operation; it is compatible
14 with their end use because they were planning to use it
15 for a landfill anyway, and the potential for leachate to
16 egress the site based on hydraulic containment, and we
17 weren't sure but put it in the low to moderate range
18 so there is some potential for it to migrate and the
19 difficulty in accessing the water pollution control
20 plant was low. So, we looked along the bottom and
21 there is a ranking which shows that based on this chart
22 and just general considerations of what we have seen in
23 terms of operations and cover material and the hydro-
24 logic and hydrogeologic conditions in the area, that
25 the two most favourable sites from our point of view



1 were the NSP property, P&Q1, and the Nelson Quarry, P&Q3.

2 The rest of the sites we have ranked as
3 less favourable.

4 Q. Mr. Sobanski, can you perhaps
5 review with the Board more specifically or review with
6 the Board the reasons upon which that decision was based
7 and, I think you will find this on page 38 of the main
8 report.

9 A. Well, we can summarize your
10 question in five points at the top of the page. We felt
11 firstly that major changes to the local environment have
12 already occurred as a result of the land use activities.
13 Number two, there is a low potential to adversely impact
14 groundwater users. Number three is that the cover
15 material and landfill capacity are adequate. Number
16 four is that there would be a low to moderate impact on
17 mining activities. Number five is the pit and quarry
18 sites are situated in close proximity to water pollution
19 control plants.

20 I should point out though that on the
21 chart it should be noted that

22

23 we have marked two sites which are favourable and five
24 others which are less favourable, but that does not mean
25 the other five are not acceptable for landfilling. but it



1 identifies that there are significant disadvantages or
2 constraints to consider using the other five sites and
3 consequently we ranked them as being less favourable.

4 Q. What was done with all of the
5 responses to each of the five tasks?

6 A. We provided our assessments to
7 Walker, Wright and Young for inclusion in their overall
8 assessment.

9 MR. LEDERER: That takes us to the end
10 of the Phase 2, Stage 2B study and if the Board was going
11 to take an afternoon break this would be the most appro-
12 priate time.

13 DR. KINGHAM: Just one short question for
14 clarification if you could turn that on again. I am
15 having a hard time understanding the words besides
16 leachate generation quantity of contaminated water
17 produced based on mining plans on that chart.

18 MR. SOBANSKI: I am having trouble finding
19 it on the small scale.

20 DR. KINGHAM: The second one down, based
21 on mining plan.

22 MR. SOBANSKI: Yes.

23 DR. KINGHAM: What mining plan is it that
24 creates the leachate?

25 MR. SOBANSKI: Perhaps this isn't the best



1 way to describe it, but really what we are looking at --
2 it is really explained in the tables and let me explain
3 them individually. At National Sewer Pipe in terms of
4 how much leachate we would get, what we are dealing with is a
5 /fairly low permeability material which is shale and it doesn't
6 have much groundwater coming into it and so while we are
7 not sure exactly how much leachate we will have to deal
8 with, we know we must deal with the precipitation which
9 falls on the site and goes through the garbage, but we
10 probably don't have to deal with groundwater, but we
11 are not sure at this stage how much so we gave it a low
12 to moderate rating.

13 DR. KINGHAM: Is what you are telling us
14 that based on what was done in mining in the area you
15 have some understanding of the leachate?

16 MR. SOBANSKI: Yes.

17 DR. KINGHAM: You mean based on historic
18 mining?

19 MR. SOBANSKI: That is correct, but if
20 I could take it one step further for clarification, if
21 we look at the Nelson Quarry, all of the flow is towards
22 the quarry so perhaps we will have to deal with precipi-
23 tation and groundwater and so we will have a high
24 leachate generation rate. One more is the gravel site
25 at P&Q4. The site is located above the water table and
as you can see they aren't mining into the water table, so



1 consequently again all we would have to deal with is the
2 precipitation which falls on the site. We have made an
3 allowance for a little more groundwater than we have in
4 this case, the shale being much tighter and we don't
5 expect much more groundwater, and from sand and gravel we
6 might get some lateral inflow along some perched layers
7 /which could give us more
8 groundwater, and these are based on how they are operating
9 the sites and our judgment on how much leachate would
10 be generated at the individual sites.

11 --- Recess

12 THE CHAIRMAN: Be seated, please.

13 MR. LEDERER: Mr. Chairman, just before
14 we move on to the 2C study, I had an opportunity over
15 the break to review with Ms Cronk the matter raised by
16 Dr. Kingham with respect to the NSP site P&Q1. If the
17 Board could just turn to Exhibit H-68 for a moment and
18 to the table which is Appendix B. Dr. Kingham asked
19 the question,

20 Q. Do you have that easily at hand,
21 Appendix B?

22 MR. SOBANSKI: A. The pits and quarries?

23 DR. KINGHAM: It's 1.4.

24 MR. LEDERER: Ms Cronk's understanding is
25 that I have only told part of the story which is that
the proposition at that point is that they were quite



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4130

Sobanski, Beechinor,
ex (Lederer)

1 prepared to take their application for a landfill on
2 this site, which I should say predates the Region's work
3 and I'm not sure when it was first made, but it predates
4 all of this work. The proposition was that NSP was
5 quite prepared to run a landfill on the site at which
6 it would receive waste from the Burlington waste stream.
7 The Region then it seems would run a second site or
8 coincidentally run a site on the same site which would
9 take the remainder of the waste from the Region. The
10 inconsistency that that clears up is the reference to 100
11 per cent underrating because if you take the combined
12 efforts of the Region and NSP together, what you have
13 is 100 per cent of the waste.

14 DR. KINGHAM: Thank you.

15 MR. McQUAID: I might say that that state-
16 ment of Mr. Lederer may be helpful, but I think we should
17 have evidence on that.

18 MR. LEDERER: We may well have, but I am
19 simply clarifying the question from Ms. Cronk's under-
20 standing at this point.

21 Q. Now, Mr. Sobanski, if we could
22 turn, please, to Exhibit H-38, Stage 2C hydrogeologic/
23 hydrologic assessment and conceptual design and H-38A,
24 the appendices to that report. Do you have a copy of
25 that report in front of you?



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4131

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ex (Lederer)

1 MR. SOBANSKI: A. Yes. Just a moment
2 while I get the appendices.

3 Q. Do you have a copy of that in
4 front of you?

5 A. I do, sir.

6 Q. Let me ask you if you are familiar
7 with this report?

8 A. I am.

9 Q. Could you indicate to the Board
10 who prepared it?

11 A. Again it was our staff under my
12 direction.

13 Q. Could you indicate to the Board,
14 please, what work was Hydrology Consultants asked to
15 undertake at the Phase 2, Stage 2C level of investiga-
16 tion?

17 A. Our tasks were twofold and the first
18 was to conduct preliminary hydrogeologic/hydrologic
19 assessments of the six sites, and the second was to
20 prepare generic, conceptual site development plans for
21 Sites A, B, C, D, E and F.

22 Q. Could you indicate to the Board at
23 this stage when you came to undertake your work at this
24 level of study, were you governed by any particular
25 parameters?



1 A. We felt that there were three
2 general considerations that were important. Number one
3 was that Site E in Milton, which was the former Site F
4 which had been considered at a hearing, and it's our
5 Site E but the former Site F, and Site F in Burlington,
6 and I hope the confusion is now -- there is some confu-
7 sion so let's just consider the Milton Site E and
8 Burlington Site F, the sites the Board is considering.
9 They had already been subjected to detailed study by
10 other investigators. Since the sites must be compared
11 at a similar level of detail, we felt that we had to do
12 a comparable level of study on Sites A, B, C, and D
13 to carry out more detailed hydrogeologic investigations
14 by drilling and instrumenting the site. The second
15 thing we considered was when I talked about level of
16 detail, the other two sites had been carried to a high
17 level of detail and here we did not try to develop quite
18 the level of detail that had been developed on Sites E
19 and F in the previous studies because we felt that what
20 we had to do at this stage was to meet the requirements
21 of the Environmental Assessment Act and not the
22 Environmental Protection Act. The other two sites
23 were taken -- one to the Environmental Protection Act
24 level and the other close to it, so our level of detail
25 would be a little bit less than what was done on the



1 other sites.

2 By doing this it would permit us to make
3 a comparison of the candidate sites from the hydrogeolo-
4 gic perspective and it would allow a preliminary
5 determination of mitigative measures necessary for each
6 of these six sites and it would give us the opportunity
7 to determine the engineering feasibility of using each
8 candidate site.

9 The third parameter that was important
10 was the preparation of conceptual landfill plans for
11 each site at a level of detail suitable for the
12 Environmental Assessment Act purposes.

13 Q. You indicated to the Board that
14 some previous work had already been done with respect
15 to what are now known as Sites E and F and could you
16 indicate where that work is referred to and where it is
17 found?

18 A. Referring to report H-38, the
19 text of this report, report 7, it is found on page 36
20 and the first report we considered was prepared by
21 Gartner Lee Associates Limited.

22 Q. I think you just referred to page
23 36 ...

24 A. I'm sorry. Page 4.

25 Q. Could you list out those reports



1 for the Board, please?

2 A. The first report was prepared by
3 Gartner Lee Associates Limited in 1978 and revised in
4 1980 and it was prepared for the Regional Municipality
5 of Halton and M.M. Dillon and it was entitled "Regional
6 Landfill Site Hydrogeological Study." The second
7 report was prepared by M.M. Dillon who was working with
8 Gartner Lee on that project, and it was prepared in 1978
9 and revised in 1980 also. It is entitled "Regional
10 Landfill Site Design and Operations Report."

11 The third report prepared by M.M. Dillon
12 Limited in 1984 is entitled "Burlington Landfill Site for
13 Continued Use" Volume 2. Report No. 4 was prepared
14 by Cherry and Hewetson in 1983 and it was entitled
15 "Hydrogeological Investigations at the Bayview Park
16 Landfill." Our next report listed was prepared by Morrison
17 Beatty Limited in 1981 and it was entitled "Phase III,
18 Hydrogeological Investigation, National Sewer Pipe Limited."

19 The sixth report was prepared by Proctor & Redfern Limited
20 in 1982 and was entitled "National Sewer Pipe Limited
21 Design Report" and finally report seven was prepared by
22 Cherry and Lush in 1980 and it was entitled "Hydrogeo-
23 logical Suitability of the NSPL Landfill Site, Burlington,
24 Ontario."

25 Q. At this level of study did you again



1 define evaluation factors?

2 A. Yes, we did.

3 Q. Could you indicate to the Board
4 how the use of these factors differ from the evaluation
5 criteria which you employed during the general screening
6 level of study?

7 A. The factors we used in 2A and 2C
8 are similar, Mr. Chairman, but new comparative factors
9 have been added to reflect our greater degree of knowledge
10 of the sites as we went through this 2C process.

11 At the Stage 2C level the factors that
12 we are selecting no longer eliminates sites. They are
13 going to be used for comparative purposes to compare
14 one site to the other. We feel there is a difference
15 between the screening process used in 2A where it is
16 the express intent to develop a general level of detail
17 meant to eliminate areas from consideration as landfills.

18 In Stage 2C where we are now, or the part we are
19 discussing, this is now site-specific and the work is
20 designed to compare sites and identify any mitigative
21 measures that may be required to remedy environmental
22 deficiencies. So, then we considered seven evaluation
23 factors and I would like to go through these and they are
24 shown on page 5, or they start on page 5 of the report.

25 As I indicated, the first factor is



1 ② attenuation capability and, as I had indicated before,
2 the fine-grained soils are better attenuators than
3 coarse-grained soils and therefore the glacial tills
4 possess high leachate attenuation capabilities. In
5 these areas we would have low impacts on groundwater
6 and on groundwater resources and the coarse-grained
7 sediments of course have poorer attenuation capability.
8 So again in these areas landfilling would be classed as
9 having impacts that are moderate to high.

10 → ② The second factor we considered was
11 geologic complexity. Again there are uncertainties in
12 complex geologic environments and there are uncertainties
13 as to the contaminant migration routes.

14 ③ Overburden thickness. This is an example
15 of what we can expect to occur when we move from a
16 general screening process into site-specific studies.
17 It may be that some of the sites do not meet the general
18 screening criteria. However, with more detailed work
19 we know more about the geology and the hydrogeology of
20 the sites and we do not have to rely any longer on
21 assumptions or limited information. Here we can deter-
22 mine with greater certainty whether a landfill site can
23 safely be designed and implemented on a specific piece
24 of property. In terms of overburden thickness, if the
25 site has thinner overburden, we now look at the mitigation



1 factors as opposed to saying the site is no good and
2 this is required I believe by the Environmental
3 Assessment Act. In terms of overburden thickness, again
4 the importance of it is that the thicker the overburden
5 the better environmental security it offers to the site.
6 The contaminant transport in fractured geological media, which we
7 are considering here, where at this level there is a
8 quarry site or a shale site being considered, but it is
9 generally less predictable than for movement in a
10 granular medium.

11 (4) Another factor we considered was the
12 complexity of the groundwater flow system. It is
13 desirable to locate a landfill in a discharge or lateral
14 flow area. The subsurface paths through which leachate
15 may move at this type of site are more predictable and
16 in groundwater recharge areas some contaminants may move
17 to depth and deeper leachate tile drains are needed to
18 control leachate movement in these areas.

19 The complex flow systems referred to when
20 we are assessing these sites now would possess both
21 recharge and discharge conditions within the site
22 boundaries, or more than one dominant lateral groundwater
23 flow direction.

24 (5) In terms of buried valley, aquifer
25 complexes, I think we have discussed that issue in enough



1 detail, but again we want to avoid these major aquifers
2 that may be buried within these buried valleys.

3 6 The type and distribution factor, or of
4 aquifers rather, the type and distribution of aquifers
5 on page 7; this factor was used to reassess the candidate
6 sites for the presence of significant aquifer zones.

7 2 Finally on drainage, as we mentioned previously, it is
8 desirable to locate a site that is suitably set back from
9 watercourses and this factor was again taken into account
10 but now on a site-specific level.

11 Q. Mr. Sobanski, quite apart from the
12 evaluation factors with respect to site selection, did
13 you also consider any criteria with respect to the second
14 level of work you did at this stage, the matter of
15 conceptual design?

16 A. Yes, we did, Mr. Lederer. We
17 discussed in a previous report that we took a first cut
18 at it to look at capacity, and now we started to tighten
19 up on our design considerations for the sites. On page
20 9 we give the general engineering criteria that we used
21 and the first was the 100-metre-wide buffer we discussed
22 previously and this was to provide visual and sound
23 separation, an area for a leachate attenuation zone,
24 an area for monitoring and an area for the installation
25 of environmental control works. While we wouldn't



1 dispose of wastes in these areas, we would construct
2 berms or roads in these areas and some of the facilities
3 associated with landfills.

4 The second general criterion was that
5 the depth of the cut would average about 4.5 metres, or
6 about 15 feet, and the height of the fill would be
7 about 15 metres across the top. So this is the height of
8 the mound above the ground level. The third was that
9 the cut slopes within the fill itself would be at 1 to 1
10 to provide short-term stability and the final landfill
11 side slopes would not be steeper than 4 to 1 on the
12 outside slopes when we are finished with the site. The
13 final cover was to be one metre thick and we were going
14 to use a ratio of daily cover volume to refuse volume
15 of 1 to 4, one part of earth to four parts of garbage.

16 We would design suitable leachate
17 collection systems for all of the sites based on the
18 hydrogeologic details we developed from the drilling
19 programs that would follow, and the site capacity was to
20 be a maximum of 11.3 million cubic yards of compacted
21 refuse, and that is using 1,000 pounds per cubic yard
22 as a compaction density, and you can see that the size
23 of the site would change from the previous study
24 slightly.

25

Q. Could you look at the last sentence



1 on page 9 and indicate its significance?

2 A. I'm sorry?

3 Q. The last sentence on page 9.

4 A. "These parameters are only general,
5 and necessary deviations have been noted
6 in Section 3.0 for the appropriate site."

7 I should explain that. We found it necessary to deviate
8 from some of the general engineering criteria and these
9 are noted in the report where we had to make changes and
10 we have had to go a little higher or we may have had to
11 reduce a buffer to get the capacity we wanted, but in all
12 cases we have given an explanation of why we did it and
13 its justification and they are contained within the
14 report.

15 Q. If you can sit down I will pose
16 my next few questions to Mr. Beechinor. If you could
17 turn to page 10 of the report... Mr. Beechinor, what I
18 would like you to do, please, is to take the Board
19 through the steps in the study process which was under-
20 taken at this level of study.

21 MR. BEECHINOR: A. Yes. Very well.
22 There were nine steps in the study process that we carried
23 out and the first step was the detailed planning. The
24 detailed planning involved preparing land ownership maps
25 in concert with regional staff and it was the purpose in



1 the preparation of these maps to arrange for property
2 access so we could do our test drilling and other site
3 investigations. The second step in the process was the
4 site reconnaissance. Here we did a detailed field
5 inspection of the candidate sites and located suitable
6 areas for the test drilling programs. The third step
7 in the study process was the data compilation and this
8 involved a review of all the existing reports available
9 on the sites and, in addition, waterwell records from
10 the Ministry of the Environment were compiled in order
11 to have a better understanding of local hydrogeologic
12 conditions and to identify water supply sources.

13 The fourth step in the study process was
14 the field testing. This was carried out in June of
15 1984 when boreholes were advanced on candidate Sites A,
16 B, C and D and boreholes were generally advanced to
17 the overburden/bedrock contact, or to a depth of about
18 15 metres, whichever came first. The borehole logs are
19 contained in the appendices to the text of this report
20 in Appendices A1, B1, C1 and D1.

21 I thought I would show the Board a typical
22 borehole log for your information. This is a borehole
23 log from a drilling site on candidate Site D. In fact
24 this is borehole log No. 7. Some of the information on
25 the borehole log is this; number one is a soil



1 description and in this case we see two types of soil
2 textures recorded here. From a depth of about zero to about
3 6.5 metres the soil has been classified as a clayey
4 silt till. The soil texture then changes at a depth of
5 about 6.5 metres to a sandy silt texture and so there
6 is a change at 6.5 metres from clayey silt to sandy silt
7 and contained within the soil description is the
8 general information about the colour, the moisture and
9 other geologic information. There is also an "N" value
10 recorded which provides us with a general understanding
11 of the relative density of the soil of the samples
12 collected. On the right-hand margin are the locations
13 where we extracted soil samples from the borehole logs,
14 from the borehole itself, and this occurred at about
15 every five metres -- the interval for soil sampling
16 occurred at about every five feet. These soil samples
17 were then subjected to physical tests in the laboratory
18 to quantify or classify the soil type.

19 At each of the drilling locations, as a
20 borehole was prepared for each drilling location, we
21 advanced two boreholes and one borehole was advanced
22 to a depth of about four metres and a second borehole
23 was advanced to the bedrock/overburden contact or to
24 a depth of 15 metres, whichever came first. In each one
25 of the boreholes, monitoring wells or observation wells



1 were installed and it was the purpose of these observa-
2 tion wells to allow us to collect groundwater samples
3 for chemical analysis and also to measure the groundwater
4 levels in the wells to establish, for instance, whether or
5 not we were in a recharge or discharge gradient and
6 the in situ permeability tests were conducted on at
7 least one piezometer on each of the sites in order to
8 establish the relative hydraulic conductivity or the
9 permeability of the geologic units on site.

10 Now, a typical drilling site installation
11 as I mentioned is composed of two wells and one referred
12 to as the standpipe and the other referred to as a
13 piezometer. Now, a standpipe is a device used to measure
14 the depth to the water table or the water table elevation,
15 and it simply is a plastic pipe which is slotted through-
16 out its entire distance to about one metre below ground
17 surface and we simply put down a line to measure or sound
18 the water level in the pipe. At the surface a bentonite
19 seal is installed to prevent surface water from entering
20 the borehole itself and contaminating the water in the
21 borehole or in the well.

22 The other type of installation is known
23 as the piezometer, and what the piezometer is doing is
24 it allows us to measure the hydraulic head or pressure
25 head or I call it just groundwater level of distinct



1 geologic units and that is defined by the well screen,
2 and in this case it might be limited to about a two-foot
3 section whereas with the standpipe it is slotted from
4 the bottom to nearly the ground surface. A standpipe
5 would be used in an environment such as if we were
6 installing a well into a sand unit below, say, 40 metres
7 of clay or are interested in screening that sand unit,
8 and say that is two feet or something like that, we
9 would install a screen over the interval of that sand
10 unit and then install a seal of bentonite, a swelling
11 clay material, above the screen and later come back and
12 measure the hydraulic head or groundwater level
13 associated with the sand unit that is being screened.

14 Q. I might just say that drawings,
15 and not these but drawings very similar to these, are
16 found in Volume 3 of H-39 and H-49, the technical level
17 of study, so unless the Board requires it there is not
18 much to add by way of exhibiting them.

19 A. As Mr. Sobanski has already pointed
20 out, there was considerable work done on candidate Sites E
21 and F and for that reason we felt it was not necessary
22 to do substantial drilling at those two sites. We did
23 some confirmation test holes on the sites just to confirm
24 some earlier work, but there was no substantial test
25 drilling done by Hydrology Consultants on candidate



1 Sites E and F.

2 The fifth step in the study process would be
3 field monitoring and this involved the measurement of
4 groundwater levels in the monitors installed, in the
5 well monitors installed on Sites A, B, C and D, and this
6 was carried out generally during June and July, 1984.
7 In addition, water samples were collected from the wells
8 that were installed on these sites in order to establish
9 background groundwater chemistry of these sites. As I
10 mentioned before, one of the piezometers installed in the
11 unweathered till in each of those four sites were tested
12 for their hydraulic conductivity, through water recovery
13 tests, and I think Mr. Sobanski has referred to the
14 hydraulic conductivity before and, simply put, it is a
15 measure of the ease with which a fluid moves through
16 a geologic medium. I thought the Board may be interested
17 in some of the ranges of hydraulic conductivity for
18 various geologic units because there will be considerable
19 reference to this later in our discussion. For example,
20 on the left margin we have a geologic material and the
21 next column shows the ranges of hydraulic conductivity
22 associated with these geological units and then in a
23 relative sense what that means. For instance, a massive
24 shale could have hydraulic conductivity in the range of
25 10^{-11} to 10^{-7} and that is considered very low permeability



1 whereas a glacial till can have a permeability of 10^{-7} --
2 in this case 10^{-10} to 10^{-4} and you would consider that
3 to be a moderate to low permeability whereas a clean sand
4 will have a permeability of 10^{-3} , and I should mention
5 this is all in centimetres per second, to about one
6 centimetre per second.

7 Q. Before you put that away, to the
8 best of my recollection this is not in any other report
9 and in fact you can say it is credited to the work of
10 Dr. Cherry in 1979 and since it may assist the Board
11 perhaps it should be exhibited separately.

12 DR. KINGHAM: Would that be 153?

13 MR. LEDERER: I'm not certain, but you
14 might want to associate it with this study since this
15 is the first reference and the best numbering for it
16 might well be H-38D and that would in effect put it
17 directly after the appendices and it becomes a further
18 appendix.

19 THE CHAIRMAN: All right. That is the
20 table.

21 --- EXHIBIT NO. H-38D: Table entitled "Range of Value
22 of Hydraulic Conductivity and
 Permeability"

23 MR. LEDERER: We will also undertake to
24 have some hard copy made and distributed to the various
25 representatives of the various other parties.



1 Q. Mr. Beechinor, if you could
2 continue to take us through the study methodology, please.

3 MR. BEECHINOR: A. Could you repeat the
4 question?

5 Q. Could you continue on with your
6 review of the study methodology?

7 A. The sixth step was the laboratory
8 analysis. The groundwater samples collected from the
9 wells on Sites A, B, C and D were returned to the lab
10 where we conducted chemical analysis on these samples.
11 Water samples were collected and tested for pH, sulphate,
12 alkalinity, chloride, iron, total hardness and specific
13 conductance. Soil samples were also returned to the
14 laboratory in order to conduct soil particle size
15 distribution analyses and this is a physical test to
16 classify the soil type as to their grain size. For
17 example, this is a grain size curve for a soil sample
18 collected from Site D at a depth of 1.5 metres and what
19 we have on the horizontal axis are the grain sizes.
20 There are four main grain sizes, the clay, a very fine-
21 grained soil, a little bit coarser-grained soil is the
22 silt...

23 DR. KINGHAM: Could you slide it up a bit?

24 MR. LEDERER: Q. To be very clear perhaps
25 you should indicate, if my friends will permit me to lead



1 to this small extent, but we are talking about the hori-
2 zontal axis that appears at the bottom of the table
3 as opposed to the top?

4 MR. BEECHINOR: A. Yes. Grain size is reported
5 as either a clay, a silt, a sand and a gravel and the
6 grain sizes in numeric terms are recorded here. For
7 instance, sand has a grain size between about two milli-
8 metres and 0.06 millimetres. On the vertical axis is
9 the per cent passing, and what is done when a soil sample
10 is brought to a lab it is passed through a series of
11 sieves and the per cent of soil passing or retained,
12 in this case passing, is recorded on the vertical axis.

13 Q. Again to be clear, since you say
14 it passed through various sieves, where do you see the
15 sieve sizes?

16 A. The sieve sizes are recorded along
17 the horizontal axis on the top of this curve. Now, we
18 read the curve in order to classify the soil texture.
19 If we look at this part of the curve, we can calculate
20 the percentage or the weight percentage of the total
21 for that soil sample and we would find that that curve
22 indicates about ten per cent of that soil sample falls
23 into the sand-grained size. If we look at the curve
24 that falls in the silt grain size we are able to deter-
25 mine that about 60 per cent of this soil sample falls



1 into the silt size and so on for the clay and we would
2 estimate from this soil sample that the clay would be
3 roughly 30 per cent of the soil sample.

4 Now, from that, as I pointed out, the silt
5 content of this soil sample is in the order of 60 per
6 cent and that is the dominant grain size for this soil
7 sample and the next dominant grain size for the soil
8 sample is clay and so this material is classified as
9 a clayey silt as the dominant percentage of the soil
10 is reported last.

11 In another example ...

12 Q. Just a moment. All right, I would
13 like you to put that back up because I have one other
14 question. Can you explain to the Board whether or not
15 you rely on sieves for the part of the curve which is to
16 the left-hand side beyond the number 270?

17 A. No. Sieves end, or the smallest
18 sieves are in the order of the 270 size, and for that
19 reason most of the silt and clay has to be determined
20 through the use of a hydrometer which essentially in very
21 simple terms evaluates the settling velocity of the silt
22 and clay over time and from that we are able to estimate
23 the percentage fraction of, say, clay and silt within
24 each soil sample.

25 Q. You have one other example of a



1 grain-size curve.

2 A. One other example I thought I would
3 show the Board and in this case you can see the curve
4 falls entirely -- I think I can show it better this way.
5 In this case the curve falls entirely within the sand,
6 the limits of the sand-grained size, and for this reason
7 this soil sample is classified as a sand.

8 The seventh step in the study process is
9 called the hydrogeologic relationships. Here all the
10 data is interpreted to assess the potential for contami-
11 nant migration in the subsurface at each of the sites.
12 We also relate the site-specific conditions to the
13 location of nearby water supply sources such as water
14 supply wells. Some of the tasks we follow in step seven
15 include the preparation of geologic cross-sections or
16 stratigraphic cross-sections for all the sites, and I
17 will be going into these on a site-by-site basis in a
18 few moments, and one of the other pieces of information
19 that is important to our analysis is determining the
20 direction of groundwater movement. The direction of
21 groundwater movement in a shallow overburden and the
22 direction of groundwater movement as measured by the
23 piezometers, and they are generally at the bedrock/over-
24 burden contact or about 15 metres below surface, but
25 that information is plotted and contoured in order to



1 determine the direction of groundwater movement. For
2 example, a water table as I mentioned before is measured
3 in the standpipes, the depth of water or the water
4 table elevation and it is measured in the standpipe and
5 that information is plotted and contoured and the slope
6 of those contours then defines the direction of ground-
7 water movement.

8 Now, I have another overlay and it's also
9 not contained in the report, but, for example, if you
10 assume that these three locations represent standpipes,
11 we have measured the groundwater elevation at each one
12 of these standpipes and for instance at this location
13 which is reported to be 152.8, at this location it
14 is reported to be 151.8 and at this location it is
15 reported to be 150.1, and we contour that information
16 and as you can see we have a 153 contour here and it's
17 falling in this direction, 152, 151 and 150. So,
18 essentially what we can find with these contours is the
19 slope of the water table and the slope of the water table
20 will define the direction of groundwater movement and
21 in this case the direction is thus.

22 Q. What direction does water flow in
23 relation to the contours?

24 A. Down-slope from a high contour to
25 a low contour or high potential to a low potential.



1 MR. LEDERER: I don't propose to exhibit
2 that because you will see as we go through this report
3 and others that this is done because there will be plenty
4 of examples of the contouring done in this kind of
5 situation.

6 Q. Go ahead.

7 MR. BEECHINOR: A. Mr. Sobanski alluded
8 to this earlier and he mentioned what we have defined
9 so far is the direction of groundwater movement in a
10 lateral sense. Mr. Sobanski pointed out that the
11 groundwater also moves in a vertical direction as well,
12 and what we did to determine the vertical direction of
13 groundwater movement was to measure the water levels in
14 these nests of monitoring wells. For instance, as I
15 mentioned before, a standpipe was installed at a depth
16 of about four metres and a piezometer was installed at
17 a depth of about 15 metres or at the bedrock contact.
18 Now, we compare the water level in those wells at any
19 given location and that relationship lets us know whether
20 or not we are in a discharge or recharge environment.
21 For example, you can see in this location as this is the
22 land surface, and the water table is measured at this
23 location in the standpipe here and the hydraulic head
24 in the standpipe is measured at this depth which as you
25 can see is a lower depth in relation to the water table.



1 So, this tells us that there is a decreasing hydraulic
2 gradient with depth and therefore this defines a recharge
3 environment. The reverse is true, and Mr. Sobanski
4 pointed out that if you install a well nest near a stream
5 you might see a situation such as this where the deep
6 piezometer, the water level associated with the deep
7 piezometer is above the water table measured in the
8 standpipe and in this way we have an increasing -- an
9 increasing hydraulic head with depth and that defines a
10 discharge environment.

11 The eighth step in the study process was
12 the preparation of the conceptual plans, and Mr. Sobanski
13 has discussed some of the general criteria involved in
14 the preparation of these plans and some of the steps
15 we went through in the preparation of these plans are
16 as follows; a site visit was carried out to examine
17 the topography and assess local drainage conditions, we
18 examined and reviewed air photos to understand the
19 drainage patterns better, we conceptualized the environ-
20 mental controls, and here I mean we conceptually designed
21 or conceptually planned locations of berms for screening,
22 we considered surface water quality management, we
23 considered sediment control to protect surface water
24 courses and we considered leachate collection systems
25 to protect off-site water supply wells and surface water.



1 The final step in this process involved a
2 ranking of the candidate sites. Now, the ranking was
3 based on the degree of environmental protection provided
4 by the natural setting or natural hydrogeologic setting
5 and mitigative measures necessary to remedy or reduce
6 any environmental impacts that we predicted as a result
7 of our site-specific analysis.

8 MR. LEDERER: Mr. Beechinor has indicated
9 the next thing he will do is to review with you what
10 was discovered through this study. He said it would
11 be a few moments but I think it would be better to delay
12 it until tomorrow.

13 THE CHAIRMAN: I would think so. So, it
14 being close to 5:00 o'clock we will adjourn until 9:30.

15 MR. LEDERER: Thank you, sir.

16 --- Adjournment (4:47 p.m.)

17
18 CERTIFIED CORRECT

19 
20 _____
21 C. F. Nethercut, C.V.B.

22
23
24 (page 4250 follows)
25

