

"S"

Settlement Hearings

Pinder

Rovers

MacKay

1 UNITED STATES DISTRICT COURT
2 WESTERN DISTRICT OF NEW YORK

3
4 UNITED STATES OF AMERICA, et al.,

5 Plaintiffs,

6 vs.

Civil #79-988-C

7 HOOKER CHEMICAL, et al.,

8 Defendants.

9
10 Proceedings of trial held before the
11 HONORABLE JOHN T. CURTIN, Chief Justice, in the United States
12 Courthouse, Buffalo, New York, taken on May 2nd, 1984,
13 commencing at 11:30 A.M., before SANTO VITRANO, MARILYN BROWN
14 and JAMES J. HAGERTY, JR., Court Reporters.
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INDEX TO WITNESSES

Witness	Examined By			
	Sunderland	Court	Elder	Truitt
Dr. Pinder	2	9	14	--
Frank Rovers	--	--	--	26



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1 (Appearances as before noted.)

2

3 (Proceedings reconvening after the
4 recess at 11:30 A.M.)

5 MR. SUNDERLAND: Your Honor, I had thought it would be
6 better if Dr. Pinder would go over to the
7 board.

8 THE COURT: That would help me to understand where
9 you are questioning, Mr. Sunderland, and
10 where we are.

11

12 CONTINUING CROSS-EXAMINATION BY MR. SUNDERLAND:

13

14 Q Dr. Pinder, why don't you proceed?

15 A I'm going to draw a schematic of what I visualize this
16 discontinuity to look like and then we will work from
17 there, okay?

18 THE COURT: Excuse me, Doctor, I take it that is a
19 tree?

20 THE WITNESS: Yes. Now, I think, or the conceptualization
21 of this system is we have an overburden,
22 a clay layer and a bedrock base. And I
23 think the question that you are addressing



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1 is what happens if we put in place some
2 type of cement plug, grouted portion of
3 the discontinuity. Let this red area
4 represent the zone where we put cement
5 grout. Now your question is if we had a
6 gradient in the upper direction when this
7 grout was not here such as this, what
8 happens when this grout is in place and the
9 water can't flow through the hole. I think
10 your concern that with the grout in place
11 it will not get vertical upward movement.
12 Let me draw a drain. It is in yellow.
13 The water moving to that drain will
14 basically move like this, and the same
15 from the other side. So if the drain is
16 not on the lowest point, you will get a
17 vertical upward movement of water which
18 will create a vertical gradient. If the
19 drain is right on the cement grout, then
20 of course there is no vertical gradient
21 because there is no water below the drain,
22 all of the movement would be towards the
23 drain.

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NAPL = non-aqueous phase
liquids (e.g. oil...)

1 BY MR. SUNDERLAND:

2 Q Now, the horizontal movement that you have drawn with
3 the black lines, is that connected as well with the
4 gradient, the upward gradient that is underneath the --
5 the clay layers to the right and left of your diagram?

6 A There will be a vertically or vertical upward gradient
7 across the clay layer and also across the grout. So
8 the gradient will exist but the material properties are
9 such that the permeability is so low you will have very
10 little physical movement of water across either this
11 barrier or this barrier. As these barriers become more
12 permeable, then you will have more water movement through
13 them.

14 Q Now, am I correct in saying from your earlier statement
15 that it is your opinion that the potential of collection
16 of NAPL by the containment system is greater if we
17 grout the discontinuity than if we achieve the definition
18 of a confining layer equivalent at the discontinuity?

19 A Well, to answer that question --

20 THE COURT: Doctor, some time before Mr. Sunderland
21 would use the phrase collective layer
22 equivalent?

23 THE WITNESS: Yes.



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1 THE COURT: And then that gave you some trouble?

2 THE WITNESS: Yes.

3 THE COURT: Can you tell me what is the difficulty?

4 THE WITNESS: Well, what he asked me was just now if
5 I have any in place, do I feel it will
6 capture NAPL more effectively if this is
7 not here, that is my understanding of your
8 question.

9 MR. SUNDERLAND: If it is not here and you achieve the
10 definition of the confining layer equivalent?

11 THE WITNESS: The reason I have some hesitancy in
12 answering you is that I prefer not to have
13 this grout here, the reason I prefer not
14 to have it here is that the potential for
15 collection is more far reaching without
16 any grouted portion in place. In other
17 words, if this is not here, any NAPL that
18 may have inadvertently gotten below this
19 plug elevation has the potential of being
20 drawn up and captured, so philosophically
21 I would like to have a design that captures
22 potentially as much of the NAPL as possible.

23 MR. ELDER: Your Honor, the record should reflect when



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1 Dr. Pinder said here he was referring to
2 the portion of the Exhibit number 96 that
3 is below the grout material in the bedrock.

4 MR. SUNDERLAND: Now, if the -- if we get away from the
5 grouting mechanism and we go back to the
6 confining layer equivalent notion, do you
7 have any opinion today as to where the
8 drains in relation to the clay layer would
9 be placed or is that something that can't
10 be achieved until we get down to the design
11 phase?

12 THE WITNESS: Well, I think that the exact location of
13 the drains should be based on the infor-
14 mation that we acquire during the investi-
15 gative phase of this project. I think to
16 make any concrete suggestions before that
17 would be premature.

18 BY MR. SUNDERLAND:

19 Q Okay. You earlier stated in your direct testimony that
20 it was your view that the containment system or more
21 appropriately stated, the collection system would, if
22 the upward gradient necessary to contain the NAPL were
23 attained, would collect some of the NAPL, do you have



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1 any quantification or statement that you can give to that,
2 in other words, how effective in your view would the
3 collection system be in actually collecting and removing
4 NAPL from the system?

5 A It is difficult for me to give you a quantitative answer
6 unless I were to do some additional simulations. The
7 basic idea of moving NAPL vertically upward through this
8 zone in the absence of the cement, holds until it reaches
9 the drain. There is no particular location. May I
10 draw another picture without our cement plugs?

11 THE COURT: Sure.

12 THE WITNESS: So we don't get confused here. We will
13 make a nicer tree. We will hypothesize,
14 the drain is indicated in yellow. And
15 the concept is that over an area that is
16 represented by this discontinuity there
17 will everywhere be an upward gradient
18 so we will have a drain here, and of
19 course also here. Now, once NAPL begins
20 to migrate under the influence of this
21 gradient, we have a NAPL region in blue,
22 once this begins to migrate up towards the
23 drain, there is no mechanism that is



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1 obvious to me that will preclude its
2 movement into the drain and eventual
3 capture. Okay? I would suspect that in
4 the best case scenario what would be
5 resident here would be that residual
6 saturation we talked about earlier.

7 BY MR. SUNDERLAND:

8 Q And, that residual saturation that we talked about
9 earlier would as well remain in any of the areas of the
10 landfill that exist today?

11 A Yes. But do keep in mind that we have a large volume of
12 flow across this area where the residual saturation would
13 exist. The opportunity for dissolution into the aqueous
14 phase is optimized in this area. In other words, there
15 is more water moving past those discrete blabs of NAPL
16 that are left in the porous media. And because of that
17 you have an optimum likelihood of dissolving that NAPL
18 over a reasonable period of time.

19 Q That would be true for the NAPL that was contained around
20 the discontinuity, the residual NAPL that is still left
21 in the other portions of the landfill would not have the
22 same amount of water and consequently not the same
23 potential for dissolution, correct?



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1 A I think that's a fair statement.

2 MR. SUNDERLAND: Thank you, Dr. Pinder. Your Honor, I
3 have nothing further.

4
5 EXAMINATION BY THE COURT:

6
7 Q Doctor --

8 A Yes.

9 Q To go back to your initial diagram.

10 A Way back in the beginning?

11 Q Right at the very beginning. Over here. Okay. Now, as
12 I understand it, when we were talking before with Mr.
13 Sunderland, when you referred to remedial strategy
14 tested, that is a mathematical testing?

15 A Yes, sir.

16 Q And you then drop down to the next box, strategy
17 effective?

18 A Yes, sir.

19 Q As I understand it, we do have the concept of the drains?

20 A Yes, sir.

21 Q And, to take off this material, but we are going to have,
22 as I understand it, further information gathering?

23 A Yes, sir.



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1 Q So that now when we get to that place, when you get
2 further information I suppose, then that means you will
3 have to reconsider?

4 A Yes, sir. Go right back up to here.

5 Q Go back up to field information acquired?

6 A Yes, sir.

7 Q As I understand it, that will be done under the agreement?

8 A That's my understanding, sir.

9 Q So that as far as -- I mean the belief now is that we
10 would still be with the drain system, but as to where to
11 place the drains, how many drains, size and so forth,
12 I mean these are engineering concepts?

13 A Yes, yes.

14 Q Which I know you will not get into, this would be all
15 considered again in your mathematical consideration?

16 A Exactly. That's the exactly the way this should be
17 viewed. They're down here on the first pass to look at
18 feasibility. The consent order is written in such a
19 way that it will bring us back up and we will update
20 and improve our simulation capability through the
21 investigative stage, and optimize the design of the
22 remedial system.

23 Q Fine. Now, then, when you finally get down, I suppose



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1 remedial strategy implemented, that means the work is
2 done, and the drains are put in, and the system begins
3 to operate, and even after that there will be monitoring?

4 A Yes, sir.

5 Q Is that true? Well now, even after all of the, you know,
6 your mathematical considerations and design of the system,
7 the work begins and you have monitoring, and what happens
8 after that, I mean if there is certain portions that
9 don't seem to be working as they should. Do you know?

10 A The consent order is written in such a way if that should
11 occur, that there must be additional work done through
12 what's called RRT concept.

13 Q All right. We'll get to that with Mr. Rovers?

14 MR. TRUITT: We hadn't specifically intended to go
15 through that concept here, it's the same
16 as the concept in --

17 THE COURT: I see.

18 MR. TRUITT: In Hyde Park, when you reach that point
19 where the performance standard as it were
20 wasn't done, then we do a study, and the
21 Governments look at it, and if we can't
22 come to a joint resolution, we come to
23 Your Honor.



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1 THE COURT: This is part of the RRT?

2 MR. TRUITT: Yes, sir. That is the RRT.

3 THE COURT: Now, before you talked about the use of
4 similar designs, for example, in pumping
5 oil or gas, and things of that nature.

6 THE WITNESS: Yes, sir.

7 BY THE COURT:

8 Q Now, there is the -- did they use a similar design of the
9 drain system or --

10 A It's similar in the sense, what they're trying to do is
11 collect the NAPL phase. But it's different, because they
12 can't get down to those depths, and build a drain. What
13 they do is they put in a well. Typically you have this
14 kind of classical situation, this would represent the
15 confining bed. It's an upside down problem. This now is
16 very low permeability. Now, here we have what they call
17 a reservoir rock. It's a rock where water and oil
18 coexist. In this case, because oil is lighter than water,
19 in most of the situations, the water resides on the
20 bottom. What they do, they put down a well and they
21 want to try and get the oil out without drawing the water
22 in, because once the water goes in, you have a mixture
23 of oil and water that has to be separated, and it's not



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1 efficient. Then to use your mathematical simulator to
2 figure out how many wells to put in, where to put them,
3 so you draw the oil without invading the well with the
4 water phase, they don't want this to happen. Same thing
5 happens in salt water intrusion, in coastal aquifers,
6 you don't want to bring the salt water up and destroy
7 the well. Every oil company has a whole division dedicated
8 to the mathematical model of this, to optimize this kind
9 of production strategy. We're using the same idea in
10 terms of trying to capture the oil, but now it's a
11 different reason but the same basic idea.

12 Q Right. Now here, in the use of the system, you say if
13 it appears to you that perhaps it would be overdesigned,
14 so instead of just containing the materials that there
15 is instead of retaining the materials an overdesign,
16 there is a good possibility that at least if I could
17 use the free flowing material, that is material that is
18 not still contained within barrels, drums and so forth,
19 that it will be captured and be carried off by the drain
20 system?

21 A Yes, sir. I think what we can logically expect is that
22 it's most unlikely that we will get a gradient that
23 exactly balances gravitational forces. Almost certainly



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1 we will overdesign to the point this is moving, albeit
2 slowly, upwards, then I will anticipate what we will see
3 is this kind of gradual progression to the drain where it
4 is gradually collected. You will have only the residual
5 saturation, the immoveable saturation left.

6 Q Will the monitoring system in your last box there,
7 will that give you some idea of what is occurring,
8 whether this is happening?

9 A What this will do in this particular case is give us a
10 measure of the upward movement of the aqueous phase
11 around the NAPL. It does not measure directly the
12 saturation of the NAPL in place. I don't know of a
13 technology that will allow us to do that. I can add
14 that we are working on technology that would measure
15 the movement of this NAPL up or down, but that is a
16 university project, it's not in the public domain at this
17 point.

18 THE COURT: Anything else, Mr. Elder?

19
20 REDIRECT EXAMINATION BY MR. ELDER:

21
22 Q I just have a couple brief redirect questions. Dr.
23 Pinder, you testified in response to Mr. Sunderland's



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1 question that you weren't aware of any experiments that
2 had been conducted other than the computer simulation.
3 By that do you mean that no such experiments exist or
4 that you yourself were not made aware of them?

5 A I'm aware of experiments that have been done at the
6 university to check mathematical simulator against
7 experimented generic levels. Does this mathematical
8 model capture the physics in this column. Although I
9 have every expectation that such experiments have been
10 done in this case, I simply am not aware of them.

11 Q That's my point. Dr. Pinder, on cross-examination Mr.
12 Sunderland asked you to postulate about the possibility
13 of pockets, dips and dishes in the clay layer that might
14 trap the NAPL. Is it possible there might be pockets,
15 dips and dishes in the bedrock which would trap NAPL,
16 if in fact NAPL has moved off site as Ontario has
17 postulated?

18 A I think the same phenomenon holds when you talk about
19 the clay or you talk about the formation that underlines
20 the river. I think my observations of that formulation,
21 just driving in, looking at the road cuts, I think there
22 is a reasonable possibility that such dips and depressions
23 do exist, at least in the bedrock.



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1 Q If they do exist, they will trap the non-aqueous phase
2 liquids?

3 A They trap them in the same sense counsel has described.

4 MR. ELDER: Nothing further, Judge.

5 THE COURT: Mr. Sunderland?

6 MR. SUNDERLAND: Go ahead, Your Honor.

7 THE COURT: I think the answer is obvious, I wanted
8 to be sure, that when you gave us one
9 example about the Ping-Pong ball being
10 suspended in air by the force of air
11 pressure, now of course, if you kept the
12 air pressure up, then the ball would just
13 stay in the air as long as you want to
14 keep the pressure up?

15 THE WITNESS: Right.

16 THE COURT: Is that true of the system here, I mean
17 let's assume it's being maintained and
18 so forth, would that -- would that continue
19 through the years to give us the appropriate
20 upper gradient that you're talking about?

21 THE WITNESS: Yes, sir.

22 THE COURT: All right.

23 THE WITNESS: And remember when you talk about the Ping-



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1 Pong ball, I think it's a good analogy,
2 it's very difficult to set up the air
3 pressure so it just suspends it, it's
4 much easier to get it to flow up or fall
5 down, that's logic, that leads me to here,
6 we'll overdesign the system, and in fact
7 the NAPL will move up rather than just be
8 suspended there.

9 MR. SUNDERLAND: I actually had thought Your Honor had
10 asked this question before. Let me ask
11 it, if in the system of collecting NAPL,
12 if we find it in the drain, we can conclude
13 that it certainly is collecting NAPL?

14 THE WITNESS: If we don't find it in the drain, it may
15 still be moving up, it doesn't mean it is
16 moving down.

17 MR. SUNDERLAND: When would you anticipate, once the
18 system gets functioning, when would you
19 anticipate that one would first know whether
20 NAPL is being collected?

21 THE WITNESS: I'm trying to remember back to the
22 simulations that were done. I think we're
23 probably talking in terms of somewhere



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1 greater than a matter of months, and
2 less than several years, understanding
3 that that is just extrapolation from
4 work that's been done, not specifically
5 addressed to that question.

6 MR. SUNDERLAND: Would it be fair to say if there is no
7 collection say in a period of five years
8 or after some point that you could define,
9 that the conclusion reasonably could be
10 reached that NAPL will not be collected
11 by the system?

12 THE WITNESS: If I were involved in the design of the
13 drains, and privy to the information that's
14 known about the NAPL, I think that if I
15 didn't see NAPL entering the drains in the
16 five year period, I would become concerned.

17 MR. SUNDERLAND: Thank you. Thank you, Your Honor.

18 THE COURT: Well, because the whole purpose of the
19 system is to either pick up or contain?

20 THE WITNESS: Exactly.

21 MR. SUNDERLAND: I just want to make -- I would like to
22 make a comment.

23 THE COURT: Go ahead.



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1 MR. SUNDERLAND: We have had kind of a free flowing thing
2 here, which we seem to --

3 MR. TRUITT: It makes me very nervous. I want to make
4 -- if I may, a statement. I think the
5 record has gotten somewhat skewed, at
6 least from our perspective. The primary
7 purpose of remediation system that is
8 displayed in the consent judgment is
9 containment. As a result of how it is
10 designed and how the witness has testified
11 that it will be overdesigned, it is also
12 contrary to what Mr. Sunderland's
13 client suggests. It also collects, and
14 so the witness' response about the witness
15 would become concerned, that is the
16 witness' concern, that is not the Govern-
17 mental party's concern or the Defendant's
18 concern.

19 THE COURT: Well, we have gone through all this before,
20 I suppose you're right in making that
21 statement. Anything else?

22 MR. SUNDERLAND: He made it clear, Your Honor, exactly what
23 I wanted to make clear, that's fine.



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1 THE WITNESS: I think -- I think the key thing you have
2 to keep in mind, if I designed the system,
3 that may not be the same system that's
4 going to be designed by Hooker.

5 THE COURT: Mr. Elder, anything else?

6 MR. ELDER: I have nothing further, Judge.

7 THE COURT: Well, that is all.

8 MR. ELDER: May the witness be excused, Judge?

9 THE COURT: Yes.

10 MR. ELDER: Judge, with the conclusion of Dr. Pinder's
11 testimony, the Federal Government rests
12 its case in support of the settlement
13 agreement, reserving the right to call
14 rebuttal witnesses as necessary in response
15 to whatever the testimony Ontario may
16 produce.

17 THE COURT: Well, now is Dr. Pinder, is he going to
18 stay, is he going to be here, how about
19 on rebuttal, we did discuss the affidavit
20 of -- what is his name, Mr. Sunderland?

21 MR. SUNDERLAND: Grisak.

22 THE COURT: Grisak, is there any possibility that he
23 may be needed in rebuttal?



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1 MR. ELDER: Judge, we have another witness who will
2 be available for rebuttal and who is
3 extremely well qualified to address the
4 matters that might be raised by Mr.
5 Grisak, we have no concern about rebuttal
6 or Dr. Pinder leaving.
7 THE COURT: Dr. Pinder, thank you very much.
8 MR. TRUITT: Judge, we have between fifty and sixty
9 minutes of testimony with Frank Rovers
10 and we are prepared to start it now, we
11 would like to finish it if we start it
12 or we are prepared to take a lunch break.
13 THE COURT: Well, did you have an opportunity to go
14 over any material you wanted to go over
15 with him?
16 MR. TRUITT: The fact of the matter is we have him
17 trained up pretty well now.
18 THE COURT: Well, then in that event, why don't we
19 take a luncheon break, I think it would be
20 better if we did that. If we took a
21 recess break now.
22 MR. TRUITT: I think that is right.
23 THE COURT: And then came back at, you think one



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1 o'clock, Mr. Truitt?

2 MR. TRUITT: That is fine.

3 THE COURT: Come back at one.

4 (Whereupon a luncheon recess was then
5 taken at 12:00 P.M.)

6 (Proceedings reconvening after luncheon
7 recess at 1:15 P.M.)

8 THE COURT: Do you want to step down and be sworn?

9 MR. ELDER: Mr. Truitt, before you call your witness,
10 Judge, I don't think I formally offered
11 a number of our exhibits into evidence,
12 I would like to do that at this time.

13 THE COURT: Fine. All right. Whatever the numbers are,
14 you can tell the Court.

15 MR. ELDER: We will provide the Court with the full
16 list as requested to do earlier.

17 THE COURT: Fine.

18

19 F R A N K R O V E R S, 14 Post Horn Place, Waterloo, Ontario,
20 Canada, after being duly called and sworn, testified as follows:

21

22 MR. TRUITT: Your Honor, if I may summarize his
23 professional experience, Mr. Rovers is a



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1 professional engineer and hydrogeologist,
2 he received his Bachelor of Science Degree
3 in 1970 from the University of Waterloo.
4 In 1972 he received a Master of Science
5 Degree in civil engineering with emphasis
6 on hydrogeology, also from the University
7 of Waterloo in Ontario, Canada. Mr. Rovers
8 was a senior engineer with Hydrology
9 Consultants Limited between 1973 and 1975.
10 Since 1976 Mr. Rovers has been a principal
11 in the engineering firm of Conastoga, Rovers
12 & Associates, Waterloo, Ontario, Canada.
13 Mr. Rovers has been a university lecturer,
14 teaching undergraduates and at the graduate
15 level course in sanitary engineering,
16 sanitary chemistry, hydrology. He taught
17 at the University of Waterloo from 1970,
18 1975, University of Ottawa from 1975
19 and 1978, and the University of Buffalo,
20 1976 to 1977. At the present time, Judge,
21 he is adjunct professor of civil engineering
22 at the University of Waterloo. Conastoga
23 and Rovers Associates is a civil engineering

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1 firm with thirty-five professional staff
2 members. It is engaged in research and
3 development activities dealing with hazardous
4 waste material handling and landfill
5 management as well as the design of waste
6 disposal on land systems. This includes
7 remedial work on existing facilities as
8 well as traditional civil engineering work
9 such as roads, sewer design and con-
10 struction. Conastoga, Rovers represents
11 Governmental as well as private parties
12 and some of its Governmental clients have
13 included Environment of Canada, which is
14 the Canadian equivalent of our EPA, the
15 Ministry of the Environment of the Province
16 of Ontario, the entity which is participating
17 in this proceeding, the City of Niagara
18 Falls, the New York State Department of
19 Environmental Conservation, the United
20 States Environmental Protection Agency,
21 whereas as a hazardous landfill sub-
22 contractor, Conastoga, Rovers has worked
23 for various Super Fund programs. Mr.

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1 Rovers has personally designed and super-
2 vised remedial programs at a number of
3 existing and former waste disposal sites
4 both in the Niagara Frontier area and in
5 other locations in the United States and
6 Canada. He was a key participant in the
7 settlement discussions with the various
8 Governmental parties throughout the past
9 four years, first as Your Honor will recall,
10 in conjunction with the Hyde Park remedial
11 program and subsequently in the S-Area
12 program. I'm sure Your Honor will recall,
13 I trust favorably, Mr. Rovers' testimony
14 in the proceedings which led to this
15 Court's approval of the Hyde Park decree.
16 Mr. Rovers has published forty-one
17 professional articles, papers and reports
18 dealing with waste disposal on land systems.
19 Mr. Rovers is a member of the Association
20 of Professional Engineers of Ontario, the
21 American Waterworks Association, the
22 Water Pollution Control Federation, the
23 Canadian Society of Civil Engineers and the

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1 Soil Conservation Society of America.
2 I request that Mr. Rovers' curriculum
3 vitae including a list of his publications
4 and papers which I have had marked as
5 Defendant's Exhibit number 1, Mr. Wasser is
6 handing out the copies of it, I ask that
7 it be marked and identified as number 1.
8 With the Court's permission then, we would
9 offer Mr. Rover is qualified to testify
10 in these proceedings and to render
11 professional opinions and judgments
12 concerning the work that we will establish
13 that he performed in conjunction with the
14 document that is before Your Honor.

15 THE COURT: Why don't you continue, Mr. Truitt?

16
17 DIRECT EXAMINATION BY MR. TRUITT:

18
19 Q Mr. Rovers, would you please describe to the Court the
20 circumstances of your initial involvement on behalf of
21 Hooker with the S-Area landfill?

22 A From 1979 Conastoga, Rovers and Associates was retained
23 by Hooker, now Oxy, to advise them on civil engineering



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1 and hydrogeologic matters regarding S-Area landfill
2 site.

3 Q Have you continued from then until the present time to
4 be engaged by Hooker to address the S-Area landfill?

5 A Yes, I have.

6 Q Mr. Rovers, would you please summarize very briefly your
7 understanding concerning the history of Hooker's use of
8 the S-Area landfill?

9 A Yes, I will. Very briefly, my understanding of the S-Area
10 landfill as follows, firstly, the site is located on
11 land reclaimed from the Niagara River. The reclamation
12 took place in the late 1930's and early 1940's. After
13 reclamation, Hooker used the area for the disposal of
14 wastes from about the period 1947 to 1961. During the
15 period of 1961 to '60 -- or 1975, the site area was
16 used for the washing of various equipment. However,
17 no waste was disposed of at the site during this period.
18 It was closed in 1975.

19 Q Mr. Rovers, is it your understanding that all of the
20 wastes landfilled at the S-Area are NAPL?

21 A No, not all the waste at S-Area are NAPL. It is
22 estimated that approximately forty percent of the
23 material that was disposed of at S-Area during 1947



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1 [REDACTED] and 1961 was NAPL.

2 Q In the course of your work at the S-Area landfill, have
3 you studied data concerning the geologic and hydro-
4 geologic conditions at the S-Area landfill and the
5 surrounding area?

6 A Yes, I have.

7 Q What type of data did you study, sir?

8 A There were two types of data that were studied. First
9 of all, we looked at and searched up historic data
10 available for the date, and secondly we undertook our
11 own investigations which were commissioned by Hooker
12 for the area.

13 Q Mr. Rovers, I'm going to show you a document that I have
14 had marked as Defendant's Exhibit number 2, and it is
15 entitled chronology of historical geologic and hydro-
16 geologic investigations, S-Area drinking water treatment
17 plant and Buffalo Avenue plant, and ask you if you will
18 identify it and explain to the Court what it is?

19 A Exhibit number 2 identifies the historic bore hole
20 data available in the area of the S-Area drinking water
21 treatment plant, that was the bore holes were installed
22 during the period 1908 until 1977. During this period
23 five programs or drilling programs were undertaken in the



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1 area of S-Area. They were undertaken by the City of
2 Niagara Falls in four cases, and undertaken by the Power
3 Authority, State of New York in one case. These logs
4 identify the geology of the area.

5 Q Mr. Rovers, I would like to show you a document which I
6 have caused to be marked as Defendant's Exhibit number 3,
7 which is entitled chronology of historical geologic
8 and hydrogeologic investigations, S-Area drinking water
9 treatment plant and Buffalo Avenue plant, and ask you
10 if you will look at it and identify it and tell the
11 Court what the document shows?

12 A Exhibit number 3 identifies the programs of bore holes
13 installation and monitoring well installation for the
14 period 1979 to the present, which were commissioned in
15 large part by Hooker Chemical, also commissioned by the
16 City of Niagara Falls for both bore hole and well
17 installation in the area of S-Area in the drinking
18 water treatment plant. In total nine programs of such
19 drilling and well installation took place during this
20 period.

21 Q With reference now to Exhibit number 3, would you take a
22 look at it and tell the Court, please, what entities
23 collected the data which is described on that exhibit?



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- 1 A The entities that collected the data were Hooker
2 Chemicals and Plastics, that requested specific infor-
3 mation, hydrogeologic information of the area
4 commissioning the firm of Leggette, L-E-G-G-E-T-T-E,
5 Brashears, B-R-A-S-H-E-A-R-S, and Graham, G-R-A-H-A-M.
6 That firm is a hydrogeologic firm. They were commissioned
7 to undertake some hydrogeologic investigations of the
8 area on behalf of Hooker, to identify work that was done
9 by Conastoga, Rovers and Associates as commissioned by
10 Hooker, and identify work as done by Clayton Environ-
11 mental Consultants, commissioned by the City of Niagara
12 Falls for work on the drinking water treatment plant.
- 13 Q Thank you. Mr. Rovers, would you please summarize the
14 three purposes of the data gathering that is shown on
15 Defendant's Exhibits number 2 and 3?
- 16 A Yes, I will. There is three purposes for this data
17 gathering. First of all, we wanted to find the geologic
18 and hydrogeologic conditions of the S-Area, and the
19 drinking water plant. Secondly, we wanted to define the
20 pathways of migration or the pathways of chemical migration
21 from the S-Area landfill site, and thirdly, we wanted to
22 define appropriate remedial measures to alleviate that
23 chemical migration that was occurring.



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1 Q Mr. Rovers, in Exhibits number 2 and 3, which you have
2 before you, which describe the chronology of investi-
3 gations, those exhibits make references to wells, and
4 to bore holes. May I ask you to tell the Court how
5 many bore holes and wells have been drilled in and about
6 the area, S-Area landfill in the time line that is
7 described in Defendant's 2 and 3?

8 A During the period described by Exhibits number 2 and
9 number 3, approximately fifty bore holes and approxi-
10 mately seventy-five monitoring wells have been installed
11 in and around the S-Area and drinking water treatment
12 plant.

13 Q Mr. Rovers, did your data collection activities include
14 any laboratory experiments to simulate the behavior
15 of the NAPL in the S-Area hydrogeologic environment?

16 A Yes, it did.

17 Q Would you explain what those were?

18 A One of the remedial measures that were identified for
19 containment of chemicals at the S-Area landfill site
20 was hydraulic containment. Our data base identified
21 that there were two sources of chemicals at S-Area
22 which needed to be contained, and that was non-aqueous
23 phase liquids and aqueous phase liquids. Studies were



1 undertaken in the laboratory of the New York State
2 Department of Environmental Conservation and Conastoga,
3 Rovers and Associates, and Arthur D. Little, to evaluate
4 what exact hydraulic controls would have regarding the
5 migration of both aqueous phase liquids and non-aqueous
6 phase liquids or NAPL.

7 Q Did those experiments show to your satisfaction that
8 under appropriate hydraulic conditions designed to achieve
9 an upward gradient in the water, that NAPL would not move
10 downward?

11 A That is correct. They did show that.

12 Q Now, were the results of these experiments communicated
13 broadly among all of the Governmental parties during the
14 settlement discussion which gave rise to the consent
15 judgment before His Honor?

16 A Extremely broadly, they were the topic of -- probably the
17 central focus on all of the discussions, because it was
18 this method that would contain the S-Area landfill site.

19 Q Now, Mr. Rovers, was any data gathered in the course of
20 your work at S-Area to address manmade impacts on the
21 geologic environment?

22 A Yes. We did an extensive historic data file search of
23 both the City Engineering files, the Power Authority,



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1 State of New York Engineering files, and the Mohawk
2 Power Authority for the Mohawk Power Company files to
3 search for all manmade installations in the geologic
4 environment.

5 Q Would you --

6 A Manmade installations such as pipe installations,
7 foundation installations, and footing installations and
8 so on. All conserved to be manmade pathways of migration,
9 and those were searched through, those files.

10 Q Would -- would an electrical conduit be a further
11 example of a manmade natural pathway that would cause
12 migration?

13 A Yes, it would.

14 Q Mr. Rovers, what role does soil permeability play in the
15 study of conditions at landfill sites such as S-Area?

16 A A very significant role. As Your Honor has heard
17 throughout these proceedings, permeability is the
18 measure of the ability of the soil environment to
19 transmit liquids, and it is liquids that transmit the
20 chemicals from the site. So it is a very important
21 factor in determining the remedial measures for the S-Area
22 landfill site.

23 Q Mr. Rovers, have tests been conducted to define the



1 permeability of the overburden and bedrock at the S-Area
2 landfill?

3 A Yes, they have.

4 Q Would you describe the tests that have been conducted?

5 A Three types of tests have been conducted at the S-Area
6 landfill site for the overburden and bedrock to define
7 permeability. The first test that was undertaken, a
8 first test that was undertaken was the taking of a soil
9 sample from the site taking that into the laboratory
10 and undertaking a laboratory permeability analysis.
11 A second test that was undertaken is identified or called
12 a slug test. And, this test is done on an installed
13 well at the site, and it measures the very local
14 permeability of the soils in the area of that well
15 installation. And finally, a test was undertaken in
16 the overburden and the bedrock to define the permeability
17 called a pump test. And in such a test, the well is
18 pumped of water, and the impact of that pumping is
19 measured in both the rock and the overburden, and an
20 evaluation is done and permeability is calculated.
21 Q Mr. Rovers, you testified earlier that one of the purposes
22 of the data gathering was to define the geology and the
23 ground water flow regime, my question is what data was



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1 collected to allow this definition?

2 A The first instance soil information is collected to
3 define the geology and ground water elevations are
4 measured to define gradients of flow.

5 Q Mr. Rovers, in your judgment from the data that has
6 been collected, what does the data indicate about the
7 geology and gradient and direction of the ground water
8 flow in the overburden in the vicinity of the S-Area
9 landfill?

10 A The data that we have collected indicates that the over-
11 burden materials consist of three main components. The
12 very surface materials are a film material, this overlies
13 an alluvium sand material, this overlies a clay till.
14 All of this overburden soil material overlies the bed-
15 rock, the measurement of water level elevations in the
16 various wells show that ground water flow from S-Area
17 and the drinking water treatment plant is southward
18 or towards the Niagara River.

19 Q And that is in the overburden?

20 A That is in the overburden, yes.

21 Q Now, what does the data show about the geology and the
22 gradients and the direction of flow of the ground water
23 in the bedrock in the vicinity of the S-Area landfill?



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1 A The bedrock beneath the S-Area landfill site and
2 surrounding area is identified to be a dolomite material,
3 more fracture than the upper zones than at depth, so
4 that the upper fifteen feet or so is more fractured
5 than the deeper zones of the bedrock, water elevations
6 measured in the bedrock indicate that flow in the
7 bedrock is north northwestward or from the river into
8 the site and towards Buffalo Avenue.

9 Q Mr. Rovers, does this ground water data indicate the
10 direction and rate of chemical migration from the land-
11 fill?

12 A I would like to split that up into the two flow patterns
13 that you can have or the two sources of chemical,
14 first of all, you have chemicals that can migrate either
15 in the aqueous phase liquid or as a non-aqueous phase
16 liquid. We will address aqueous phase liquids first.
17 Knowing the direction of ground water flow, you do
18 in fact know in what direction the aqueous phase liquid
19 is going to migrate. You do know how the dissolved
20 chemical will migrate so the overburden dissolved
21 chemical migrates toward the river and the bedrock
22 dissolved chemical migrates towards Buffalo Avenue.
23 However, non-aqueous phase liquid is not influenced



1 totally by the gradients of the ground water flow
2 regime. In fact, non-aqueous phase liquids being
3 heavier than water, can migrate under its own weight
4 against the ground water flow direction. So that in
5 fact with respect to non-aqueous phase liquids, the
6 direction of ground water flow does not necessarily
7 define the direction of non-aqueous phase liquid flow.

8 Q Mr. Rovers, you testified earlier that the purposes of
9 the data collection and analysis include defining the
10 pathways of chemical migration and defining remedial
11 proposals to address those pathways. In your pro-
12 fessional opinion, is the data collected and the
13 analysis that you have described to the Court just now
14 adequate to define remedial proposals for the S-Area
15 chemical migration in the overburden and in the bedrock?

16 A Again I would like to split that up into two parts. First
17 I would like to address the overburden. The data that
18 we have collected at S-Area and the drinking water
19 treatment plant we believe to be adequate to address
20 chemical migration in the overburden in the vicinity of
21 the drinking water treatment plant and S-Area. We do
22 recognize, however, there is chemical or the potential
23 for chemical migration outside these two areas, and that



1 migration will be identified by surveys and addressed
2 with appropriate studies after the surveys are completed.

3 Q Now, before you go on, does the settlement agreement
4 provide with a collection of all the data that you
5 believe will be necessary for that purpose?

6 A It does that, yes.

7 Q All right. Could you go now and answer the second portion
8 of the question?

9 A In the bedrock our data base is not as complete as it is
10 in the overburden. We have enough data to identify the
11 appropriate remedial measures in the shore shaft in the
12 bedrock and in the intake tunnels in the bedrock. The
13 remedial measures as such have been defined in the
14 settlement agreement. We, however, do not have enough
15 data outside the intake tunnel and shore shaft in the
16 bedrock for the definition of a remedial measure. Again,
17 the settlement agreement defines how data will be
18 collected so that we can properly address any chemicals
19 we would find in the bedrock with appropriate studies.

20 Q Mr. Rovers, in your opinion is existing data sufficient
21 to determine whether non-aqueous phase liquids have
22 migrated along the bedrock bedding planes south underneath
23 the Robert Moses Parkway towards the Niagara River and in



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1 this connection I would like to call your attention to
2 Government's Exhibits number 12 and 27. For Your Honor's
3 convenience, are both of those exhibits -- are they up
4 there?

5 MR. WASSER: This is number 12, this is number 27.

6 MR. TRUITT: The one closest to you, Judge, is 12,
7 the other is 27. Do you have the question,
8 Mr. Rovers?

9 THE WITNESS: Yes, I do, Mr. Truitt. First of all,
10 Exhibit number 12 identifies all of the
11 existing survey locations in and around
12 S-Area and the drinking water treatment
13 plant, particular attention should be
14 pointed out to the location south of the
15 parkway, the Robert Moses Parkway. You
16 will observe that there are seven such
17 survey locations to the south of the
18 Robert Moses Parkway. Secondly, I would
19 like to point out the information presented
20 on Exhibit number 27, Exhibit number 27
21 is entitled identified NAPL locations.
22 These were the locations of all the surveys
23 done south of the parkway which identify



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1 NAPL for example. You will see --

2 BY MR. TRUITT:

3 Q May I stop you right there, on Exhibit number 27, how
4 many wells are listed south of the S-Area landfill?

5 A Only one.

6 Q And have you had occasion to examine the well logs in
7 conjunction with that well?

8 A Yes, I have.

9 Q Have you drawn any professional judgments concerning the
10 efficacy of the data provided as related to that well?

11 A Yes, I have, and I would like to explain.

12 Q Would you like to tell the Court what your judgment is
13 about that?

14 A Yes, during the installation of the well at that location
15 shown on Exhibit number 27 it was a well that was
16 installed through the overburden and during that
17 installation non-aqueous phase liquids were encountered in
18 the overburden. That well installation continued on
19 down into the bedrock, subsequently was identified that
20 non-aqueous phase liquids were in the bedrock. However,
21 it is my belief that it was very possible that a cross
22 contamination, a cross connection or an interconnection
23 occurred during that installation so that non-aqueous phase



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1 liquids identified in the bedrock was in fact carried
2 down during the well installation procedure. It is to
3 be pointed out that NAPL was not located at the other
4 six locations in the area of S-Area south of the Robert
5 Moses Parkway.

6 THE COURT: Now, do all the wells shown on 26, do
7 they all go to bedrock or some just over-
8 burden?

9 THE WITNESS: Some go to overburden and some go to bed-
10 rock, but in both the overburden and the
11 bedrock south of the Robert Moses Parkway,
12 only one well identified NAPL in either
13 the overburden or the bedrock. Upon
14 examination, however, we see that that
15 one well locates both NAPL in the over-
16 burden and in the bedrock. And it is very
17 possible that the NAPL was carried from the
18 overburden into the bedrock as an inter-
19 connection or a cross contamination.

20 THE COURT: Now, what about the other wells south of
21 the parkway on 26, do they all go to
22 bedrock?

23 MR. WASSER: Excuse me, Your Honor, I believe this is



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1 Exhibit 12.

2 THE COURT: I'm sorry, 12.

3 THE WITNESS: All of them do not go to bedrock.

4 THE COURT: Do some of them go to bedrock?

5 THE WITNESS: Yes, they do.

6 THE COURT: All right.

7 THE WITNESS: As you will notice, Your Honor, the some
8 that do go to bedrock except for this
9 one well did not identify NAPL in the
10 bedrock. As a result of this evaluation,
11 I concluded that we do not have enough
12 information to identify NAPL in the bed-
13 rock south of the landfill site.

14 BY MR. TRUITT:

15 Q All right. Thank you. Mr. Rovers, will the data
16 collection required pursuant to the settlement agreement
17 address the issue of NAPL bedrock migration towards the
18 river, in that conjunction I call your attention to
19 Government's Exhibit number 39? Please note, Judge,
20 that Exhibit number 39 has been placed up here and it
21 is entitled off site survey location.

22 A Your Honor, Exhibit number 39 identifies the types of
23 surveys that are to be undertaken around the S-Area



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1 which would allow for the study of NAPL migration from
2 the S-Area landfill site. Two types of wells are being
3 installed in this survey, there are overburden wells
4 being installed, both immediately south and north of the
5 Robert Moses Parkway, and there are bedrock wells being
6 installed all around the S-Area landfill site. This
7 survey will provide the type of information we need
8 to understand NAPL migration in the bedrock.

9 Q Mr. Rovers, I think I want to ask you a few more questions
10 about the potential for NAPL to migrate in the bedrock
11 towards and under the Niagara River. Does the fact
12 that NAPL has been found around the 1937 portion of the
13 intake system show NAPL's potential for migration in the
14 bedrock?

15 A No, it does not.

16 Q Why?

17 A The shore shaft and the intake tunnel is a manmade
18 preferential pathway for the migration of non-aqueous
19 phase liquids, as a manmade pathway, it does not describe
20 the ability of the bedrock to transmit non-aqueous phase
21 liquids.

22 Q Mr. Rovers, after the intake system is remediated
23 pursuant to the settlement agreement, will it continue to



1 provide a preferential pathway for NAPL migration?

2 A No, it will not.

3 Q Why?

4 A The settlement agreement clearly identifies that the
5 preferential pathway of the intake tunnel is to be
6 grouted so that it is no longer a preferential pathway.

7 Q Mr. Rovers, returning to NAPL migration in the natural
8 bedrock environment, have you prepared a material
9 balance potential for NAPL migration?

10 A No, I have not.

11 Q Why?

12 A I believe that there is not enough data available in and
13 around the S-Area landfill site to undertake such a
14 formal mass balance calculation.

15 Q Mr. Rovers, have you had an opportunity to review the
16 calculations by Mr. Grisak which purports to show the
17 potential for NAPL migration under the river?

18 A Yes, I have.

19 Q In your judgment, ~~Mr. Grisak's assessment, is it correct?~~

20 A ~~No, it is not.~~

21 Q What is the basis for your conclusion that it is not
22 correct?

23 A ~~There are a number of inaccuracies, fundamental~~



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1 ~~inaccuracies in the assessment.~~

2 Q What I would like you to do is then list each inaccuracy
3 or miscalculation or wrong predicator, whatever you think
4 it is so that the record will reflect, seriatim, what you
5 believe those inaccuracies to be?

6 A Yes, I will identify what I believe to be three funda-
7 mental inaccuracies over and above the inaccuracy of the
8 equasions as described by Dr. Pinder this morning.

9 Q What is the first one, sir?

10 A The first one is that Mr. Grisak fails to recognize that
11 only some of the waste material disposed of at the site
12 was NAPL. Secondly, Mr. Grisak fails to consider that
13 some portion or possibly a significant portion of the
14 NAPL will be soaked up in the landfill site itself,
15 in other words, the landfill will act as its own sponge.
16 If Your Honor will remember, this morning Dr. Pinder
17 talked about that being residual containment at the site.
18 The third assumption made in the calculation was that
19 NAPL flows only in the upper fifteen feet of the bedrock
20 as it migrates southward.

21 Q Let me just pick up on the last suggested inaccuracy,
22 what is the depth of the bedrock?

23 A The depth of the bedrock of the dolomite bedrock to the

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1 top of the Rochester shale is a hundred and forty feet
2 in the area of the S-Area landfill site approximately.

3 Q Mr. Rovers, do you have any field information that would
4 indicate that NAPL does not flow laterally in a fifteen
5 foot plane but that it flows -- it must by necessity
6 drop?

7 A We have two pieces of information to allow us to make
8 the conclusion that flow in the upper fifteen foot is
9 an inaccuracy. First of all, we have the field
10 experiments that we have collected at Hyde Park regarding
11 NAPL migration in a similar dolomite bedrock. Secondly,
12 we have data that we have collected at the S-Area
13 landfill site. Specific reference is made to a well
14 identified in the various geologic reports as TRW1.
15 That well is installed approximately seventy feet below
16 the land surface or approximately fifty feet into the
17 bedrock. During its installation it was observed that
18 there was no NAPL in the upper portion of the bedrock.
19 Only when we got down to approximately fifty foot into
20 the bedrock did we encounter the NAPL. In the one case
21 where we did drill a well around the S-Area landfill
22 site, we have found the NAPL at depth, and not at the
23 surface of the bedrock.



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1 THE COURT: Is this well located on the present
2 exhibit?

3 THE WITNESS: Yes. The well that is located would be
4 in the north -- in the northeast corner
5 of the S-Area landfill site. It would be
6 one of those red dots.

7 THE COURT: One of the red dots, northeast corner?

8 THE WITNESS: Just up on the top of the lagoons, and
9 a little bit to your right.

10 THE COURT: I was going to ask you about that, are
11 they -- are the wells that you drilled
12 into the bedrock, are they a different
13 depth?

14 THE WITNESS: Yes. Some of -- most of the wells, Your
15 Honor, have been installed in the upper
16 let's say ten to twenty feet of the bed-
17 rock. However, there were a few wells
18 that went down some distance further.
19 This is one of those wells, it went down
20 to about fifty feet into the bedrock. It
21 was one of those wells we actually pumped
22 to measure permeability of the bedrock.

23 BY MR. TRUITT:



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1 Q Mr. Rovers, in the data gathering in the future,
2 pursuant to the consent agreement, how far down will
3 the bedrock wells go, if you recall?

4 A In the future the bedrock wells would go all the way
5 down to the top of the Rochester shale. We will drill
6 into a full hundred and forty feet, into the dolomite
7 bedrock underneath the site.

8 Q Mr. Rovers, in the view -- or, in view of the three
9 inaccuracies that you suggest, Mr. Grisak's conclusions
10 involve, do you believe that those inaccuracies materially
11 affect his ultimate conclusion that NAPL has migrated
12 along the bedding plane and arrived on Canadian soil?

13 A Yes. I believe that these inaccuracies would make a
14 significant impact on that conclusion.

15 Q How significant an impact?

16 A Significant impact is that ~~I believe that the conclusion~~
17 ~~that NAPL has migrated into the rock on the Canadian~~
18 ~~shore of the Niagara River is wrong.~~

19 Q Mr. Rovers, now let me turn to your role in helping to
20 develop the remedial programs described in the settlement
21 agreement. When did the technical discussions with the
22 Federal, State and City Governments and their experts
23 relating to the settlement agreement begin, and for how



1 long did they continue?

2 A The settlement discussions began in approximately October,
3 1980, and continued through till about July, 1983 for
4 a thirty-two month period.

5 Q In the course of your work for Hooker, did you personally
6 participate in the technical discussions with the Federal,
7 State and City officials, and their experts, which led
8 to the proposal which presently is before this Court?

9 A Yes. I personally participated in all those discussions.

10 Q Mr. Rovers, have you been involved in similar technical
11 discussions with Governmental experts relating to other
12 landfill sites in and around the Niagara Frontier?

13 A Yes, I have.

14 Q And, which are those?

15 A One that Your Honor will remember was the Hyde Park
16 landfill site, another one would be -- we were involved
17 in discussions on the Niagara plant suit, another one
18 we were involved in discussions on the 102nd Street
19 landfill site.

20 Q Mr. Rovers, can you describe for the Court your role in
21 the S-Area technical settlement discussions?

22 A Yes. Our role was to collect geologic and hydrogeologic
23 data, was to evaluate that data, was to present our evalu-

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1 ations to the discussion meetings in presentation form,
2 and was to discuss the presentations made. Furthermore,
3 we were to define appropriate remedial measures as
4 indicated by that evaluated data base, and present those
5 proposed remedial plans to the discussion meetings,
6 and again evaluate that following the presentation.

7 Q Did you also review and critique all reports from all
8 consultants that were made a part of the discussions?

9 A Yes. Not only all of the consultants that were retained
10 by Hooker, but also the consultants and the reports that
11 were submitted by the Governmental parties.

12 Q Now, let me ask you to just try to summarize the kinds
13 and types and locations as an example of the sort of
14 presentation that you and your colleagues would be
15 involved in during this thirty or thirty-two month
16 period?

17 A Excuse me. What -- I don't understand the question.

18 Q Well, I gather that you have made a number of presentations
19 to Governmental parties?

20 A Yes, I have.

21 Q What I'd like just very briefly is for you to describe
22 to the Court is how -- how does that whole system work?

23 A What we did is to accommodate the various involved parties



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1 throughout the discussions, we would participate in
2 the technical discussion meetings whereby both the
3 Governmental parties and ourselves would make presen-
4 tations and evaluate presentations in cities such as
5 Buffalo, Niagara Falls, Albany, New York, Washington.

6 Q How many manhours have you and your firm devoted to work
7 relating to the S-Area landfill site, since 1979, and
8 let's break that down into your hours individually first?

9 A My hours individually would be approximately sixty-five
10 hundred hours.

11 Q And, what about the hours of your colleagues within
12 Conastoga, Rovers, since 1979 on this project alone?

13 A On this project, that would be approximately eighteen
14 thousand hours.

15 Q And, that does or does not include your time?

16 A That does not include my time.

17 Q Mr. Rovers, I show you a document which I have caused
18 to be marked as Defendant's Exhibit number 4, and ask you
19 if you will review it and explain to the Court what is it?

20 A Yes. Exhibit number 4 is entitled Occidental Chemical
21 Corporation, S-Area settlement agreement, expert
22 consultants and personnel. It identifies the consulting
23 firms that were retained, commissioned by Hooker to study



1 the S-Area problem. Identifies those personnel which
2 partook in technical discussions from each of those
3 firms, and it identifies the discipline of expertise
4 of each of those people from the various firms.

5 Q Let me just ask you, from that document, sir, if you
6 would describe the range of disciplines that are displayed
7 as part of the Hooker team?

8 A Yes. The range of disciplines are broad. This document
9 identifies hydrogeologists, civil engineers, geologists,
10 geologic engineers, geotechnical engineers, geochemists,
11 analytical chemists, chemists, statisticians, identifies
12 chemical engineers, biochemists, medical doctors and
13 toxicologists. These are the various fields that partook
14 of the technical discussions.

15 Q That is just from the point of view of the Defendant,
16 is that correct?

17 A That is correct.

18 Q Can you briefly describe the extent to which each of the
19 experts listed on this exhibit participated in the
20 technical discussions and the settlement process?

21 A There were two levels of participation of these
22 personnel. The first level consisted of myself, Mr.
23 Joseph Kolmer of Woodward, Clyde Consultants, and Dr.



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1 Phillip Levins, of Arthur D. Little, and Mr. Jay Cull
2 of Occidental Chemical Corporation. These four
3 individuals participated in all of the technical
4 discussions. They were the technical team that went
5 from meeting to meeting on a full-time basis. Other
6 technical experts that were retained by Occidental
7 to participate at the technical discussions were brought
8 in on an as needed or individual problem basis. For
9 example, Dr. Michael Grossman of Arthur D. Little is a
10 statistician. He was involved in the discussions
11 regarding what do we do with all the monitoring data
12 that we collect. And, Your Honor will understand, there
13 is an awful lot of monitoring data to be collected that
14 has to be evaluated. Normal procedure to evaluate that
15 statistically. Dr. Grossman was involved extensively
16 in discussions with the Governmental parties regarding
17 what type of statistics would be appropriate to use in
18 this evaluation. Another example would be appropriate to
19 use, would be Dr. William Augerson, again, of Arthur D.
20 Little, a medical doctor. And he was involved in the
21 discussions associated with the environmental safety
22 and health both of worker personnel that would be at the
23 site and also of residential people that live around the



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1 site, and he would be involved in that aspect of the
2 discussions, and that aspect of the settlement agreement.
3 Those are just two examples of those other people that
4 were used.

5 Q Mr. Rovers, you mentioned Dr. Phil Levins, who the Court
6 may remember for contributions in the Hyde Park case.
7 Dr. Levins participated in the formulation of this
8 settlement program?

9 A Yes, he did.

10 Q As the Court is aware, I would like to state on the
11 record that shortly after all of the technical discussions
12 were concluded, Dr. Levins died in a swimming accident.
13 Mr. Rovers, I hand you a document that I have caused to
14 be marked as Defendant's Exhibit number 5, and just to
15 clean up the record, there are probably two Defendants
16 in this case, and I'm referring to the corporate
17 Defendant, and not any other Defendant in this case.
18 And I'll ask you if you would take a look at Defendant's
19 Exhibit number 5, and tell the Court, please, what is it?

20 A Defendant's Exhibit number 5 is entitled Occidental
21 Chemical Corporation S-Area settlement agreement,
22 curriculum vitae of expert consultants and personnel.
23 What this exhibit does is identify by name the experts



1 used by Occidental during the settlement discussions.
2 It identifies the affiliations of each expert, in other
3 words, the firm he works for, and it therefore then
4 identifies or presents the curriculum vitae of that
5 individual, gives his experience in that vitae. What
6 in fact his job responsibilities are at the present time,
7 what affiliations he has with his various -- within his
8 field of expertise, and any publications he may have
9 in that field.

10 Q Mr. Rovers, during the settlement discussions, did Hooker
11 evaluate the option of incinerating all of the S-Area
12 waste?

13 A Yes, it did.

14 Q To what extent?

15 A It evaluated by starting with the evaluation and
16 excavation of materials, and then as one of the options
17 of what to do with the excavated materials, one of the
18 options was incineration.

19 Q Now, when you're going to incinerate or take it off
20 site and bury it somewhere, am I correct in either of those
21 cases you first have to dig it up?

22 A That is correct.

23 Q Did you cause an estimate to be developed as to what it



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1 would cost to dig it up?

2 A I have done that, yes.

3 Q And, what is that number?

4 A To excavate and put the materials that would have to be
5 excavated up into trucks for removal either to an
6 incinerator or to an off site, whatever you would do with
7 it, the estimated cost to do that is approximately forty-
8 two million dollars.

9 Q Now, approximately how many tons of waste materials mixed
10 with soil are we talking about digging up?

11 A The material that you would be digging up, Your Honor,
12 at the S-Area landfill site is primarily soil and rock
13 material. There are some chemicals in the soil and rock
14 material, and the total quantity and material you would
15 be digging up just for the landfill site itself and just
16 for the overburden at the landfill, this doesn't include
17 anything else, would be approximately nine hundred
18 thousand tons of material.

19 Q Now, Mr. Rovers, you got a number here of forty-two
20 million dollars for nine hundred tons of waste materials.
21 How did you calculate that estimate, what is in it?

22 A There are a number of items in it. One of the things we
23 have to remember, this is not -- we often talk about each



1 site must be looked at individually. This is particularly
2 true at this site. That was cost strictly excavating the
3 material and putting it into the truck, to get it out of
4 the site itself and put into the truck, that's about
5 ten and a half million dollars. There are a number of
6 other costs associated with this particular site.

7 However, the first one being construction water. As
8 we all know, the site is located adjacent to the Niagara
9 River. In excavating the -- below the water table
10 adjacent to that Niagara River, we're going to encounter
11 an awful lot of water. We must handle that water,
12 the water will have chemicals in it, it must be properly
13 treated. To handle that construction water, it is
14 estimated that would cost approximately six million
15 dollars. The S-Area landfill site on two sides of the
16 S-Area landfill site are transmission tower constructions.
17 These transmission towers would have to be relocated in
18 order to excavate the S-Area landfill site. The cost for
19 that is approximately two point two million dollars.
20 Through the site run the industrial intake pipe trench
21 and the industrial intake pipes that supply water not
22 only to the Hooker facility on Buffalo Avenue, but other
23 industrial facilities along Buffalo Avenue. They run



1 from the industrial dock all the way through the site,
2 and to the various industries located south of Buffalo
3 Avenue. To relocate this industrial intake pipe trench
4 and the pipe in it would cost approximately ten and
5 three-quarter million dollars. After we have excavated
6 the site, we have a big hole in the ground, probably
7 filled with water. At this point we have to backfill that
8 hole. Cost to backfill that hole is approximately three
9 point eight million dollars. Throughout this whole
10 program because we're dealing with a hazardous waste
11 landfill site, we would have to incur safety and
12 health programs to be implemented at the site. There
13 is a cost associated with this. We estimated that cost
14 to be approximately seven point four million dollars.
15 These approximations will all add up to about forty-two
16 million dollars.

17 Q Now, Mr. Royers, were certain costs not considered in
18 this estimate?

19 A There are a number of costs that were not considered in
20 this estimate.

21 Q Just give us some -- some examples of cost items not
22 considered in this estimate?

23 A Yes. The very first one would be the cost of lagoon



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1 relocation.

2 Q By -- excuse me, Your Honor. Let me just go back and
3 call the Court's attention to for example Government's
4 Exhibit number 27. This is the S-Area, that's the
5 barrier wall around it. Mr. Rovers is saying that it's
6 in that confines within the barrier wall that the nine
7 hundred tons would have to be removed, and the two
8 lagoons would have to also be taken out and redone.
9 The transmission lines and so forth are also on that
10 real estate.

11 A These lagoons are an integral part of the process,
12 operation on the Hooker facility, and they would have
13 to be relocated. We would be concerned furthermore with
14 slope stability during construction in the excavating.
15 The major land beside the Robert Moses Parkway, beside
16 the water drinking treatment plant, the shore shaft,
17 very close, we would be concerned the sides of the hole
18 would slip into the hole. We would be concerned with
19 slope stability. That wasn't addressed. We did not
20 address the cost of interrupting electric power
21 transmission during route switch-overs. We didn't estimate
22 the cost of interrupting water flow to industrial users
23 during the relocation of the industrial pipes.



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1 MR. TRUITT: Your Honor, in playing my own tape back
2 to myself about what I just said, I realize
3 that I said nine hundred tons, and what I
4 meant to say is nine hundred thousand tons.

5 THE COURT: Right.

6 BY MR. TRUITT:

7 Q Mr. Rovers, what excavation and incineration of the soils
8 that you have discussed, or simply excavation and some
9 other form of deposition elsewhere, would that take
10 care of all of the environmental problems associated
11 with the S-Area landfill?



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1 A. No, it would not.

2 Q. Would you explain your answer?

3 A. If you excavate the S-area and fill site the 900,000
4 tons that we have described is that contaminated soil
5 within the boundary of the barrier wall at S-area in the
6 overburden, we do not address off-site contamination
7 in the overburden. Both the contamination and the
8 drinking water treatment plant and the overburden and
9 contamination in the overburden outside the drinking
10 water treatment plant in S-area such as in the overburden
11 to the south of the S-area landfill site should it exist.
12 We do not address furthermore contamination in the bedrock,
13 either under the S-area landfill site or off-site or
14 around the S-area landfill site. That is not addressed
15 in this remedial action that we described here of
16 excavation and taking it somewhere else.

17 Q. Now Mr. Rovers, are there additional factors which you
18 considered in evaluating the excavation-incineration
19 operation?

20 A. Yes, there are a number of factors that would have to
21 be considered if you were going to excavate and incinerate.

22 Q. Well, why would -- could you list for the Court what
23 some of the more significant factors would be that you



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1 would have to consider?

2 A. Yes, generically you would have to concern yourself with
3 worker safety. You are asking workers to work in
4 hazardous waste facilities over a considerable period
5 of time while you did the excavation. During this
6 excavation you are exposing an awful lot of chemicals
7 to the atmosphere, during the excavation you would
8 have to concern yourself with vaporization of those
9 chemicals and the impact on residences of the area.
10 During incineration even though we recognize that
11 incinerators are fairly efficient, even Ontario
12 recognizes that a certain amount of chemicals during
13 the incineration process will be discharged to the
14 atmosphere. The estimate is up as high as six and
15 a half tons of chemicals from S-area will be discharged
16 through the atmosphere during incineration.

17 Q. Let me just stop you there. Do you mean that if you
18 take the 900,000 tons and you incinerate it, you get
19 a fly ash going off into the atmosphere of some six
20 tons of air pollution?

21 A. Yes, you could get it as fly ash or just straight
22 chemicals themselves going off in the atmosphere would
23 be one concern that is here.



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1 Q. Fine. Excuse me. Are there other considerations that
2 would go into an assessment here?

3 A. Yes.

4 Q. Would you state them?

5 A. A very major consideration is what did you do with the
6 ash that is left after incineration, in excavating
7 900,000 tons of material at S-area and running this
8 through an incinerator, only the organic portion would
9 be incinerated, in other words, you would be left with
10 approximately 900,000 tons of ash.

11 Q. Bottom ash.

12 A. Bottom ash. This ash could well be defined as hazardous
13 material, if it was hazardous material you must dispose
14 of that into a secure landfill site. You furthermore
15 you are concerned -- this is also generic, but you would
16 be concerned with siting an incinerator, and I believe
17 you would all be aware of the problems of getting a
18 location for an incinerator to incinerate hazardous
19 waste materials. And then after the period, long period
20 of time in getting a site picked out, okay, and I
21 believe we are all experienced with this, you would have
22 to have it permitted. And the permitting process again
23 would be a considerable length of time involved in



1 permitting it, and none of this is a sure thing. You
2 cannot assure yourself that you can site it and you
3 can't assure yourself that you can get it permitted.

4 Q. Now, if you incinerated the 900,000 tons of materials
5 that are in the area within the barrier wall and if
6 you had to deposit the bottom ash in a secure landfill
7 have you caused there to be an estimate made as to
8 what the costs would be to take the amount of bottom
9 ash and get it to a secure landfill?

10 A. Yes, I have.

11 Q. And how much monies was that?

12 A. First of all you must understand that we would concern
13 ourselves with the availability of such a large
14 volume or large space for the disposal, but if
15 assuming this was available in the area of the landfill
16 site, it would cost approximately seventy million
17 dollars to dispose of that in a secure landfill.

18 Q. Now is that in addition to the forty-two million dollars
19 about which you testified earlier?

20 A. It's -- there are two additions yet, there is the
21 forty-two million dollars for excavating, there is
22 the seventy million dollars to dispose of it should the
23 ash be hazardous. We haven't estimated the cost of



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1 building and running the incinerator but it certainly
2 is an addition. There is also another major cost on
3 top of those two which is the incinerator itself.

4 Q Mr. Rovers, taking into account all the factors that
5 you have just discussed, would you recommend that Hooker
6 execute a settlement agreement requiring excavation
7 and incineration of the contents of the S-area landfill?

8 A No, I would not.

9 Q And why is that?

10 A Firstly, the high cost associated with it makes it
11 non-cost effective to do it that way and there are
12 other remedial technologies which can very effectively
13 contain the S-area landfill site.

14 Q And are those technologies embodied in the documents
15 proffered to the Court as the settlement agreement in
16 this case?

17 A To the extent that we could define those technologies
18 they are and there are studies available or defined
19 which will select the further technologies which would
20 be required, yes.

21 Q Mr. Rovers, the goals of the remedial program described
22 in the settlement agreement are stated as follows and
23 I will quote "to store and protect the environment and



1 to protect against endangerment, human health or the
2 environment in and about the landfill and to protect
3 the consumers of the City of Niagara Falls drinking
4 water from endangerment." That is the end of the quote.
5 My final question to you is this, taking account of
6 your general experience and expertise as an engineer
7 and professional hydrologist, as well as the data
8 gathered, the data gathering and the analysis already
9 done at the landfill and further taking into account
10 your discussions with other technical personnel involved
11 in the settlement process, do you have a professional
12 opinion whether the programs described in the
13 settlement agreement can be successfully applied to
14 achieve the goals of the agreement which I have
15 just described to you?

16 A. Yes, I have.

17 Q. And what is your judgment?

18 A. My judgment is that the technologies can be successfully
19 applied to meet the goals as you described them.

20 Q. Can you indulge me for a moment, Judge? Thank you,
21 Mr. Rovers. I have no further questions on Direct
22 Examination. You may inquire, Mr. Sunderland.

23



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1 CROSS-EXAMINATION BY MR. SUNDERLAND:

2

3

Q Mr. Rovers, could you tell us the basis for your
4 estimate that of the original materials deposited at
5 the S-area landfill approximately forty percent
6 constituted NAPL?

7

A Yes, the 63,000 tons of materials when they were first
8 identified as to the quantity and the type of materials
9 were taken from records put together by Hooker,
10 Occidental Chemical. They searched the records to
11 the extent that records were available and identified
12 that approximately 63,000 tons of material went to
13 S-area. They knew what types of materials constituted
14 the 63,000 tons of material, evaluating that material
15 they were able to estimate that approximately forty
16 percent of the 63,000 tons of material would be the
17 NAPL that we are talking about here.

18

Q And they being whom, you said they were able to
19 estimate it?

20

A Hooker Chemical and their engineers.

21

Q I see. Can you tell me when they did that?

22

A They estimated that in, I believe the inter-agency
23 task force report was in the late '70's, the estimate



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1 as to how much NAPL was put in the site constituting
2 that I believe, was in 1979, but around the same
3 period, that was the first evaluation as to what the
4 material was.

5 Q. And is that set forth in the inter-agency report?

6 A. The forty percent?

7 Q. Right.

8 A. I don't believe that is set forth in the inter-agency
9 report.

10 Q. Is that set forth, to your knowledge, in any document
11 other than internal Hooker communication or internal
12 Hooker memorandum?

13 A. It was used as a document in our discussions but I
14 don't believe that it is presented for example to other
15 governmental agencies, no, it is an internal document.

16 Q. When you say it was used in our discussions, can you
17 tell me what you mean by our discussions?

18 A. It was used in our discussions as a consideration of
19 NAPL migration when we first evaluated probably Mr.
20 Grisak's presentation as to how NAPL would migrate.
21 That is when we first used it.

22 Q. I'm sorry I'm not making myself clear, when you say our
23 discussions, is it our in the sense of Hooker?



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1 A. Yes.

2 Q. I see. So to your knowledge there is no outside of
3 an internal Hooker memorandum or document, there is
4 no publicly available document indicating the forty
5 percent figure?

6 A. No, there is not. However I believe that an evaluation
7 of the data itself, the components of the materials
8 disposed of at the area and an understanding of those
9 components would allow you to come to that type of
10 conclusion.

11 Q. And had that conclusion been communicated to the other
12 parties in the course of settlement discussions, to
13 your knowledge?

14 A. No, not that I am aware of, no.

15 Q. Now, your conclusion from the Exhibits that -- Exhibits
16 26 and 12, with regard to NAPL in the bedrock under
17 the river, am I correct in saying that your conclusion
18 is simply that the data currently available today
19 does not warrant a conclusion one way or the other?

20 A. That is correct, I believe that it is not sufficient
21 to conclude definitively that NAPL is migrating in
22 the bedrock under the river at this time.

23 Q. Is it your view that it is not possible for NAPL to



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1 be migrating today in the bedrock under the river?

2 A. No, that is not my view.

3 Q. Now you testified in your Direct testimony that the
4 settlement provision provides for wells to be located,
5 bedrock wells to be located between the landfill and
6 the Niagara River. And that those wells could be
7 utilized to test for the presence of NAPL migrating
8 in the river, excuse me, in the bedrock under the
9 river. Now my question is, is it in your professional
10 opinion, would the sampling that would be performed
11 utilizing those bedrock wells be sufficient to enable
12 one to determine the extent of the migration in the
13 bedrock under the river?

14 A. Yes, we would have to evaluate the data we collect
15 first of all to determine whether it is sufficient,
16 but at this time we believe it would be sufficient, yes.

17 Q. It will be sufficient to enable you to decide how far
18 any migration has gone in the river?

19 A. Yes, we believe that we will be collecting enough
20 information to make that type of an assessment.

21 Q. Well, can you explain to me how it is that the
22 information from the bedrock wells will be able to
23 tell you in addition to telling you that there is

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1 migration into the river how it will be able to
2 tell you how far the migration in the bedrock under
3 the river has gone?

4 A. The ideal situation would be that there is no NAPL
5 in the bedrock and then I would know it didn't go
6 anywhere, however in the presence of NAPL you would
7 be able to identify how much NAPL is available in the
8 bedrock and therefore assess the potential for
9 migration. You also understand the NAPL migration
10 characteristics in that bedrock better, you would be
11 better able to evaluate residual NAPL in the bedrock,
12 how much NAPL would say be in place by examining the
13 cores, putting that all together and understanding that
14 the source of NAPL is being cut off at S-area, you would
15 therefore be able to make an evaluation I believe as
16 to the potential for NAPL migration not only just
17 under the Niagara River, but to an area where human
18 endangerment can take place.

19 Q. Now for you to make that determination would you not
20 have to make or to begin with some estimate as to
21 the amount of NAPL that had migrated from the landfill?

22 A. Not particularly, because you can in fact examine by
23 the survey program how much has migrated, by just



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1 looking at what is there, particularly in the -- in
2 the indication if it is a small amount or if it in
3 fact is no amount, you would therefore have some
4 definitive ideas as to how much there is a potential
5 to migrate. But you can in the surveys that are being
6 done make probably a better mass balance than we have
7 now regarding the quantity of NAPL still remaining in
8 the S area landfill site, plus the survey data that
9 you are getting in the overburden and in the rock
10 make some assessment as to how much has migrated from
11 the site, yes.

12 Q. You indicated in your Direct testimony that you
13 disagreed with Mr. Grisak's conclusion that it is
14 -- there is a potentiality, a potential for NAPL
15 migration to have occurred in the bedrock and you
16 phrased it over to the Canadian side of the Niagara
17 River. Is that how you interpret his conclusion?

18 A. Mr. Grisak talks about migrating seven thousand nine
19 hundred feet as -- I believe that is the distance to
20 the side of the Niagara River, the Canadian side of
21 the Niagara River, it is my understanding that would
22 be the distance.

23 Q. Your view is it -- you would disagree with the conclusion



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1 that says that today NAPL has migrated from the S-area
2 site through the bedrock under the river to the
3 Canadian side of the river?

4 A. Oh, no, I conclude even further than that. I don't
5 believe there is even a potential to get to the
6 Canadian side of the Niagara River not that it just
7 hasn't gotten there today, we all agree it hasn't
8 done it today, I don't believe there is a potential
9 either particularly with the remedial plan being
10 proposed for S-area and cutting this source off.

11 Q. Your 900,000 ton figure from the S-area site, could
12 you tell us the parameters or the boundaries that
13 you utilized in deriving that site -- excuse me, that
14 figure?

15 A. Yes, the boundaries that we used in our definition
16 were the perimeter of the landfill site defined by the
17 barrier wall proposed to be installed around the site,
18 approximately twelve and a half acres has been
19 determined that not only the -- the sort of defense
20 around S-area is the source of contamination at S-area,
21 but that whole twelve and a half acres is the potential
22 source of -- of chemicals, furthermore, we identified
23 that we could excavate to three foot into the clay/till



1 layer at the site, in other words, we can't just go
2 to the very top of it where we expect everything to
3 stop, we have to go a little bit into it to make sure
4 we get it all, and that volume has been evaluated to
5 be approximately 900,000 tons.

6 Q. Twelve and a half acres going down two or three feet
7 into the clay/till?

8 A. No -- yes, into the clay/till.

9 Q. Correct?

10 A. That is approximately 900,000 tons.

11 Q. And how many cubic yards, do you have an approximation?

12 A. Approximately 540,000 cubic yards I believe, I would
13 have to look the number up as to what the estimate
14 exactly was.

15 Q. Well, while you are looking for that, let me ask you
16 something else. Why is it necessary to relocate the
17 transmission towers --

18 MR. TRUITT: I don't know if the witness can look that
19 up and answer your question at the same
20 time.

21 THE COURT: Yes, Mr. Sunderland, can you wait a
22 minute?

23 THE WITNESS: It is estimated at 530,000 cubic yards



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1 of material would be excavated.

2 BY MR. SUNDERLAND:

3 Q. Could you explain to the Court why it would be
4 necessary in the case of excavation to relocate the
5 industrial intake trench and the transmission towers?

6 A. They are two very, very significant reasons, first of
7 all the transmission towers are right on the landfill
8 site, in order to excavate the landfill site you have
9 to move it or part of the site has to stay there,
10 second very important reason is that you cannot
11 excavate under and near those transmission towers. The
12 hazards associated with an accident on those towers
13 and the impact of such an accident are so great you
14 must move the transmission towers, the Power Authority
15 of the State of New York would not allow you to do that
16 type of excavation around their towers, okay, during
17 construction. It just would not be allowed. The
18 second thing is that the industrial intake pipe that
19 runs through the landfill site during excavation of
20 that site you would in fact excavate all the way
21 around those intake pipes, the chance of having an
22 accident with those pipes and causing all of the
23 Niagara River to flood into the landfill site are so



1 great and the cost of impacting on water supply to these
2 industries, Hooker for example, the whole plant would
3 close right up if it didn't have its water and so on,
4 you would have to relocate it, you couldn't take that
5 type of risk. There is no question.

6 Q I understand that, you are starting however with the
7 assumption that one would excavate the entire site,
8 in other words the necessity to move the transmission
9 towers and the necessity to move the industrial intake
10 trench follows from complete excavation of the site?

11 A Yes, but if you don't, if you don't --

12 THE COURT: Can we go one step at a time, I guess
13 the answer is yes, I don't know what his
14 next question is, okay?

15 THE WITNESS: But -- okay.

16 THE COURT: Why don't you just wait and see, why
17 don't you wait and see what his next
18 question is.

19 MR. SUNDERLAND: I think my next question will probably
20 stop right there. I have a feeling on
21 Redirect we will have that. What is your
22 answer to the question?

23 THE WITNESS: What is the rest of my answer?



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BY MR. SUNDERLAND:

Q. No, what is the answer to the question?

A. Yes, it is assumed that the whole site is being excavated.



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1 Q I'm correct that the transmission towers and the
2 industrial intake trench is at the very southern portion
3 of the landfill?

4 A The southern portion of the landfill, yes.

5 Q What's your experience in incineration technology?

6 A Incineration per se is very limited.

7 Q Did you prepare or participate in the preparation of
8 the report that is apparently before you on the
9 excavation and incineration alternative for the S-area
10 site?

11 A No. The report before me that I'm looking at is
12 primarily an excavation option. We get it into a truck
13 and then what do you do with it?

14 A I didn't participate. We didn't put together an estimate
15 of the incineration. What we are concerned about primarily
16 is getting it into a truck and then evaluating the
17 options of what to do with it. Landfill is one of them.
18 We were very familiar with those costs, and in fact we
19 turned around and put an estimate on incineration.
20 We know what the technology can do, but identified
21 a number of problems. We precluded incineration as
22 a problem. Those would be siting and permitting. That
23 may take, for example, a dedicated method and remedial



1 measures are required at that land site, not a dedicated
2 method.

3 Q The problems were directed at siting an incinerator
4 at what place or what locations?

5 A In the area of the S landfill site.

6 Q You would have a transportable --

7 A That's right, for New York State.

8 MR. SUNDERLAND: Okay, thank you. That's all I have.

9

10 EXAMINATION BY THE COURT:

11

12 Q Mr. Rovers, well, first one or two -- one question.
13 Do you remember in the Hyde Park site we had quite a
14 bit of testimony about soil samples?

15 A Yes.

16 Q Were soil samples taken here?

17 A Oh, there are going to be, I believe without
18 exaggerating, thousands of soil samples taken. These
19 again will give us an awful lot of information regarding
20 chemistry, geologic conditions, and so forth.

21 Q Have any been taken so far?

22 A Yes, a number of soil samples have been taken and that
23 is, in fact, how we defined the geologic conditions at



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1 that site. However, we plan to take many more.

2 Q We assume here the flow in the overburden is to the
3 south towards the river. Were there any soil samples
4 taken between the site and the river?

5 A Yes. Soil samples were taken and they were evaluated.

6 Q And what did the evaluation show?

7 A Evaluation identified the type of material that we
8 were dealing with. It also identified the presence
9 or absence of chemicals. We did identify chemicals
10 there sometimes and sometimes basically no chemicals.

11 Q Is there any way you can compare or tell us what that
12 would indicate about the movement of the NAPL from the
13 site to the river, how much over a period of time?
14 Anything like that?

15 A No, Your Honor, we have drilled a number of holes to the
16 south of the site and only in one hole did we identify
17 NAPL.

18 Q I'm talking about, as I remember at Hyde Park people
19 would take samples right at the ground level?

20 A Yes. In our future surveys we would be able to define
21 the question.

22 Q But that has not been done as yet?

23 A Not been done.



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1 Q. Can you tell us why? Why was that not done yet?

2 A. Primarily it was, we were collecting an awful lot of
3 data. We knew how it had to be corrected and decided
4 it would be appropriate to correct after a settlement
5 agreement had been reached as opposed to before a
6 settlement agreement being reached.

7 Q. Looking at the chart here, can you see the existing
8 survey location chart?

9 A. Yes.

10 Q. This is Exhibit 12. And now these indicate the various
11 wells, bore holes?

12 A. Yes.

13 Q. Is there any difference between a well and a bore hole?

14 A. Yes. A bore hole would just be a drilling through of
15 overburden from which soil samples were taken and
16 subsequently the hole is taken up. A well is where
17 you drill a bore hole taking your soil samples and
18 install a drill in it to take your samples.

19 Q. In Exhibit 12 we have the site here?

20 A. Yes.

21 Q. And it is obvious where the green dots are?

22 A. Yes.

23 Q. Extensively to the north and west and north and east.



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1 How was a decision made about where to put the survey
2 locations?

3 A. There are a number of decisions -- or a number of
4 factors that you take into account when you install
5 bore holes and wells. First of all is what type of
6 installations are under the ground. For example, you
7 go immediately north of the Robert Moses Parkway and
8 you try to drill. You have difficult drilling through
9 the industrial intake pipe trench. There are a lot
10 of services underground.

11 Q. The industrial pipe trench is near the Robert Moses
12 Parkway?

13 A. Yes. It runs from where you have your pencil, goes
14 straight north across the Robert Moses and go to your
15 left. It just runs straight across the site in that
16 area of the site.

17 Q. So of course, obviously, you couldn't be drilling
18 survey wells immediately adjacent or through that
19 particular area?

20 A. You couldn't. You'd have to take great care. The
21 document recognizes the significance of that industrial
22 intake pipe trench at a preferential route of chemical
23 migration and the document therefore says, using the



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1 best care possible and the best technology, they would
2 like us to drill as close to the industrial pipe trench
3 as possible, and in the future surveys we'll be attempting
4 to do just that.

5 Q. Again, we know the flow through the overburden is toward
6 the river?

7 A. Right.

8 Q. And here we had the seven bore holes or wells which are
9 along the river between the Robert Moses Parkway and
10 the river?

11 A. Right.

12 Q. Can you tell me, why would you not drill some holes in
13 the river itself?

14 A. In the river itself no holes are being proposed to
15 be drilled probably for the reason that it was evaluated
16 that that wasn't necessary to undertake the assessment.
17 In fact, we are going to undertake that and that is
18 chemical migration. Primarily, you are concerned now
19 with overburden flow in drilling a hole because the
20 chemicals that flow in the overburden discharge to
21 the river, flow to the river, and you evaluate the
22 impact to the river. You wouldn't need a bore hole in
23 the river to do that. The concern you have with



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1 migration or the concern you might have is with NAPL
2 liquid migration in the bedrock under the river, and
3 it was our belief and the technical personnel that we are
4 associated with all believe that we could restrict our
5 boring at this initial survey stage to drilling on the
6 shore of the river through the bedrock, and we'd be
7 able to collect enough data to evaluate the potential
8 for migration and what that would do.

9 Q. Now, it appears that there are many more survey locations
10 on Exhibit 12 than are identified in the NAPL locations
11 on Exhibit 27. Where are the survey locations?

12 Were they made in any kind of sequential fashion? Do
13 you remember in Hyde Park where they had the plan
14 that you would have various rings where the wells would
15 go?

16 A. That sequential pattern, Your Honor, occurred after
17 the settlement agreement was agreed to, and again,
18 we had a sequential pattern that would occur on the site.
19 Not the same pattern, but it is sequential. These were
20 not really sequential. Basically, what occurred with
21 it, you have in front of you both the green dots which
22 were all of the wells and the red dots which were those
23 wells or borings where we identified NAPL. Each sort



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1 of program installation was designed to look for a
2 specific thing. For example, there was a program to
3 identify just the overburden materials at the S-area.
4 There is a program to identify bedrock around the S-area.
5 There was a program to identify what was in the sheet-
6 rock underneath the Robert Moses Parkway. So very often,
7 during our discussions, we would come up with some
8 technical concern. We wouldn't have any data, we'd go
9 out and collect some data so we have what looks like
10 a scattered approach to drilling that really wasn't
11 addressing very specific problems.

12 Q So that is why there are some more drill holes in the
13 sites than there are sites where you found NAPL?

14 A No. The drill holes address specific problems, but the
15 NAPL locations are specifically those areas where we
16 found NAPL. For example, we have a green dot and
17 it doesn't turn into a red dot, it means we drilled the
18 hole but didn't find NAPL. It means, as far as we
19 could see, the NAPL is restricted to the area where
20 we have red dots.

21 Q Are any of these bedrock, these survey locations on 12,
22 or are they all simply the holes as you described them?

23 A No, they are bore holes. They are wells installed in



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1 the overburden and they are drillings into the bedrock.
2 And we also installed in the bedrock. They are
3 a combination of all that.

4 Q In spite of the fact that you only found NAPL in this
5 very tight cluster around the S-area, yet you can
6 continue to make exploration in the whole area here,
7 is that it?

8 A. Yes.

9 Q Can you give us an example of why, for example, you
10 would have this distance up here in the far northeast
11 corner, why there would be surveys made there when the
12 -- it would appear at any rate that what you were
13 finding was NAPL near the site?

14 A. Okay. The reason that was happening, Your Honor, is
15 that Hooker doesn't perceive S-area really as an
16 individual problem. They perceive the whole Niagara
17 plant as an environmental problem to be addressed, and
18 they were addresssing two problems at once, environmental
19 concerns at the Niagara plant and S-area. And so you
20 are drilling not only around S-area, you are also
21 drilling at the plant at the same time and you have,
22 in fact, got two simultaneous constructions going on.
23 That's what happened.



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1 Q I see. We do know there are other problems involved
2 and some of these surveys would also give you
3 information about S-area but also about other subjects?

4 A That's correct.

5 Q Now, Exhibit 27 the main part of the site is, here we
6 have the two lagoons?

7 A That is correct.

8 Q And there are no red dots over the lagoons, they surround
9 the lagoons, but there is none over the lagoons?

10 A There is a specific reason for that, Your Honor. There
11 were no --

12 Q He always jumps ahead, doesn't he? Over here you show
13 bore holes or wells which would appear -- we don't
14 have the lagoons set out here, but it would appear that
15 some borings were made right at the place of the lagoons.
16 Can you explain if this is the site, then why didn't
17 you -- we find any NAPL?

18 A Okay. There were some very shallow borings made in the
19 area of the lagoons themselves. There were none that
20 were very deep in the lagoons themselves or there weren't
21 very many in the lagoons themselves. If you would notice,
22 these are pretty big dots and to spread them out, to
23 give a pictorial location, each is probably within one



1 hundred foot in diameter true to scale, and there is
2 a pictorial representation to pose an exact location.

3 Q And of course, we don't know just from looking at these
4 charts? There is no way to tell how deep the hole was,
5 but right in the vicinity of the site itself, that
6 you didn't drill the hole deeply in that particular
7 area?

8 A Yes. We restricted ourselves primarily to drilling on
9 the S-site to the overburden material. There was
10 some drilling down in the bedrock in the early years.
11 Particularly, we weren't familiar with NAPL migrations.
12 When we knew that NAPL was heavier than water and could
13 go down a hole we drilled, we quickly quit drilling holes
14 through the area which was protecting ourselves, which
15 was over clay area.

16 Q The reason I bring the subject up is someone would think
17 about it later on and I think it might be a good idea
18 to clear it up now. Keeping in mind that it would seem
19 to me, on excavation you have picked up a number of
20 difficulties with it. You talked about truck removal.
21 Now, the site is within a stone's throw of the Niagara
22 River and it would be, you know, barges could be brought
23 up and the material could be loaded in some kind of a



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1 device that they move coal and grain, and so forth,
2 some kind of an elevator or slurring movement device in the
3 barges. Now, was that considered at all?

4 A. Yes, barging of the transportation was looked at, okay.
5 It was in fact barging. The transportation techniques
6 we looked at were as follows: First of all, we looked
7 at slurring and pumping via pipeline, slurring techniques
8 turning a solid into sort of a sludge or semi-liquid
9 and pumping it through pipes. For instance, a pole
10 technology that is used, we looked at that, and seeing
11 if we could pump it all the way to a secured landfill.
12 The second thing was branching from the industrial warf
13 to a secure landfill. The third thing we looked at
14 was truck transportation via land, and the fourth was
15 containerized rail transport because we have railway
16 tracks in the area. We did look at all of those.

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1 Q Yes, and then as far as well -- costs, would it be
2 substantially less or more or about the same?

3 A The truck transport was evaluated to be the cheapest,
4 in large port barging for example, we didn't -- if you
5 could barge it to an area of the landfill, okay. But
6 then you had to truck it a long way to get to the
7 landfill, the nearest landfill that we have in this
8 site is the landfills in Niagara Falls themselves.
9 There are two New York State secure landfills, both
10 located near the S area landfill site. To get to those
11 sites, which are probably the most obvious choice for
12 secure landfill disposal, because of the two sites
13 nearest the S area, the trucks would be the preferred
14 route by far the cheapest.

15 Q And you would still, however -- you would move it --
16 you would still have all the other difficulties?

17 A Yes, that's correct. The tremendous problems that
18 you would have in the excavating this material, because
19 it is a hazardous material.

20 THE COURT: Any further questions? Mr.
21 Sunderland, do you have any other
22 questions?

23 MR. SUNDERLAND: Your Honor, I would like to ask



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1 one question on Hyde Park, if
2 I could. It was mentioned to
3 the extent of the contamination
4 at Hyde Park.
5 THE COURT: Sure.
6 MR. TRUITT: Before --
7 THE COURT: Well --
8 MR. TRUITT: If I may. I'm not trying to
9 be difficult. You're one person,
10 and that's another. I would like
11 to know what the question is
12 going to be about Hyde Park.
13 THE COURT: We'll hear the question.
14 MR. TRUITT: This is a matter that is subjudica.
15 THE COURT: Mr. Sunderland, what is the question?
16 MR. SUNDERLAND: The question is simply the extent
17 -- if Mr. Rovers could tell us,
18 the extent of migration from
19 Hyde Park site that has occurred
20 in the bedrock?
21 THE WITNESS: Okay.
22 MR. TRUITT: Are you talking about NAPL
23 migration?



1 MR. SUNDERLAND: NAPL migration.

2 MR. TRUITT: I have no trouble with the --

3 with the question, as long as

4 the implied differences, the

5 hydrogeology underlying conditions,

6 concentration and so forth, is

7 written into that sort of a

8 question. There is no relation-

9 ship between Hyde Park technology

10 and the subsurface conditions,

11 and this site.

12 MR. SUNDERLAND: That's fine.

13 THE COURT: There are many differences.

14 MR. SUNDERLAND: I understand that, Your Honor.

15 THE WITNESS: We have --

16 MR. SUNDERLAND: I expect in responding Mr. Rovers

17 will tell us.

18 THE WITNESS: We have identified or mapped out

19 the extent of NAPL migration and

20 non-aqueous phase liquid migration

21 in the S area landfill site in

22 three dimensions all around the

23 the site, with adept. We have



1 identified how far it is gone,
2 how far -- without the reports
3 being here. I can't be exactly
4 sure. It's probably true that
5 Mr. Sunderland probably has a map.
6 You would have to scale it off.
7 I don't have a map with me. I
8 didn't bring.

9 THE COURT: I think there are so many dif-
10 ferences, Mr. Sunderland, it will
11 not help us in this case to go
12 into that really any further.

13 MR. SUNDERLAND: Fine.

14 THE COURT: Mr. Elder or I mean Mr. Truitt?

15 MR. TRUITT: I think we have concluded. I
16 would ask the court that the
17 Exhibits marked, Defendant's 1
18 through 5 be made a part of the
19 record of the proceedings. We
20 have no further proofs, Judge.
21 The Government has concluded and
22 we have concluded with ours, with
23 the exception of possible rebuttal.



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1 THE COURT: Mr. Wassar, you have been
2 gathering up the Exhibits, would
3 you and Mr. Elder have somebody
4 from the Government and from the
5 State coordinate with Paul
6 Campagna to be sure that all we
7 have -- we have all of the Exhibits
8 here to go in one packet, you
9 know, together?
10 MR. ELDER: We will do that, Judge.
11 MR. TRUITT: May Mr. Rovers step down?
12 THE COURT: Mr. Rovers, thank you.
13 THE WITNESS: Thank you, your Honor.
14 THE COURT: We'll take a recess break. Mr.
15 SUNDERLAND, do you have a witness
16 ready when we return?
17 MR. SUNDERLAND: Yes.
18 THE COURT: We'll take a recess for about
19 ten or fifteen minutes, and then
20 we'll come back..
21 (A recess was then taken.)
22
23



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(Reconvening after the recess at
3:15 p.m.)

THE COURT:

Mr. Sunderland, sir, do you want
to step up here and be sworn,
please?

D O N A L D M A C K A Y, 6 Fairway Drive, Scarborough, Ontario
Canada, after being duly called and sworn, testified as
follows:

MR. SUNDERLAND:

Your Honor, Dr. Mackay is a
Professional Engineer who is
licensed in the Province of
Ontario. He is a 1958 graduate
of the Royal Technical College
at the University of Glasgow.
He received a Ph.D in the Chemical
Engineering in 1961 from the
Royal College of Science and
Technology also at the University
of Glasgow. Dr. Mackay has been
associated with the University of
Toronto since 1966. He is currently
a full professor in two departments,
of, Chemical Engineering and



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1 Applied Chemicals, and enjoys
2 a parallel appointment to the
3 Universities Institute for
4 Environmental Studies. In these
5 capacities, he teaches a variety
6 of Chemical Engineering courses
7 to both graduate and undergraduate
8 students. Since the early 1970's
9 Dr. Mackay's professional efforts
10 both in his research and teaching
11 activities are concentrated on
12 the topic of fate of chemicals
13 in the environment. This work
14 has involved investigation into
15 and mathematical quantifications
16 of the multiple processes which
17 determine the behavior and life
18 span of chemicals in the environ-
19 ment. Dr. Mackay's work in these
20 areas has focused in two general
21 areas, first he has investigated
22 and written extensively on the
23 subjects of oil pollution. This



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1 work has included efforts in the
2 areas of vaporization, dispersion,
3 emulsification, the chemical
4 degradation of oils and soils,
5 the interaction between oil and
6 ice and the general subject of
7 oil spills in the arctic. His
8 work has also involved oil spill
9 modeling and oil spill analysis.

10 In addition to the work in the
11 area of oil pollution, Dr. Mackay
12 has written and researched
13 extensively on the fate of toxic
14 chemicals in the environment. In
15 this area he -- excuse me, in this
16 area he has investigated the variety
17 of processes including volatilization,
18 dissolution in water, vaporization,
19 oxidation, hydrolysis, among others,
20 the numerous processes which effect
21 the time that toxic chemicals will
22 remain in the environment in
23 significantly toxic amounts. In

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1 this area he has undertaken
2 projects for the United States
3 Environmental Protection Agency,
4 The United States National Bureau,
5 The United States Coast Guard,
6 The Environment Canada, The
7 Ministry of the Environment and
8 other projects in private interests.
9 He has published ~~in~~ his curriculum
10 vitae lists over a hundred and
11 eighty papers and reports and
12 articles and publications, well
13 over half of these deal with the
14 fate of and impact of oil and
15 other chemicals in the environ-
16 ment. Of particular relevance
17 to this proceeding, he published
18 a book in 1981 on the physical
19 behavior of the subject of PCB's
20 in the Great Lakes, a series of
21 papers on the solubility of hydro-
22 carbons in water and several papers
23 on the dissolution of chemicals



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1 in water. Dr. Mackay is a member
2 of the editorial board of chemosphere
3 of the environmental science and
4 technology bulletin, which is the
5 journal of the American Chemical
6 Society, the journal of oil and
7 petrochemical pollution, and the
8 journal of water resources in
9 Canada. He is a member of the
10 Association of Professional
11 Engineers of Ontario, of the
12 Chemical Institute of Canada,
13 the Canadian Society for Chemical
14 Engineering, the American Chemical
15 Society, the International
16 Association for Great Lakes
17 Research among other organizations.
18 He is also a member of the Association
19 of Environmental Engineering
20 Professors which awarded him
21 their distinguished Professor
22 award in 1982. Your Honor, I
23 offer Dr. Mackay as an expert



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*Brault refers to
pp 100-109 in n2
8/15/07 press release
on p. 5*

witness who is competent and
capable of offering his opinions
in this matter on the subject
of the fate of non-aqueous phase
chemicals in the S area landfill
following construction of the
proposed site containment system.

THE COURT:

Why don't you continue, Mr.
Sunderland?

DIRECT EXAMINATION BY MR. SUNDERLAND:

Q Thank you, your Honor. Dr. Mackay, I have asked you
to determine how long and how much of the chemicals
which are listed in the table four of the Samuel Fogel
affadavit which is an affadavit submitted in this matter
by the Government, your Honor, how long and how much
of those chemicals can be expected to remain in the
S area landfill making two assumptions. First that all
of the non-aqueous phase liquids or NAPL, that all of
these liquids, excuse me, that all of the -- that all
of the chemicals, I'm sorry, are in non-aqueous phase and
second that the non-aqueous phase liquids will be contained
within but will not be removed from the landfill by the
proposed site containment system?



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1 MR. TRUITT:

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13 THE COURT:

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22 MR. SUNDERLAND:

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Excuse me, Council, the proof so far on the issue of what is non-aqueous phase in the landfill site of the sixty-three thousand tons is that the unchallenged record shows it to be forty percent. So it seems to me that the question put to the witness is simply improper, unless it has something to do with a case other than the case that we are hearing here.

Well Mr. Sunderland, frankly I thought there was a -- if not a double -- I didn't understand the question, maybe the witness did, perhaps I missed some of it. Could you put shorter questions together please? I think we will move ahead a lot faster.

I have two assumptions, I want to set it up and I will get us



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1

going.

2

THE COURT:

Give us the assumptions, I thought

3

there was something ~~contradictory~~

4

in the assumption.

5

MR. SUNDERLAND:

Let me go to Mr. Truitt's point

6

and change one assumption, Dr.

7

Mackay, if you will make two

8

assumptions in giving your testimony

9

today, first, that of the sixty-

10

three thousand tons that were

11

deposited in the S area landfill

12

would you assume that approximately

13

forty percent or let's say twenty-

14

five thousand tons went in in

15

non-aqueous phase liquids, ~~and~~

16

~~second would you assume that~~

17

~~under the proposed site~~

18

~~containment system those non-~~

19

~~aqueous phase liquids will be~~

20

~~contained~~ but will not be

21

removed from the system by the

22

collection mechanism.

23

MR. ELDER:

~~Objection your Honor, same~~



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1 objection but with respect to
2 the second part, at this time
3 the record is that non-aqueous
4 phase liquids will be collected
5 and unless Mr. Sunderland can
6 offer or make a proffer that he
7 can prove that --
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1 THE COURT: Well, it is either that -- I don't
2 understand. We'll have to wait for the
3 answer. As I understand it, you assume
4 that the non-aqueous material will be
5 at least contained. And I suppose also
6 some of it will be taken off by the drain
7 system.

8 MR. SUNDERLAND: Your Honor, can I offer proffer, what
9 Dr. Mackay is going to testify to?

10 THE COURT: Yes.

11 MR. SUNDERLAND: Mr. Mackay's sole point in being here today
12 is to express his opinion that the non-
13 aqueous phase liquids in the landfill,
14 if they're not collected and removed from
15 the landfill that the NAPL will continue
16 to exist in the landfill for years and
17 years and years. But he's going to talk
18 about the persistence of the --

19 MR. TRUITT: We'll stipulate to that, Judge.

20 THE COURT: That's obvious, nobody has to testify to
21 that. If the material is not removed,
22 it stays there. There's no question
23 about that, except I suppose if unless



1 there would be some chemical breakdown of
2 the material.

3 MR. SUNDERLAND: Well --

4 THE COURT: We haven't heard any of that thus far.

5 MR. SUNDERLAND: ~~If Mr. Truitt is willing to stipulate,~~
6 ~~Dr. Mackay can go home.~~

7 THE COURT: All right.

8 MR. TRUITT: I will stipulate to what counsel said,
9 and that is to the extent that there is
10 NAPL in the S-Area landfill, and to the
11 extent that it is contained, it will stay
12 there. I will -- for many, many years.
13 I will stipulate to that here, and now,
14 counsel, if that means that this gentleman
15 may go home, so be it.

16 MR. ELDER: I still object to the second prong of the
17 assumption, I think our proof has
18 demonstrated pretty doggone well that
19 there will be NAPL collection at the
20 site. The relevant proof will not be
21 what the witness will testify to, but
22 whether he can prove the second prong of
23 the assumption.



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1 THE COURT:

2 Excuse me, Mr. Elder. Mr. Truitt, his
3 assistance, he wants to stick right to
4 the agreement, and I think that he's
5 right in that sense, that the agreement
6 provides for containment. Now, at least
7 some of our experts that have testified
8 here indicate that simply because the way
9 the collection system works, that some
10 NAPL will move out of the site. Mr.
11 Truitt wants to point out, well, Judge,
12 if none of it moves out of the site,
13 still, if it's contained, that's the
14 purpose of the agreement. Now, Mr.
15 Sunderland --

16 MR. ELDER:

17 May I respond to that, Judge? We have a
18 slight disagreement on that point. It is
19 true that the purpose of the discontinuity
20 remedy is to make sure that the non-aqueous
21 liquids do not enter the bedrock through
22 the discontinuity. That's only one part
23 of the program. The other part of the
program is the tile drains, as the
settlement requires, that part of the



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1 settlement that is the design standard,
2 that the tile drains have to maximize
3 the direction of the non-aqueous phase
4 liquids, while I agree with Mr. Truitt
5 that chemicals will not leave the site,
6 we believe and bargained very hardly for
7 that provision that requires the maximization of the collection of the NAPL.
8 Now we agree that we can't quantify at
9 this point in time how much that is, but
10 to us the tile drain part is a very
11 important part of the agreement. That's
12 my problem with Mr. Sunderland's question.
13 Unless he can prove to the contrary.
14

15 THE COURT:

We have to -- I'm going to let him go
16 ahead. Do you have some questions, Mr.
17 Sunderland, in view of the remarks made
18 by Mr. Elder and Mr. Truitt?

19 MR. SUNDERLAND:

Let me say two things, Your Honor. Our
20 contention and the reason for having this
21 witness stems solely, as I indicated from
22 my opening remarks, that the face of the
23 agreement I agree with, Mr. Truitt, the



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1 agreement does not require -- does have a
2 performance standard for the collection
3 of non-aqueous phase liquids. It has a
4 design standard, and Mr. Elder points out,
5 which if not met, the agreement has no
6 sanction for it. It's a goal or an
7 objective, but there is no performance
8 standard for the collection of non-aqueous
9 phase liquids.

10 THE COURT:

11 ~~I think it's a silly discussion we're~~
12 ~~having here,~~ because in order to make the
13 upward gradient system work, you have to
14 have the tile drain system work, and we
15 know from the sense that the non-aqueous
16 material is mixed in here, that there is
17 bound to be, if it works, there is bound
18 to be at least from a layman's point of
19 view and from what I've heard from all the
20 witnesses, there is bound to be flow
21 migration, whatever, percolation, what-
22 ever you want to call it, in the tile
23 drain system. But, I'm willing to listen
to any questions that you want to put to



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1 Dr. Mackay. So go ahead.

2 BY MR. SUNDERLAND:

3 Q All right. Your Honor, thank you. Dr. Mackay, have
4 you prepared the analysis that I asked you to do?

5 A Yes.

6 Q And, would you summarize your conclusions -- did you
7 summarize your conclusions for us in written form?

8 A Yes. In a report, the long term presence of non-aqueous
9 phase liquids.

10 THE COURT: Doctor, if you're going to read, please
11 do so very slowly and keep your voice up.

12 THE WITNESS: In a report, the long term presence of
13 non-aqueous phase liquids in the S-Area
14 landfill site.

15 MR. SUNDERLAND: Your Honor, this has been marked as
16 Ontario Exhibit number 3. I would like to
17 offer this, and I would also like at the
18 same time to offer Ontario Exhibit number
19 6 which is a curriculum vitae of Dr.
20 Mackay.

21 THE COURT: All right. That may be done. I wonder,
22 Mr. Sunderland, could you hand those up
23 to me, please?



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1 BY MR. SUNDERLAND:

2 Q Yes, sir. Dr. Mackay, I would like you to take us
3 through the process that you utilized in reaching
4 your conclusion regarding the amount of non-aqueous phase
5 liquids which will remain in the S-Area landfill over
6 time. Will you start by telling what factors determine
7 the amount of NAPL which will remain in the landfill over
8 time?

9 A I examined two processes by which NAPL may be removed
10 from the site. One is the destruction of the material
11 chemically. That is its persistence. And secondly, its
12 removal by dissolution in water, which flows through the
13 area.

14 Q Can you tell us what persistence of the chemical means?

15 A The persistence is an indication of the lifetime of the
16 chemical. How long it is likely to survive intact in
17 its present chemical form.

18 Q And, could you tell us what chemical solubility is?

19 A Chemical solubility is the extent to which the chemical
20 will dissolve in water.

21 Q And, what does dissolve in water actually mean?

22 A Water has a certain capacity to accommodate or take up
23 these chemicals. And it varies from chemical to chemical.



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1 And it is expressed as a concentration of chemical at
2 saturation conditions.

3 Q Can you give us an analogy or picture that will distinguish
4 between chemical persistence and insolubility?

5 A Yes. A suitable analogy might be to consider a cube of
6 sugar. If one wanted to estimate how long a cube of
7 sugar remained in a particular location, one would have
8 to consider two processes. One is its chemical persistence,
9 it may for example be degraded by microorganisms or by
10 sunlight or by some other chemical reaction. If there
11 was water flowing past the cube of sugar, and the water
12 would cause some of the sugar to dissolve. And the mass
13 of sugar would be reduced. So with these two quite
14 distinct mechanisms, one involving chemical reaction
15 and one involving dissolution in water.

16 Q Let's turn to the subject of persistence for a moment.
17 How typically is the persistence of a chemical measured?

18 A The usual procedure is to take the chemical and place it
19 in a reactive environment of some kind and measure what
20 fraction of the chemical is destroyed in a particular
21 period of time.



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1 For example, how long it takes for half of it to disappear.

2 That would be half of the life of the chemical.

3 Q And what factor determined the degree of any chemical
4 persistence in the environment or the length of its half-
5 life in the environment?

6 A There are two groups of factors. One is the inherent
7 stability of the chemical itself and the second the nature
8 of the inherent active environment that the chemical
9 finds itself in.

10 Q What are the properties of the chemical which affect or
11 determine its existence?

12 A It is basically the strength of the chemical bonds between
13 the atoms which constitute the molecules of the chemical
14 and how resistant these bonds are to breakage.

15 Q And with respect to the non-aqueous phase chemicals that
16 are in the S-area landfill, how would you characterize
17 their degree of chemical stability?

18 A The chemicals are mostly hydrocarbons. These are amongst
19 the most stable organic chemicals known.

20 Q Now, the second factor that affects, you indicate, a
21 chemical's persistency involve the environment in which
22 it exists. What are the properties of an environment
23 which affect the chemical's persistence?



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1 A There are four primary processes or reacting agents which
2 cause a chemical to degrade. One is hydrolysis or
3 reaction with water. A second is phytosis.

4 A reaction, as a result of radiation, solar radiation.
5 The third is oxidation and the fourth is biodegradation
6 reaction mediated by micro-organisms.

7 Q To what extent would these environmental reaction
8 processes occur in the S-area site, in your opinion, once
9 the site containment system is constructed?

10 A Regarding hydrolysis, it is exceedingly unlikely that any
11 of these chemicals will be subject to hydrolysis. They
12 come from a chemical which is very similar to those in
13 crude oil, which has existed for geologic time in the
14 presence of water, so that hydrolysis would not, I believe,
15 occur. Phytosis is impossible because it is dark in the
16 landfill. Oxidation is also unlikely because the
17 principal oxidizing agents are substances such as ozone
18 hydroxyl radicals which are environmentally absent in the
19 landfill, and although there may be some oxygen present,
20 oxygen does not react with these compounds at normal
21 temperatures. The final mechanism, biodegradation is, I
22 believe, unlikely because the NAPL chemicals are
23 inheritantly very toxic and I believe that it would be



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1 impossible for a population of micro-organisms to survive
2 in the NAPL, and affect any degradation.

3 Q So would you state your opinion, then, on the basis of
4 these persistent factors, what your opinion is to the
5 persistence of NAPL chemicals in the S-area landfill over
6 time?

7 A My opinion is that the chemicals would persist indefinitely
8 and that I could conceive that over a period of about
9 five hundred years perhaps a couple of percent might be
10 degraded.

11 Q All right. Now, you earlier testified that the amount of
12 NAPL chemicals in the landfill over a period of time would
13 be affected as well by the chemical's solubility and that
14 is their ability to be transferred into the aqueous phase
15 chemical state and then likely drained from the landfill.
16 Now, let me ask you this: Do different chemicals have
17 different solubilities?

18 A Yes.

19 Q And what does it mean for one chemical to have a different
20 solubility than another one?

21 A A chemical which has a high solubility will, of course,
22 tend to dissolve more in water and, therefore, be conveyed
23 more rapidly away from the area than one that is less



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1 solid.

2 Q Can you give us an example of this, an analogy?

3 A If we have a volume of NAPL and there is water flowing
4 past it, then the NAPL chemicals will dissolve in the
5 water and be conveyed away. It is rather analogous to
6 a situation in which you have a crowd of people waiting
7 for buses, for example, after a ball game, and as a bus
8 comes along, analogous to the water flow, some people
9 can get on the bus and are conveyed away, and slowly over
10 time the crowd shrinks, or the NAPL will shrink and it
11 will be conveyed away in this flow of buses.

12 Q Who gets on the bus first?

13 A In the analogy, obviously, the faster people will get on
14 the bus first. In the case of NAPL, there are in this
15 report treated fifteen classes of chemicals and the
16 fastest dissolving chemicals will be those of highest
17 solubility, so it's as if you have a group of fifteen
18 classes of people all with bidding ability to get on the
19 buses.

20 Q Have you estimated the amount of non-aqueous phase liquids
21 which will be removed in this manner, that is, in aqueous
22 phase from the landfill following the site of the
23 containment system?



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1 A Yes.

2 Q And that calculation is contained in your report?

3 A It is.

4 Q Tell us how you made the estimate.

5 A I had to make some assumptions. These are, first of all,
6 an amount of NAPL which is present, and I made three
7 assumptions there, that there was, number one, ten thousand

8 tons, number two, thirty thousand tons, and number three,
9 fifty thousand tons. So I carried out the calculation

10 for all three cases. I assumed that the composition and

11 chemical nature of the NAPL as given in table 4 of the

12 Fogel Affidavit. I also had to assume a flow rate of

13 water through the NAPL and I chose twenty gallons per

14 minute. I also assumed that of the twenty gallons, only

15 ten were completely saturated and ten were unsaturated.

16 This was to include allowance for the possibility that

17 some of the NAPL -- some of the water flow might bypass

18 the NAPL or it might have sufficient time in contact with

19 the NAPL to achieve the full dissolution or solubility.

14-SV 20 Q Having made those assumptions then, what did you do?

21 A I then wrote a simple computer program which calculated

22 the amount of NAPL which would dissolve at various

23 periods of time following the introduction of this water



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1 flow.

2 Q All right. What periods of time did you utilize?

3 A I calculated it for five, twenty, fifty, two hundred, and
4 five hundred years.

5 Q All right. And just to bring us to summarize this, what
6 were your estimates, what were the conclusions that you
7 reached in using the five hundred year period?

8 A In assuming initially there are fifty thousand tons of
9 NAPL over five hundred years, I estimated that about a
10 thousand tons of NAPL would dissolve which corresponds
11 to about two percent of the total amount of NAPL present.

12 Q And if we utilize, rather than an initial figure of fifty
13 thousand or initial figure of thirty thousand, would the
14 estimate have been off or different by very much?

15 A No, the total amount of NAPL which dissolves is about
16 the same, it is about a thousand tons, but the percentage
17 goes higher because the initial amount is lower, so you
18 are looking at dissolving over a five hundred year period
19 about a thousand tons of NAPL.

20 Q If I asked you to change the initial assumption that you
21 made which was that the non-aqueous phase liquids would
22 not be removed from the landfill and I asked you to assume
23 that some -- an undefined portion is removed from the



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1 landfill and, what happens to the remaining NAPL in the
2 landfill with respect to its long-term presence in the
3 area?

4 A The conclusion would be that provided there is a
5 substantial fraction or residue of NAPL remaining, saying
6 four or ten percent, then the total amount of NAPL
7 dissolved will remain around about a thousand tons.

8 Q And therefore, the amount of NAPL that you would exit
9 from the landfill would be the thousand that you talk
10 about as well as the undefined amount that would be
11 collected by the system?

12 A That is correct.

13 Q And over a five hundred year period or so, we could still
14 be left with a considerable portion of NAPL?

15 A That's correct.

16 Q Now, Dr. Mackay, I would like to ask you now a couple of
17 questions about the endangerment posed by the NAPL, as
18 the mass of NAPL decreases.

19 MR. TRUITT: Excuse me, Counsel, I would like to hear
20 a voir dire of the witness concerning his
21 qualifications as a toxicologist before I
22 hear testimony on endangerment.

23 MR. SUNDERLAND: He is not going to testify specifically



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1

regarding the endangerment of any of

2

these chemicals, all he is going to

3

testify to is the relationship between

4

the decline -- excuse me, the declining

5

mass of the chemicals and the corresponding

6

degree of toxicity left by the remaining

7

mass.

8

MR. TRUITT:

To repeat the objection --

9

MR. ELDER:

I have an objection also, Your Honor, that

10

would be that endangerment is a legal

11

term. First of all, one component of that

12

would be health effects, I think that is

13

Mr. Truitt's objection. Once you have

14

that information, then you have to draw

15

the legal conclusion about whether an

16

endangerment has been presented.

17

THE COURT:

Mr. Sunderland, how do you get around this problem?

18

19

MR. SUNDERLAND:

I will use the word toxicity and not use the term endangerment.

20

21

THE COURT:

Mr. Elder and Mr. Truitt -- Mr. Elder and Mr. Truitt object to the term toxicity.

22

23

MR. SUNDERLAND:

I think Mr. Elder objects to the term



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1

endangerment.

2

THE COURT:

3

4

5

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7

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12

Or endangerment. I think he can tell us about his beliefs about his opinion about quantity, and if he wants to further refine that like he told us about the fastest chemicals will go out first like the individual waiting for a bus, if he wants to give us his estimates as to which chemicals would go out first and at what rate, that is fine, but as far as toxicity, that is a different question and I think the objection is well taken.

13

MR. SUNDERLAND:

14

15

16

THE COURT:

17

18

19

20

21

22

23

May I say, may I respond in one fashion, Your Honor. The toxicity of the chemicals is well known. All he is going -- If you want to put an assumption to him as far as that is concerned, I mean, it is a matter of argument, too. You can take his testimony, you can take the evidence from the record or testimony of other witnesses and make an argument, but as far as his testifying as an expert about endangerment, toxicity, that is

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1

something else again

2

MR. SUNDERLAND:

Let me try it this way, if I may. Dr.

3

Mackay, you will assume that the chemicals

4

listed in the table 4 of the Fogel

5

Affidavit, I don't want you to give your

6

opinion as to their toxicity, I don't

7

want you to discuss in any way their

8

toxicity, I want you to assume that these

9

chemicals have the toxicity to the extent

10

reflected in the record in this hearing,

11

and then I will like you to simply give

12

your opinion as to the impact on the

13

potential toxicity of these chemicals,

14

the impact that the declining mass of

15

NAPL in the landfill would have over time.

16

THE WITNESS:

Okay. It is well known that the fifteen

17

chemicals differ greatly in their

18

behavior regarding their partitioning

19

into organic organisms such as fish. And

20

the partitioning tendencies into fish are

21

related to the toxicity and the substances

22

exerted on fish. It is well-accepted

23

principal that the more soluble chemicals

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1 tend to partition less into fish and tend
2 to exert less toxicity. Conversely, the
3 less soluble chemicals partition more and
4 exert greater toxicity. The point as
5 regards the NAPL is that the more soluble
6 chemicals dissolve first. And they are
7 the more innocuous chemicals, the least
8 nastier chemicals. So as time progresses,
9 the NAPL becomes depleted of the least
10 nastier chemicals and the concentration
11 of the nastier chemicals actually
12 increases, and as a result, the dissolution
13 process changes composition for the NAPL,
14 in fact, to make the mixture nastier
15 from a bioconcentration and toxicological
16 viewpoint. And the water which leaves
17 the NAPL remains essentially equally --
18 it has an equal potential for biocentra-
19 tion and toxic effects because it, over
20 a period of time, the concentration of the
21 less soluble nastier material tends to
22 increase.

23 BY MR. SUNDERLAND:



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1 Q You say it has an equal potential to bioaccumulate, equal
2 to what, equal with what?

3 A Well, what I mean is that the water leaving the NAPL in
4 day one will result in a certain concentration in fish and
5 possibly a certain toxicity to fish.

6 THE COURT: Wait a minute. First of all, to get to
7 the fish it has to get to the water, I
8 think that this is -- these are things
9 that certainly the less -- the more
10 soluble material would go out in the drain
11 system, if it worked, through the drain
12 system first, and if -- if you want to
13 say that it would also dribble out through
14 the system, I suppose that is the same
15 thing, they go out first.

16 THE WITNESS: Right.

17 THE COURT: Leaving a higher concentration of less
18 soluble materials at the site, they would
19 go out last, not as quickly.

20 THE WITNESS: That's correct, yes.

21 THE COURT: All right.

22 MR. SUNDERLAND: Okay, Your Honor? Dr. Mackay, would you
23 just, in summary, would you tie up the



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1 things that you have discussed with us
2 today and just give your overall opinion
3 regarding the amount of or the mass of
4 NAPL chemicals which can be expected to
5 remain in the landfill after the initiation
6 of the site containment system and also
7 regarding the cumulative, the aggregate
8 toxicity that we pose by the remaining
9 chemicals?

10 MR. TRUITT:

Excuse me, I don't mean to formulate an
11 objection that is discreet, but I confess
12 being very confused listening to counsel
13 and the witness. I'm going to have to
14 read this, Judge.

15 THE COURT:

Mr. Sunderland, just to have the --
16 without a particular question to the
17 witness, I think we have here his testimony.
18 If you want to put any further particular
19 questions to him, certainly I want to
20 hear them. But simply to have --

21 MR. SUNDERLAND:

Just a summary question, Your Honor.

22 THE COURT:

~~To have him make a summary of what he~~
23 ~~believes~~ that this -- I mean, it will be --



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1

I'm afraid it is something that will not

2

be too helpful to us.

3

MR. SUNDERLAND:

Okay, Your Honor. It was just a summary question. Then I have nothing further, thank you.

4

5

6

THE COURT:

Mr. Elder?

7

MR. ELDER:

Judge Curtin, I would like to introduce my colleague, Mr. Bruce Berger. He is an attorney with the Justice Department and with the Court's permission, Mr. Berger will cross examine Dr. Mackay.

8

9

10

11

12

THE COURT:

Mr. Berger?

13

MR. BERGER:

May it please the Court.

14

THE COURT:

Is it B-E-R-G-E-R?

15

MR. BERGER:

Yes, sir.

16

17

CROSS EXAMINATION BY MR. BERGER:

18

19

Q Dr. Mackay, you've testified that in your opinion NAPL can be expected to remain present at the S-area landfill site even after hundreds of years, is that your testimony?

20

21

22

A That's correct.

23

Q Now, you prepared a report at the request of Mr. Sunderland,

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1 is that correct?

2 A Correct.

3 Q And it is true, is it not, that your analysis in that
4 report is based on certain assumptions?

5 A Correct.

6 Q And one of those assumptions is that the containment
7 system called for by the settlement agreement will be
8 effective in containing NAPL, isn't that true?

9 A Yes.

10

11

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1 Q And you have projected that assumption concerning
2 effectiveness for a period of at least five hundred
3 years, isn't that true?

4 A Right.

5 Q So in fact your assumption about the -- excuse me.
6 And in fact your assumption about the effectiveness,
7 it will be one hundred percent effective the contained
8 NAPL for five hundred years, is that true?

9 A Yes.

10 Q So in other words, as a predicate for your analysis, you
11 have assumed that the site containment system will fully
12 meet the containment objectives of the settlement agree-
13 ment, is that correct?

14 A I have no knowledge about the objectives of the site
15 containment agreement. I have not seen the document.

16 Q You have assumed it will be fully effective in containing
17 NAPL?

18 A Yes.

19 Q You made another assumption I believe, correct me if I'm
20 wrong, you have assumed that the only mechanism by which
21 NAPL might be removed from the site would be either by
22 chemical reaction or by dissolution in water, isn't that
23 correct?



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1 A That's correct.

2 Q And, you have basically said there would be no chemical
3 reactions, a very small amount of chemical reaction,
4 is that correct?

5 A That's correct.

6 Q And, also a very small amount of dissolution over a period
7 of five hundred years, is that correct?

8 A Yes.

9 Q Now, in other words, you're making the assumption here
10 that the tile drain system which will be installed at the
11 site will collect absolutely no NAPL, is that part of
12 your assumption?

13 A I assumed three amounts of NAPL. Fifty thousand, thirty
14 thousand and ten thousand. If for example you start off
15 with fifty thousand tons of NAPL, and there was transfer
16 of thirty thousand tons in -- as NAPL phase, to the drain
17 system, then it would be valid to use the calculations
18 from then on for the ten thousand ton case. So that using
19 my report it is possible to estimate what would happen
20 for example forty thousand of the fifty thousand tons
21 was removed.

22 Q Dr. Mackay, if you start with ten thousand tons, your
23 report then assumes that there will be absolutely no



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1 collection of NAPL by the tile drain system, is that
2 correct?

3 A If we start with ten thousand, yes.

4 Q Now, first of all, that is strictly an assumption on
5 your part, isn't that true?

6 A That is correct.

7 Q When Mr. Sunderland asked you to prepare a report, he
8 asked you make that assumption?

9 A Yes.

10 Q And, did Mr. Sunderland cite to you any scientific
11 principles in support of that assumption?

12 A The -- no.

13 Q Did you question Mr. Sunderland concerning whether he
14 knew of any scientific principles which would support
15 that assumption that no NAPL would be collected by the
16 tile drain system?

17 A No

18 MR. BERGER: No further questions.

19 THE COURT: Any questions?

20 MR. TRUITT: No questions.

21 ~~THE COURT~~ Any questions? No questions?

22 ~~Dr. Mackay, in preparing your~~

23 ~~report, were you here the last~~



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- 1 [REDACTED] few days?
- 2 THE WITNESS: [REDACTED] No.
- 3 THE COURT: [REDACTED] When did you come in, just today?
- 4 THE WITNESS: [REDACTED] Just this morning.
- 5 THE COURT: [REDACTED] Did you hear the testimony
- 6 [REDACTED] then -- you didn't hear the
- 7 [REDACTED] testimony of any witness until
- 8 [REDACTED] today?
- 9 THE WITNESS: [REDACTED] That's correct.
- 10 THE COURT: [REDACTED] In preparing your report, did you
- 11 [REDACTED] examine any of their affidavits
- 12 [REDACTED] or other materials?
- 13 THE WITNESS: [REDACTED] The documents I had were the
- 14 [REDACTED] affidavits of Samuel Fogel, and
- 15 [REDACTED] hydrogeologic survey of the area
- 16 [REDACTED] which is called the Grisak report.
- 17 [REDACTED] Those are the only documents.
- 18 THE COURT: [REDACTED] Those are the only documents. Did
- 19 [REDACTED] you have any information concerning
- 20 [REDACTED] where NAPL has been located so
- 21 [REDACTED] far in the area surrounding the
- 22 [REDACTED] site?
- 23 THE WITNESS: [REDACTED] In the Grisak report, there are



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1

maps somewhat similar to these

2

Exhibits.

3

THE COURT:

I see. And you had those?

4

THE WITNESS:

Yes.

5

THE COURT:

Anything else? Nothing further?

6

All right. Mr. Mackay, thank you

7

very much.

8

THE WITNESS:

Thank you.

9

MR. SUNDERLAND:

Your Honor, in light of some

10

testimony that came up here

11

earlier from Mr. Rovers, our

12

witness, Mr. Grisak's testimony,

13

I would like to have about five

14

minutes if I could to talk to

15

Mr. Grisak. It may substantially

16

shorten his testimony.

17

THE COURT:

All right. We'll take about

18

a five minute break.

19

(A five minute break was then

20

taken.)

21

22

23



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*Pratt refers to
PP 132-5
press release
p. 4*

1 THE COURT:

Mr. Sunderland?

2 MR. SUNDERLAND:

3 Your Honor, can I put forward a request
4 to you on behalf of Ontario. We have
5 two further witnesses, a Mr. Grisak and
6 a Dr. Martin. Mr. Grisak is going to
7 give testimony on the issue of NAPL
8 migration under the river. Mr. Grisak's
9 testimony has been prepared and, indeed,
10 his report has been prepared on a basis
11 of an assumption that we always made
12 that a very significant portion of the
13 materials in the S-area came in as a
14 non-aqueous phase. Hooker today gave
15 us an indication that forty percent of
16 the chemicals were in non-aqueous phase
17 at the time they went into the landfill.
18 That has and will have a very significant
19 impact on Mr. Grisak's testimony, indeed,
20 to the point that we may elect not to
21 proceed with his testimony.

22 Mr. Martin, our second witness, is
23 an incineration expert. He is going to
talk on incineration and he has just come



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1 into town, and in light of some of the
2 testimony today, I would like to have
3 some time with him tonight.

4 My request to you is, if it is at
5 all convenient to you, if we could recess
6 today and let us decide tonight if we
7 want to continue in light of the testimony
8 and start tomorrow morning as early as
9 you would like, either both of our
10 witnesses who will be on Direct possibly
11 in the morning an hour and a half together,
12 or the alternative, if we decide with
13 Mr. Grisak not to go forward, we will go
14 forward with one witness.

15 THE COURT:

Mr. Elder or does anyone else want to say
16 anything? It seems to me --

17 MR. TRUITT:

In deference to Mr. Sunderland, I will
18 not say all of the things that are in
19 my heart to say.

20 THE COURT:

Many times it's wise to do it that way,
21 Mr. Truitt. In any event, when we started
22 this proceeding, it appeared to all of
23 us that we would be at it much longer.



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1 Now, it certainly appears that whatever
2 happens, that we are going to be at
3 it much shorter. Now, I think it best
4 that we break until tomorrow for many
5 reasons. The issues here are certainly
6 complicated and it is something that any
7 witness, I think that anyone wants to
8 put on here, that you want to put on
9 after a careful knowledge of what you
10 expect the witness to say and also to
11 be sure that the witness is fully
12 prepared, that he is aware of what has
13 gone forward with the other witnesses
14 in the case and has had available to him
15 such materials as he should have to make
16 a good presentation.

17 So keeping those factors, and many
18 others, in mind I think --

19 MR. TRUITT:

Could I ask one request? Would it be
20 okay if we could have an understanding.
21 I'm very comfortable with everything that's
22 going on, but if we could know tonight.

23 MR. ELDER:

That would be my request.



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1 MR. TRUITT:

At the earliest time as to whether we are going to be dealing with one witness or two. It would save our time, frankly, working this evening with somebody that is not going to be called.

2
3
4
5
6 THE COURT:

Mr. Sunderland, could you do that and find out where you can easily contact Mr. Elder and Mr. Truitt and, of course, the other gentlemen, and tell them as soon as possible what your intention is?

7
8
9
10
11 MR. SUNDERLAND:

Yes.

12 THE COURT:

I think to give us as much time as possible tomorrow, again I have cut back on as many Special Term matters as I can, and tomorrow, if we could start at 9:30, that would give us time to go ahead. It appears that Mr. Martin and Mr. Grisak would be the only witnesses that you propose?

13
14
15
16
17
18
19
20 MR. SUNDERLAND:

Yes, sir.

21 MR. ELDER:

And Mr. Grisak may not, in fact, testify.

22 THE COURT:

Okay, we know that. Very well.

23 (Whereupon, proceedings concluded.)

* * *

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THE FOREGOING IS CERTIFIED TO BE
A TRUE AND ACCURATE TRANSCRIPT
OF THE STENOGRAPHIC MINUTES TAKEN
BY THE FOLLOWING IN THESE
PROCEEDINGS.

ORIGINAL TRANSCRIPT SIGNED FILED
JAMES J. HAGERTY, JR.,

SANTO VITRANO

MARILYN BROWN



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TERRIS & SUNDERLAND, ESQS.,
By: PHILIP G. SUNDERLAND, ESQ.,
Appearing for Ontario.

1-A

PHILLIPS, NIZER, BENJAMIN, KRIM
& BALLON, ESQS.
By: MARTIN B. WASSER, ESQ.,
Appearing for Occidental.

I N D E X

WITNESS	DIR.	CROSS	REDIR.
EDWARD MARTIN	3	52 (Elder) 60 (Truitt)	

1 THE COURT: All right. Now, Mr. Sunderland.

2 MR. SUNDERLAND: Yes, your Honor, thank you. Your
3 Honor, we will have one witness this
4 morning, Dr. Edward Martin. I would
5 like to have him come to the stand,
6 please.
7

8 DR. EDWARD MARTIN, 7721 Dew Wood Drive, Durward,
9 Maryland, 20855, called as a witness, having been
10 duly sworn, was examined and testified as follows:
11

12 MR. SUNDERLAND: Your Honor, I would like to examine
13 the witness, if I may.

14 THE COURT: Go ahead, Mr. Sunderland.
15

16 DIRECT EXAMINATION BY MR. SUNDERLAND:
17

18 Q Dr. Martin, could you tell us what your
19 profession is?

20 A I am an Environmental Engineer.

21 Q And what is your education?

22 A I have a Bachelor of Science in Civil Engineering
23 from Case, in 1960, Master of Science in Sanitary
24 Engineering from Case in 1961, and a Ph.D. in
25 Environmental Engineering from Rensselaer

1 Polytechnic Institute in Troy, New York, in 1965.

2 Q Doctor, could you tell us what your current
3 employment is?

4 A I am a consultant, and a part-time professor at
5 Howard University in Washington, D.C..

6 Q What courses do you teach at Howard?

7 A Solid Waste Management and Waste Water Treatment.

8 Q And to whom are those courses given?

9 A These courses are in the Graduate School,
10 Graduate School of Arts and Sciences, and the
11 School of Engineering.

12 Q And would you describe the nature of the
13 consulting work that you now engaged in, please?

14 A It is primarily in hazardous waste management,
15 with the exception of a small assignment that I
16 did since leaving EPA in Central America, all or
17 the rest of the work has been in hazardous waste
18 management.

19 Q Could you give us just a couple examples of your
20 recent work in this area of hazardous waste
21 management?

22 A I'm currently working on the incinerator
23 regulatory impact assessment, and the boiler
24 regulatory impact assessment, two pieces of work
25 for the Environmental Protection Agency.

1 Examining the impact of the regulations pursuant
2 to the Resource Conservation Recovery Act, or
3 RCRA, and doing work for several private clients
4 as well.

5 Q When did you begin this consultant work?

6 A I left the EPA in November of 1983.

7 Q And therefore, prior to that time, you were
8 employed with the Environmental Protection
9 Agency?

10 A Yes, I was.

11 Q For how long?

12 A For four years.

13 Q And what was your position at the agency?

14 A My title was the regulatory, Regulations Program
15 Manager for the Resource Conservation and
16 Recovery Act in the Office of Solid Waste in
17 Washington, D.C..

18 Q What were the technical regulations that you were
19 responsible for at that time?

20 A For the technical regulations for RCRA, other
21 than the landfill regulations.

22 Q And what would the regulations encompass, what
23 subject matters?

24 A Primarily storage of hazardous waste and
25 incineration.

1 Q Incineration of --

2 A Incineration of hazardous wastes.

3 Q And at the time you were at EPA, were these
4 regulations published in final form. They are
5 now into final regulations in the Federal
6 Register.

7 Q And would you explain to the Court your role and
8 your activities in the preparation of the
9 incinerator and other land disposal regulations?

10 A In order to perform this function there, it was
11 necessary for me to become completely conversant
12 with the incinerator technology and its
13 application to the destruction and elimination of
14 hazardous waste. I was a coordinator for the
15 Office of Solid Waste with the research and
16 developopment program of the agency, and thereby
17 had an opportunity to, and access to that data
18 and information, and with a goal to primarily
19 develop a technical base to support the -- and
20 substante the regulations in practice.

21 Q Now, following the issuance of the incinerator
22 and other regulations, would you tell us what you
23 did for EPA?

24 A The regulations, as far as completing the
25 technical bases and the regulations themselves,

1 was completed in about mid-1982, and following
 2 that time I was involved with performing work on
 3 the regulatory impact assessment for the
 4 regulations, as well as developing alternative
 5 strategy background for treatment and disposal of
 6 hazardous waste, by other alternative means.

7 Q And could you explain that a little further; what
 8 did that effort on your part entail?

9 A Specifically, at the time I left the agency, I
 10 completed a paper which is serving as the basis
 11 for the alternative development treatment
 12 disposal, chemical treatment and disposal of
 13 hazardous waste, which is now a developing agency
 14 program.

15 Q And prior to joining the Environmental Protection
 16 Agency, would you explain -- give us a little
 17 explanation of your professional work?

18 A Prior to joining the agency for the second time
 19 in 1980, I was a consulting engineer in private
 20 practice in Rockville, Maryland, which is a
 21 suburb of Washington, D.C., with a firm called
 22 Environmental Quality Systems, Incorporated and I
 23 ended up as president of that company for two
 24 years, from 1978 to 1980.

25 Q And would you describe for us the work that you

1 conducted on behalf of Environmental Quality
2 Systems in that ten year period?

3 A The work that Environmental Quality Systems, or
4 EQSI, did during that period was totally devoted
5 to environmental quality management, water
6 supply, water pollution control, industrial waste
7 treatment and some work in hazardous waste
8 management, which was just emerging in the late
9 1970's.

10 Q Can you give us a few examples of the specific
11 activities or projects that you worked on in this
12 ten year period?

13 A Yes. I was the project manager for the
14 development of a hazardous waste management spill
15 control program for the metropolitan area of
16 Pittsburgh, and also the project manager for a
17 project related to toxic material and sludges.
18 That is two examples. There are other examples
19 in the CV.

20 Q Now, prior to joining the Environmental Quality
21 Systems, could you tell us for whom you worked
22 and what you did for each entity?

23 A For two years from about 1968 to 1970, I was the
24 commissioner of water pollution control in the
25 directory, the clean water task force for the

1 City of Cleveland. In that responsibility, I was
2 directly responsible for the operation of
3 Cleveland's three major sewage treatment plants,
4 and had working for me five hundred people.

5 Q And prior to joining the City of Cleveland?

6 A From 1965 to 1969, I was with the predecessor
7 agency to the EPA, starting out in 1965 with the
8 US Public Health Service, and working through the
9 Federal Water Quality Administration, and the
10 Federal Water Pollution Control Administration.

11 Q What activities did you perform for those
12 predecessor agencies?

13 A I was in the research and development program in
14 the headquarter's office in Washington. and in
15 that role, I was responsible for developing and
16 researching development programs of all kinds.
17 Two of particular note, which I was directly
18 involved in was the development of the treatment
19 and disposal alternatives for acid mine drainage
20 and for the development of programs for the
21 control of putrefication or lake pollution.

22 Q Would you state for us the professional
23 organizations of which you are a member?

24 A I am a member of the Water Pollution Control
25 Federation. I served as president of the Federal

1 Water Quality Association, which is the DC
2 section of that organization, in 1981. I am a
3 diplomat of the American Academy of Environmental
4 Engineers, a fellow in the Washington Academy of
5 Sciences, and a registered engineer in the State
6 of Ohio.

7 Q Now --

8 A There are other things in the CV.

9 Q Have you had occasion to serve on any Government
10 task force or commissions?

11 A Prior to joining the agency for the second time,
12 I was on the White House panel directed by the
13 National Science Foundation for the handling and
14 management of toxic and hazardous materials.
15 This was during the reign of president Carter,
16 and this assignment came through the White House
17 and was implemented by the National Science
18 Foundation.

19 Q Would you briefly describe your publications in
20 the area of hazardous waste management?

21 A There are about fifty technical reports and
22 publications listed in the CV, about half of
23 which are in peer review publications. I am
24 co-editing, at this time, with a colleague,
25 another professor at Howard University, a

1 handbook for -- an engineer's guide for hazardous
2 waste management, which is now at
3 Nostrand-Reinhold and will be published sometime
4 in 1985. There is also another book in the
5 planning stages with a colleague at Oakridge
6 National Laboratory, directed specifically to
7 incineration technology and its application to
8 hazardous waste, and this book will also include
9 the treatment of the health risks from hazardous
10 waste incineration.

11 MR. SUNDERLAND: Your Honor, I would like to offer
12 Dr. Martin as an expert witness,
13 qualified to express his opinions
14 regarding the ability of existing
15 incinerator technology in the United
16 States to destroy hazardous chemicals,
17 similar -- like those at the S-Area
18 landfill, regarding the ability of
19 non-thermal technology existing in the
20 United States today to destroy or
21 otherwise physically eliminate such
22 hazardous chemicals, and to state his
23 opinion regarding the broad application
24 applications of these technologies to
25 the S-Area landfill.

1 MR. TRUITT: Excuse me, counsel. We are not going
2 to impose any objection at all to Dr.
3 Martin's extensive and distinguished
4 career, but purposes of information for
5 the Court, we do have and will have
6 some questions concerning his hands-on
7 experience as related to incineration.

8 THE COURT: You want to wait, Mr. Truitt?

9 MR. TRUITT: Well, if I could continue just a
10 little bit of voir dire on this now, I
11 would be -- that might clear up my
12 doubt.

13 THE COURT: Which way -- do you prefer to do it
14 one way or the other?

15 MR. TRUITT: I think I will wait.

16 THE COURT: Why don't you do that. Mr. Elder.

17 MR. ELDER: Judge, I have no objection, but Mr.
18 Sunderland went through the proffer
19 pretty quickly and I wonder if he could
20 repeat it so I could understand exactly
21 what Dr. Martin is being offered as and
22 what precise expertise he has.

23 MR. SUNDERLAND: Would you like me to go through it
24 again, your Honor?

25 THE COURT: Would you do that, please?

1 MR. SUNDERLAND: Sure would. I'm offering Dr. Martin
2 to express his opinion regarding the
3 following matters; the ability of
4 existing incinerator technology to
5 destroy hazardous chemicals similar to
6 those at the S-Area landfill told,
7 regarding the ability of non-thermal
8 technology to destroy or otherwise
9 physically eliminate hazardous
10 chemicals similar to those at the
11 S-Area landfill, and regarding the
12 broad application of these technologies
13 to the S-Area landfill, your Honor. We
14 have marked as Ontario Exhibit Number
15 8, the curriculum vitae of Dr. Martin,
16 and I would like to offer that into the
17 report.

18 THE COURT: All right. You want to hand it to
19 the clerk?

20 BY MR. SUNDERLAND:

21 Q Doctor Martin, I asked you, didn't I, to prepare
22 a report on the alternative technologies, which
23 are available today or which, in your opinion,
24 may be available in the reasonable future, which
25 could be used for permanently eliminating the

1 chemicals presently at the S-Area landfill?

2 A Yes. You did.

3 Q Did you prepare this report?

4 A Yes. I did.

5 MR. SUNDERLAND: Your Honor, we have had this marked
6 as Ontario's Exhibit Number 5, and I
7 would also like to offer this into the
8 record at this time.

9 THE COURT: That may be done.

10 MR. ELDER: Your Honor, I have an objection. The
11 objection is not to Dr. Martin's
12 report, but to two letters that are
13 attached to it, from Huber Corporation
14 and Rollins. They are letters
15 addressed to Mr. Sunderland, which
16 purport to explain certain research and
17 development done by those corporations.
18 I would object to them on the basis
19 that -- not only are the letters
20 hearsay, but the information contained
21 in the letters are a second-layered
22 hearsay. Reduced to their simplest
23 terms, the letters are simply compound
24 hearsay, and I don't think they should
25 be admitted into the record. They are

1 essentially brochures put out by the
2 companies to advertise their products.
3 THE COURT: Mr. Sunderland -- why don't we wait,
4 Mr. Elder, and see how this works in
5 with his report?

6 MR. ELDER: Fine, your Honor.

7 THE COURT: Mr. Sunderland, could you bring me
8 that particular --

9 MR. SUNDERLAND: Sure.

10 BY MR. SUNDERLAND:

11 Q Dr. Martin, would you generlly describe for us
12 how you addressed in your report that request
13 that I made to you?

14 A Yes. The record might be considered to be in
15 three parts. The first part was a summarization
16 of thermal destruction technologies, particularly
17 incineration. The second part is a consideration
18 of non-thermal destruction alternatives, and the
19 third element would be directed at the idea of
20 trying to examine or propose alternative
21 solutions to a complex problem, such as the one
22 we have here.

23 Q Now, Dr. Martin, I am going to ask you a series
24 of questions during this morning, and I am going
25 to use the term, hazardous chemicals, and when I

1 use the term, hazardous chemicals, I would like
 2 you to assume that they include and encompass the
 3 class of chlorinated hydrocarbons, such as those
 4 that are found at the S-Area landfill. Now, Dr.
 5 Martin, would you tell us what thermal technology
 6 exists today for the elimination of hazardous
 7 chemicals?

8 A Primarily, incineration.

9 Q And how is it that incineration achieves the
 10 elimination of hazardous chemicals?

11 A Incineration is essentially doing a chemical
 12 reaction, your Honor, at a high temperature, with
 13 enough mixing and in the presence of oxygen to
 14 oxidize the chemicals that are present. So, in
 15 effect, what we are doing with combustion
 16 technology is we are breaking the molecules apart
 17 into the pieces that go into making them up.

18 Q And is it fair to say in so breaking the
 19 chemicals apart, we are effectively destroying
 20 the chemicals?

21 A We are certainly altering their toxic natures.
 22 Complete combustion would result in basically
 23 harmless by-products, such as carbon dioxide and
 24 water. In the case of incinerating chlorinated
 25 hydrocarbons, we could expect to get HCL or

1 hydrogen chloride in the off-gas stream as well.

2 Q What are the major types of incinerators that
3 exist today in the United States for and are used
4 in the treatment of hazardous chemicals?

5 A Basically, there are three configurations that I
6 would like to mention, and before I do that, I
7 would like to say that incineration is not a
8 research kind of approach at the moment.

9 Incineration is a real alternative. There is a
10 lot of hardware around, manufactured by many
11 different companies, and its application to
12 destruction of the kinds of chemicals we are
13 talking about at S-Area is well documented. The
14 three configurations that I would like to mention
15 are, multiple chamber units, in other words,
16 putting stuff into a rotary kiln first, followed
17 perhaps by an afterburner, another kind of burner
18 in addition to the first one, the option of
19 putting things directly into a rotary kiln, and
20 designing that system for destruction of the
21 chemicals, and the third would be a liquid
22 injection incinerator. Each of these systems
23 have different capabilities and are engineered
24 and designed in different ways, depending on the
25 kind of situation that one is facing.

1 Q Is the basic process the same in each of these
2 three alternative form or incinerators?

3 A Yes. It is. We are burning the stuff at high
4 temperatures for a sufficiently long time to get
5 destruction, in the presence of air and with
6 mixing.

7 Q Now, in what settings today are hazardous
8 chemicals treated and destroyed by incinerators
9 in the United States?

10 A Largely, chemicals such as the ones we are
11 talking about here, are destroyed in incineration
12 facilities on wastes coming directly from
13 processes, coming directly from manufacturing
14 processes or wastes that have been stored in
15 various ways in danks, in empoundments, and so
16 on.

17 Q And are those burned in a commercial setting, in
18 a another type of setting, or whereabouts are the
19 incinerators located that are utilized?

20 A There are two main kinds of applications. The
21 first is what we might call on-site, in other
22 words, a commercial operation or industry might
23 have an incinerator on the site, which is captive
24 for destroying these materials, and the second
25 kind of application is what I would call

1 off-site, or represents those people who own and
2 operate incinerators for the purpose of
3 destroying hazardous wastes that come from other
4 places, in other words, that they serve as
5 clients.

6 Q Could you tell us approximately how many
7 incinerators there are currently in use in the
8 country in the former category that you
9 described, and then in the latter category, the
10 off-site category that you described?

11 A In total, there are probably between three and
12 four hundred commercially operated incinerators
13 in the U.S.. burning hazardous waste at this
14 time. By far, most of these are operated as
15 on-site facilities or smaller so-called captive
16 units that industries or others are using to
17 dispose of their waste directly. There are
18 probably a dozen to twenty or so in the category
19 of off-site facilities, which are larger
20 facilities operated as a business for the purpose
21 of disposing of other peoples' waste.

22 Q Now, have hazardous chemicals recently been
23 burned and destroyed in EPA test burns?

24 A Yes, my report contains data and information
25 resulting from about thirty such test burns in

1 three main groups. There were a series of test
2 burns conducted under EPA auspices in response to
3 toxic, the Toxic Substances Control Act
4 regulations, there were another dozen or so tests
5 conducted by EPA in response to the Research
6 Conservation and Recovery Act regulations that I
7 mentioned earlier, and another ten or so tests
8 conducted by private firms. The results of that
9 information is in the report.

10 Q Could you explain to the Court what a test burn
11 is?

12 A Well, the motivation for doing test burns in the
13 first place is in order to demonstrate on the
14 part of the owner/operator of the machine that he
15 can meet the requirements that are proposed or
16 stipulated under either the toxic regulations or
17 the RCRA regulations, so the motivation for doing
18 the test burns is to try to find out what would
19 happen burning actual hazardous waste in real
20 situations.

21 Q Now during the voir dire we discussed a little
22 bit the EPA incineration regulations and your
23 role role in those; would you explain for us what
24 the primary requirements of the EPA incineration
25 requirements are?

1 A Yes. There are only three primary requirements,
2 although I am sorry to say there is a lot more
3 verbiage than that reflected in the actual
4 regulations. The first requirement is that those
5 compounds that have been identified as principal
6 organic hazardous compounds or affectionately
7 called pot, will be destroyed to 49, 99 point 99
8 percent destruction and removal efficiency. The
9 second requirement is related to the discharge of
10 HCl, hydrogen chloride, this is stack gas, and is
11 99 percent removal of HCl, about the 4 pound per
12 hour limitation set as a sort of a base line, and
13 the third requirement is .08, is a concentration
14 requirement, a little bit different than the
15 other one, .08 grains per dry standard cubic
16 foot.

17 Q Is it -- that latter requirement referred to as a
18 particular emissions requirement?

19 A Yes, it is and it is limited directly in the
20 Clean Air Act regulations and made a part of the
21 RCRA regulations.

22 Q Now, in the twenty or thirty EPA tests. burns
23 that you just mentioned, did the tested machines,
24 the tested incinerators meet these three EPA
25 requirements?

1 A Yes, in general they did, and I want to explain
2 that further. -These trial burns, for the most
3 part, were conducted under conditions that would
4 normally be a lot worse than pme would encounter
5 in actual practice. The intention of doing this
6 tests, especially the EPA test conducted under
7 the RCRA program, were to try and find out what
8 the limits of these machines were, so in several
9 cases we cut back on the air, did all kinds of
10 things to make sure that we were trying to get
11 the machine to fail, if you will, and even in the
12 face of those conditions, the results that you
13 see in the -- in the report demonstrate very high
14 efficiency removal and destruction.

15 Q Now, Dr. Martin, what are the primary negative
16 by-products of the incineration process and how
17 are those by-products controlled?

18 A As with any other black box, your Honor, there
19 are things that come out of this thing that are
20 of interest, and I would like to put those in
21 four categories. The first one is principal
22 products of incomplete combustion or pics, P-I-C.
23 These are organic compounds which are formed in
24 this, in this reaction that is going on inside
25 the machine that can come out through the hot gas

1 stream. The second category, other gaseous
2 by-products, such as HCl, which I already
3 mentioned, sulfur oxide, nitrogen oxide, the
4 other thinks that we might classically consider
5 as stack emissions, if we were dealing with any
6 other kinds of burning device, such as a power
7 plant. If metals were in the waste, which I
8 gather I guess the case here, metals could also
9 be subject to come out the stack. In the
10 particulate fraction, and volatile metals such as
11 mercury and is a lime, could possibly come out
12 the stack as volatiles, in other words, actually
13 in a gas state, rather than in the solid state.
14 If the stack gas was above the condensation
15 temperature, in other words, if the stack gas was
16 high enough so the stuff would still remain a
17 vapor or gas. There are residues which result
18 from this process, similar to, or comparable to
19 residues we might get from any other process. We
20 get ash, which has to be dealt with in some way.
21 And if air pollution control systems exist on the
22 machine, then we are going to get residues from
23 the air pollution control systems, going to get
24 the scrubber water, eventually, if we have
25 scrubbers, and we're going to get dust from

1 electrostatic precipitators, for example.

2 Q Dr. Martin --

3 A Those are the kinds of things you can expect.

4 Q Dr. March, the residues from the air pollution
5 control system, and thesh that you referred to,
6 how are they typically disposed in the
7 incineration of hazardous chemicals?

8 A Well, the history now for actually burning
9 hazardous waste is not very broad, because the
10 legislation has just been in place since 1976,
11 and we have -- the history that we have is very
12 short. So when you say typically, I want to make
13 sure that we understand that what I am talking
14 about is my judgment of what would happen with
15 this stuff; in my judgment the ash that would
16 result from burning hazardous waste in a machine
17 that was properly designed, in other words, at
18 high enough temperature, with enough oxygen, with
19 enough mixing, the ash would not contain
20 measurable or significant quantities of the
21 organic material that we were trying to destroy.
22 I want to make sure everyone understands that
23 this is a question of engineering design, not a
24 question of whether the stuff is going to burn or
25 not, we are not talking about research to find

1 out whether the compounds are going to break
2 down, they'll break down in a machine that is
3 properly designed, so these are engineering
4 limitations that we are talking about.

5 Q The ash, the ash by-product that does result,
6 what, in your opinion, what does one do with it?

7 A The disposal of this kind of a product at the
8 moment, within the regulations under RCRA, would
9 require a simple test for instability level, and
10 then the material could be disposed of in a
11 regular landfill, or in any other hole in the
12 ground.

13 Q If it passed the test?

14 A Correct.

15 Q If it does not pass the test, what does the ash
16 have to comply with?

17 A If the ash does not past the test, it must be
18 treated as hazardous waste, because within the
19 fabric of the RCRA regulations, goes anything
20 that goes into any black box and is called a
21 hazardous waste results in by-products streams,
22 which are also hazardous waste.

23 Q Now, Dr. Martin, what is the physical state of
24 the materials that have been burned in both the
25 commercial setting and the test burn setting that

1 you referred to earlier?

2 A It might be a whole range of things, depending on
3 what we put in. In the case of a waste, which
4 has a very low ash content to begin with, we
5 might have -- such as microcline through a liquid
6 injection incinerator, we might have almost no
7 ash, might be no residual at all. In a waste
8 that had more solids in it when it went in, we're
9 going to get more solids coming out at the end.

10 Q What is the -- in terms of the commercial and the
11 test burn applications of incinerators that have
12 been done to date, what is the physical state of
13 the materials that go in, liquid, solids, what
14 can incinerators burn?

15 A Incinerators can burn waste in just about any
16 matrix. Can burn them as liquids, liquid mixed
17 with solids, solids, pressed solids, bulk solids,
18 sludges, slurries. If you want to go through the
19 expense, you could even burn water.

20 Q And the materials that you just mentioned have
21 all been burned in the commercial or the test
22 burn situation?

23 A The materials that I have mentioned in general
24 have all been burned in commercial situations,
25 yes.

1 Q Now, have soils, contaminated with hazardous
2 chemicals ever been burned?

3 A To my knowledge, the only place soils have been
4 burned, which are contaminated with hazardous
5 waste, have been in test situations. Two of the
6 EPA trial burns looked at burning hazardous waste
7 or organic chemicals in a soil matrix. In one
8 case, we put a bunch of river sand and dirt in a
9 cement truck and mixed it up with a chlorodane,
10 which as your Honor knows is an insecticide. In
11 another test, we had some soils that were in
12 drums and put those through a machine as well. I
13 might indicate that an incinerator, such as a
14 rotary kiln, with proper pretreatment, could
15 actually handle materials that are right in the
16 drums. We just take the drums --

17 MR. ELDER: Objection, Judge. Could the witness
18 clarify when he says, we, does he mean
19 himself or other EPA employees?

20 THE WITNESS: When I say, we, I think I mean us as
21 a general effector of the community.

22 MR. ELDER: You don't mean yourself personally?

23 THE WITNESS: No.

24 MR. ELDER: Thank you.

25 BY MR. SUNDERLAND:

1 Q These test burns on contaminated soils, could you
2 tell us by whom they were conducted?

3 A No. I can't name the test burns

4 Q Were they --

5 A I can't name the test burn locations.

6 Q Is that -- why is that?

7 A It was submitted as confidential business
8 information.

9 Q Were they conducted at the time you were with the
10 EPA?

11 A Yes, they were.

12 Q And your association with those test burns came
13 through your affiliation with the EPA?

14 A That is correct.

15 Q Did these test burns of contaminated soils meet
16 the requirements that we earlier discussed that I
17 found in the EPA incineration regulations?

18 A Yes. They did.

19 Q Now, Dr. Martin, in your opinion, is existing
20 incineration technology capable of treating soils
21 that are contaminated with hazardous chemicals on
22 a large-scale basis, that is, beyond the test
23 burn setting and to do so in a way in compliance
24 with the EPA regulations?

25 MR. TRUITT: Excuse me. I would like to frame an

1 objection to that. I don't believe
2 that there is any predicate laid or
3 foundation laid in this record for this
4 witness to respond to that question.
5 The state of the record presently,
6 Judge, is that the only instance in
7 which Dr. Martin knows about that
8 occurring is in test burns that he is
9 unable to identify. That is it.

10 MR. ELDER: And I have a different objection,
11 Judge, and that would be the proffer of
12 expertise, and this is why I asked Mr.
13 Sunderland to repeat it to make sure I
14 heard it correctly, is that the Doctor
15 was being proffered as an expert in
16 existing technology to destroy
17 chemicals. There was no reference made
18 to any expertise in the incineration of
19 soils and contaminated rock. That is
20 an entirely different question, your
21 Honor, and this -- as Mr. Truitt
22 indicated, there has been no predicate
23 laid with respect to any competency
24 whatever to offer testimony of that
25 type.

1 THE COURT: All right. Well, the objections are
2 noted for the record, and we must keep
3 in mind, though, that Federal Rules of
4 Evidence are very broad permitting now
5 opinioned evidence to be admitted in a
6 very broad way. You will have the
7 opportunity to cross-examine,
8 certainly, but we'll permit Dr. Martin
9 to state his opinion.

10 BY MR. SUNDERLAND:

11 Q Thank you, your Honor. Would you like me to
12 repeat the question?

13 A Yes. I would, please.

14 Q Would you state your opinion, Dr. Martin, as to
15 whether existing incineration technology is
16 capable of treating soils that are contaminated
17 with hazardous chemicals, and could you do so on
18 a large-scale basis that is beyond the test burn
19 setting and do so in compliance with the EPA
20 incinerator regulations?

21 A In my judgment, absolutely.

22 Q And would you explain to us the basis for your
23 judgment?

24 A Because, as I pointed out earlier, the question
25 of whether compounds will break down at

1 sufficiently high temperatures in an incineration
2 device is not a technical issue. The only
3 question that remains is whether or not a system
4 can be engineered, designed, put in place, and
5 the commitment made to spend enough money to do
6 so, to burn the stuff up.

7 Q Now, what specific incineration technology is
8 best suited, in your view, to treat soils that
9 are contaminated with hazardous waste?

10 A Well, I think the answer to that question would
11 have two parts. It would depend on whether one
12 wanted to do it today with the existing
13 technology that we have now, or whether one
14 wanted to do it at some time in the future. If
15 we wanted to do it today, the configuration that
16 I would choose would be a rotary kiln, followed
17 by an afterburn. Two things happen there. In the
18 rotary kiln, we get partial combustion. We also
19 get volatilization of the material into the gas
20 state. Nothing will burn unless it is in a gas
21 state. The second part of this configuration, or
22 what I am calling an afterburn, is the place
23 where we burn the gases that are coming off the
24 rotary kiln. If one wanted to burn the material
25 in a soil matrix, that would be the approach to

1 use today.

2 Q And in the future?

3 A The second part of the response would depend on
4 what would happen as the application of
5 incinerator technology is applied to different
6 places that have waste in a soil matrix as we
7 proceeded down the line in time. A few years
8 from now, we can expect to see demonstrations of
9 incineration of contaminants on soil matrices in
10 many applications around this country and in
11 other places, and the engineering that goes on to
12 put those systems in place is going to give us a
13 lot of data and information that might be
14 applicable to other sites as well.

15 Q Now, what technological restrictions are there on
16 the type of soils which could be treated with the
17 incineration technology today which you have just
18 described?

19 A There are no existing restrictions on the type of
20 soil. What would be of more concern or interest,
21 from the engineering design point of view, would
22 be things like how much water is mixed in with
23 the soil and with the waste, how many so-called
24 cats and dogs are mixed in with the waste,
25 stones, rocks, and bricks and pieces of metal and

1 can and so on. That is an engineering materials
2 handling problem, and not associated with the
3 effectiveness of the whether or organic material
4 is going to burn or not.

5 Q And similarly, what technological restrictions
6 are there on the type of organic chemicals, which
7 when absorbed to soil, could be treated when this
8 -- with this incineration technology today that
9 you have described?

10 A There are no technical or scientific reasons
11 which would warrant one to distinguish between
12 different kinds of organic chemicals being burned
13 in an incinerator.

14 Q Now, in your report, Dr. Martin, you also
15 discussed some non-thermal -- there were some
16 non-incineration technologies for the destruction
17 or the elimination of hazardous chemicals. Would
18 you first tell the Court what you mean and what
19 is a non-thermal technology?

20 A I am talking, in this case, your Honor, about
21 conducting the same kinds or similar reactions
22 perhaps that might be going on in an incinerator.
23 In this case, at lower temperatures, at lower
24 temperatures, at elevated pressures perhaps or
25 atmospheric pressures, but in general, performing

1 observation reactions, reduction reactions,
2 catalysis reactions and so on, all of these
3 constitute the area of what I am calling
4 non-thermal technology.

5 Q And today in the world of non-thermal technology
6 are such technologies used to destroy or
7 eliminate hazardous chemicals?

8 A These technologies, in contrast with the
9 incineration technologies, are used on industrial
10 waste settings pretty much exclusively as opposed
11 to what we're calling the disposal of hazardous
12 waste. Now, the connection there is that many of
13 these wastes are, of course, or were industrial
14 wastes in the first place, coming from processes
15 which manufactured other items that were used, so
16 in general, the scientific and technical
17 principles remain the same.

18 Q Can you tell the Court or give a few of the
19 examples of non-thermal technologies that are
20 used today to eliminate hazardous chemicals in
21 the industrial setting?

22 A There is a listing of them in the report. There
23 is also a paper which I developed with a couple
24 of colleagues, which we gave in Japan a
25 couple of years ago, summarizing the state of the

1 development in the U.S. of these kinds of
2 processes as applied in different kinds of
3 settings, municipal wastes, industrial waste
4 settings and so on, so all of the processes are
5 at an advantage stage of development. Again.
6 many of the processes, the processes probably can
7 be broken down into two general categories, the
8 kind that we find in use in full scale
9 application of industrial waste today or other
10 kinds of waste, and those which are back a little
11 bit in terms of their development, and require
12 additional development or application to actual
13 sites in order for to us to get enough
14 engineering operational data and cost data to be
15 able to apply them in full scale settings, and an
16 example of the first case is something like
17 activated carbon; an example in the second case
18 would be chemical dechlorination, and that is a
19 scheme for knocking off the chlorine molecules
20 from such things as dioxin molecules,, thereby
21 changing their toxicity.

22 Q Have any of these non-thermal technologies been
23 used in the treatment of soils contaminated with
24 hazardous chemicals?

25 A To my knowledge, they have not.

1 Q Now, in your opinion has any non-thermal
2 technology developed to the point of being able
3 to be applied to soils contaminated with
4 hazardous chemicals?

5 A No, they have not. But I believe again there will
6 be significant impetus to come up with
7 alternatives that are directed to destruction or
8 elimination of waste, and as such, there is going
9 to be a considerable amount of new development,
10 expenditures of dollars and resources over the
11 coming years, to try and develop these
12 alternatives to a point where they can be
13 applied.

14 Q What is the significant impetus that you refer
15 to?

16 A I think the main impetus is going to be the
17 current RCRA reauthorization bills on both the
18 House and the Senate side at this point, both
19 have a significant thread through them of banning
20 certain kinds of materials from the landfills.

21 MR. TRUITT: Excuse me, counsel. I have to object
22 to that answer, most respectfully, your
23 Honor. The RCRA reauthorization bills
24 are, in fact, moving through our
25 Governments in Washington. The witness

1 has no idea what will or will not come
2 from those bills, jis comments are not
3 informed, inI fact. They are simply
4 the same kind of speculation that I
5 have sworn off of.

6 THE COURT: Well, again, Mr. Truitt, I think we
7 know the hazards of legislation.

8 MR. TRUITT: Thank you.

9 THE COURT: All fields -- that simple proposals
10 made in the Congress, and even after
11 this matter becomes law, that does not
12 mean that certain things will
13 eventually happen, and I think that the
14 witness has sufficiently explained to
15 us that he realizes that these are
16 proposals in the Congress, but, again,
17 we'll permit it, and we will have
18 cross-examination.

19 MR. TRUITT: Thank you.

20 THE WITNESS: The seconds impetus, specifically, is
21 that EPA has just initiated in the
22 Office of Solid Waste a program,
23 specifically directed at developing
24 treatment, alternatives for hazardous
25 waste disposal. The program is not a

1 matter of speculation, but is a program
2 which is under way and planned to be
3 executed over the next three years.

4 BY MR. SUNDERLAND:

5 Q Dr. Martin, will you explain to the Court the
6 degree of contact that you have had with the
7 S-Area site, with its soils, its materials, what
8 is the basis of your knowledge of the site?

9 A Yes, I should say that I don't pretend to be an
10 expert on the S-Area. My -- the basis for my
11 knowledge and my statements here is the
12 information which I have had access to which
13 includes a copy of the settlement agreement, a
14 number of the affidavits containing data and
15 information related to the waste, the hydrologic
16 study from the Government of Ontario, Canada, and
17 some other things.

18 Q And you have never visited the site?

19 A I have not.

20 Q Never seen the site?

21 A Have not.

22 Q Your awareness of the type of the soil, the type
23 of the chemicals, and the general physical
24 characteristics of the landfill comes solely
25 from the materials that you just related to us?

1 A That is correct.

2 Q Now, Dr. Martin, with respect to the S-Area site,
3 you earlier said in a general sense that your
4 opinion was that incineration technology was
5 today capable of destroying hazardous waste that
6 had been absorbed into the soil. Is that opinion
7 any different with respect to the S-Area site?

8 A No, it is not.

9 Q Now, what particular incineration technology, in
10 your view, could be applied to the S-Area today
11 or in the future and possibly in connection with
12 some of these non-thermal technologies that you
13 described. In responding to this, Dr. Martin,
14 would you take into account and address to the
15 extent that you can, the comments and the
16 testimony given by Mr. Rovers yesterday on behalf
17 of Hooker.

18 MR. TRUITT: Excuse me, we have nothing that can
19 tell us that the witness heard the
20 testimony or has reviewed it.

21 BY MR. SUNDERLAND:

22 Q Dr. Martin, were you in courtroom yesterday when
23 Mr. Rovers gave his testimony?

24 A Yes, I was.

25 THE COURT: Okay, can we take one think at a

1 time. We covered covered an awful lot
2 of ground in that question. Can you
3 sort it out please, and take one thing
4 at a time.

5 MR. SUNDERLAND: Yes, your Honor.

6 THE WITNESS: I have been well covered. This
7 answer also has several parts. My
8 approach, and this is a matter of
9 judgment, and the approach I am
10 suggesting would have application to
11 any site, not just the S-Area site, but
12 any site where were faced with a
13 complex problem of trying to dispose of
14 hazardous waste that had been placed
15 there before, and I guess what I am
16 basically here to say is that there are
17 a whole range of potential alternatives
18 that can be applied to a complex
19 problem like that. And I guess my plea
20 is, if there is one, is that we try and
21 take a look at some of those, and the
22 way I would go about that is this. I
23 think I would approach this with a
24 four-part analysis, a study, a pilot
25 study, if you will, or a feasibility

1 study. And the four parts would be as
2 follows. The first part is making
3 assumption that in order to apply
4 existing elimination or destruction
5 technology we got to get the stuff out
6 of the hole, as Mr. Rovers correctly
7 identified this, one of the major
8 problems is how to get the stuff out of
9 the hole. The second area is
10 associated with pre-treatment; once we
11 get the stuff out of the hole, what we
12 need to do with it, to put it into an
13 incinerator, put it through a series of
14 unit processes, such as the ones that I
15 mentioned in the report which are
16 non-thermal in nature, a combinations
17 of these two, the incinerator, with
18 non-thermal approaches, and so on. One
19 of the elements in a study like this
20 would be to actually look at ways to
21 enhance removal from the site itself.
22 For example, taking the case of S-Area,
23 and the proposed approach to the extent
24 that I am familiar with it, your Honor,
25 one of the approaches to getting the

1 stuff out of there might actually be to
2 add more waste, one of the approaches,
3 for example, which might be considered
4 if NAPL will go into solution in
5 solvent, under controlled conditions,
6 it might be useful to consider getting
7 the material out in that way. That
8 might be an approach which might
9 actually enhance the elimination
10 portion of the proposal which is before
11 you here. The third element of this
12 approach, or this examination, would be
13 the elimination process itself, what
14 are we going to do to actually get rid
15 of the stuff, to break down the
16 compounds into pieces that are
17 presumably less toxic than the ones we
18 started out with, and the fourth
19 element of this pilot analysis would
20 be, what do we do with the residue and
21 these residues can come from the
22 incineration process, they can come
23 from non-thermal processes, such as the
24 sludges, slurries, solids, what have
25 you, but the point is that having gone

1 through this process of examining all
2 of the alternatives that are available,
3 we now come down, I think, with a
4 higher degree of certainty that what we
5 are going to do is logical from the
6 point of view of elimination,
7 protection of the public health and
8 welfare and is acceptable from a cost
9 point of view as well.

10 Q Now, Dr. Martin, what would come about -- what
11 would be the, in a sense that the product and the
12 following action, the filing following a project
13 -- excuse me, a pilot study such as the one you
14 mentioned?

15 A The results, from my point of view as a
16 technician, would be in two classes. We would
17 have information on the effectiveness of these
18 unit processes, combinations or different
19 configurations of them, and we would have
20 information on cost. That would allow us now to
21 examine, really examine, what we loosely call
22 cost effectiveness, because there are two
23 elements in cost effectiveness; not just which is
24 the lowest cost, but what is it we are buying for
25 the expenditure of each dollar that we spend.

1 Q Now, in my earlier question to you, which I
2 realize was compound, I also asked you to take a
3 look or to address the specific concerns
4 regarding excavations, which Mr. Rovers made
5 yesterday. I would like to take you through
6 those, and have you address those one by one.

7 MR. TRUITT: I apologize, Counsel. I have to
8 frame the objection for the record.
9 The witness is proffered as an expert
10 in specific areas. Among the areas
11 that he has had no training in, that I
12 am aware of or that appears in his vita
13 or in his experience, is the digging up
14 of anywhere from six hundred thousand
15 to a million tons of material.

16 THE COURT: All right. Well, I think, Mr.
17 Elder, you have an opinion?

18 MR. ELDER: I concur, Judge. The central concern
19 of the Federal Government in regard to
20 Ontario's preferred remedies are the
21 dangers associated with excavation, and
22 unless this witness can be qualified as
23 being familiar with the various
24 considerations involved with respect to
25 that aspect of excavation, as well as

1 the other aspects, we would object.

2 THE COURT: Well, I'll consider the objection,
3 but certainly because of the -- Dr.
4 Martin's background, training, I think
5 that he should be permitted to state
6 his opinion as to what may be done, and
7 you will be -- have opportunity to
8 cross-examine. Go ahead, Mr.
9 Sunderland.

10 BY MR. SUNDERLAND:

11 Q Thank you, your Honor. Dr. Martin, --

12 A I want to address that in two ways. The term,
13 excavation, has been used here and that conjures
14 up some things in everybody's mind, like
15 bulldozers going in and digging it out. When I
16 proposed my four point plan, I used the term,
17 getting the stuff out of the hole, and that is
18 really what I am interested in doing. There are
19 lots of ways to get things out of the hole other
20 than digging them up with bulldozers and
21 spreading them all over the landscape. Certainly,
22 any alternative study, such as the one I
23 suggested, would look at the control of air
24 emission, which might result from any program for
25 getting the stuff out of the hole. We also know

1 that when we dig stuff up, we create dust. When
2 we expose the material, we are likely to have
3 vapors coming off, which includes organic
4 compounds and other materials. I think those
5 things, your Honor, are well known. What I am
6 suggesting here is not a way to get the material
7 out of the hole, but that we look at the various
8 ways that do exist for getting the material out
9 of the hole and pick the one that is most cost
10 effective and most protective.

11 Q Now, Dr. Martin, with respect to the emissions of
12 the vapors from the excavation process, are
13 there, to your knowledge, ways or means of
14 controlling those emissions?

15 A Yes. There are.

16 Q What are they?

17 A One can use foam. One can make a slurry out of
18 the material to begin with. For example, since
19 we have a lot of water in the S-Area hole, one of
20 the thoughts that occurs to me is to use the
21 water to get the material out, and then through a
22 combination of unit processes, dewatering the
23 material, or if the water content isn't too high,
24 sending it straight into incinerator units. So,
25 there are lots of alternatives, is all I am

1 suggesting. I am not suggesting one. I am
2 suggesting that we look at them.

3 Q Mr. Rovers also raised the issue of worker risk
4 and worker safety. Can you respond to that?

5 A Yes. I would just like to make a general comment
6 on that. The risk to workers directly would
7 probably be the least of my concerns, because we
8 can put these people in moonsuits, give them
9 self-contained breathing apparatus and take other
10 protective cautions. The concern that I would
11 have would be to the neighboring population.
12 Those would be much higher than the risk to any
13 workers.

14 Q Now, Mr. Rovers also referred to the ash that
15 would be produced by any incineration of S-Area
16 materials and referred to a seventy million
17 dollar cost re-landfilling of that material, that
18 ash, in a secure landfill. Could you comment on
19 that?

20 A Yes. His assumption was that the material coming
21 out of the machine, as I stated earlier, would
22 have to be considered a hazardous waste, and if
23 the material did pass the testing, he is quite
24 right. It would have to be treated as hazardous
25 waste. In my judgment, however, as I stated

1 earlier, with the proper machine designed in the
2 proper way, the stuff would come out of there and
3 pass the test.

4 Q And if the material passed the test, what would
5 one do with it, what could one do with it?

6 A At taht point, it is no longer a hazardous waste
7 and can be disposed of in any hole.

8 Q In the same whole from which it had been
9 excavated?

10 A That is a possible alternative.

11 Q Now, Mr. Rovers also indicated the necessity to
12 relocate the power towers that are located at the
13 south end of the landfill and the industrial
14 intake frame. Could you respond to that?

15 A Yes. My understanding is that there is a
16 concentration of materials in that location. ~~Mr.~~

17 ~~Rovers knows the site much better than I do.~~ I
18 would assume that some attention would have to be
19 paid for that -- paid to that.

20 Q Now, is relocation necessarily the only option
21 that may exist in the future with respect to
22 those installations?

23 A I don't know that at this time, but it would
24 certainly be an element that we would design in
25 such a setting. In other words, what are the

1 options that exist, short of moving those things.

2 Q And generally speaking, Mr. Rovers referred to a
3 forty-two million dollar figure alone for the
4 cost of excavating the materials. Could you
5 comment on that?

6 A Again, Mr. Rovers knows the site better than I
7 do. There were several elements of this cost in
8 the construction of his estimate, as I recall.
9 One was the assumption that one would have to go
10 elsewhere to get dirt to fill the hole back up.
11 That was one piece of his cost estimate. If this
12 proceeded as I suggested, we wouldn't need to do
13 that. There are considerations, I believe, Mr.
14 Rover quite properly put in an estimate for
15 treating contaminated water. That might be an
16 actual consideration under the alternative when
17 we didn't put everything through the incinerator.
18 That would certainly have to be a consideration.
19 If we did burn the material with the water in it,
20 then we wouldn't have to treat it, and so on.
21 Yet, I am not making specific statements about
22 how one would attack the S-Area. As a matter of
23 fact, that would be contrary to what I am saying,
24 and that is, that there are other ways to do
25 this.

1 Q Do you have any opinion, generally, with respect
2 to the cost that might be incurred -- of the
3 range of cost that might be incurred in
4 conducting a pilot study, such as the one that
5 you are proposing, and then ultimately
6 incinerating the material at S-Area?

7 A Well, I want to preface anything that I say about
8 cost with the following caution; that in my mind,
9 if I'm going to spend some money buying apples,
10 than I can't compare the amount of money that it
11 costs to buy oranges. I am not trying to be
12 cute. I am saying that if we are buying
13 containment at one cost, we are buying storage,
14 that has got nothing to do and has no
15 relationship to the cost we spend for eliminating
16 the material. In one case, we are buying
17 storage, we are buying containment, and in
18 another case, we are buying destruction, or
19 elimination. The costs that may be associated
20 with disposal of material -- by disposal, I mean
21 elimination at S-Area, are really a matter of
22 conjuncture, and are likely to be significant,
23 but again, that is because we are doing one thing
24 when we destroy the material, and we are doing
25 another thing when we store it. The cost for

1 conducting an alternatives evaluation of this
2 sort, the sort I have suggested, might be ~~in the~~
3 ~~order of several million dollars. I just don't~~
4 ~~know. I haven't taken the time to sit down and~~
5 ~~do it.~~ but it is probably small in comparison to
6 the total amount that one is planning for
7 containment and/or elimination. I must admit on
8 the subject of cost also, that I am a little
9 mystified. I guess if I was looking at the
10 thing, the cost for elimination would really be
11 irrelevant. That is, I guess, because I am
12 looking at it a different way. If we dispose of
13 the stuff now or we dispose of it later, that is
14 a cost in addition to what we are spending for
15 containment.

16 MR. SUNDERLAND: I have nothing further, your Honor.

17 Thank you, Doctor.

18 THE COURT: Let us do this. Unless there is
19 something we should take up before
20 cross-examination, why don't we take a
21 brief recess now and then come back and
22 have cross-examination. Thank you.

23 (Whereupon a brief recess was
24 taken.)
25

1 CROSS-EXAMINATION BY MR. ELDER:

2 Q Dr. Martin, my name is Michael Elder. I am an
3 attorney with the Justice Department. I
4 represent your former colleagues in this matter.

5 A Yes, Mr. Elder.

6 Q Dr. Martin, as I understand your testimony, what
7 you are really here today for is to ask us to
8 consider a range of alternatives that might be
9 available now or in the future; is that the
10 thrust of your testimony?

11 A That is correct.

12 Q And are you familiar with the provisions of the
13 settlement agreement?

14 A I've read them a couple of times, but I am not --
15 I don't pretend to understand them in great
16 detail.

17 Q Specifically, are you familiar with the
18 provisions for requisite remedial technology?

19 A No.

20 Q Doctor, if I were to tell you that those
21 provisions are specifically designed to allow us
22 to consider remedies that are potentially
23 applicable to this site in the future, would that
24 be consistent with your testimony?

25 A If you say it, then it is so.

1 Q If that's premisely true, that in fact would
2 please you, would it not?

3 A If it were, it would.

4 Q Thank you. Doctor, many of the more specific
5 aspects of your testimony concerned what you
6 referred to as elimination and destruction
7 technology?

8 A Yes. I did refer to destruction and elimination
9 technology.

10 Q And carbon absorbtion, as I believe you pointed
11 out in your report, is a form of elimination
12 technology; is it not?

13 A No. Not by itself.

14 Q There are certain other things that would have to
15 be done to the chemicals absorbed on the carbon,
16 in order for that process to be completed;
17 correct?

18 A Probably. One of the things might be burning it.

19 Q If that is right, you burn the -- you burn the
20 spent ~~carbon~~ to destroy the chemicals that have
21 been absorbed?

22 A Yes.

23 Q ~~Are you~~ aware of the fact ~~that the~~ aqueous ~~leachy~~
24 collected by the landfill system, that that ~~will~~
25 ~~be treated by that particular technology?~~

1 A [REDACTED] No. I am not.

2 Q [REDACTED] Are you aware of the fact that the non-aqueous
3 phase leach collected in the system will be
4 [REDACTED] incinerated?

5 A [REDACTED] No. I am not. In fact, if it is, then that would
6 [REDACTED] be a good thing.

7 Q That would please you very much to find that out,
8 wouldn't it, sir?

9 A I don't know whether it would please me or not
10 please me. It would result in elimination of
11 whatever fraction of material you are able to
12 extract from the fill.

13 THE COURT: Mr. Elder, I don't think it's the
14 function of any witness to --

15 MR. ELDER: I used the wrong word, Judge.

16 THE COURT: All right.

17 BY MR. ELDER:

18 Q But it would be consistent with the purpose of
19 your testimony?

20 A I believe it would.

21 Q Thank you. Now, Dr. Martin, I believe you
22 testified on direct that when you were with the
23 Environmental Protection Agency, part of your job
24 involved the development of regulations under
25 RCRA?

1 A That is correct.

2 Q And those regulations, among other things, relate
3 to requirements for hazardous waste landfills?

4 A No. I was not responsible for landfill
5 regulations.

6 Q I understand that you personally were not
7 responsible, but those regulations do address
8 that topic, do they not?

9 A Yes. They do.

10 Q Isn't it true that there is no prohibition in
11 those regulations against hazardous waste
12 landfills, simply requirements related to those
13 facilities?

14 A The first part of your question is, are landfills
15 prohibited --

16 Q Prohibited by the RCRA regulations?

17 A Absolutely not.

18 Q Thank you. Now, Dr. Martin, you testified on
19 direct regarding some of the things that you have
20 done in connection with your study of this type
21 of technology. Have you yourself ever designed
22 an incinerator?

23 A No, I haven't. It's an interesting paradox, Mr.
24 Elder, that if I had, and if I were here
25 representing a specific technology, I would

1 accused of having an ax to grind, and since I am
2 not, I am accused of having no hands-on
3 experience. Let's me indicate -- I am not that
4 kind of engineer. I don't do designs. My whole
5 career for twenty years has been directed to
6 coming up with alternatives, developing
7 feasibility approaches to solving problems.
8 That's the kind of engineering I do.

9 THE COURT: Mr. Elder, can you hold a minute?

10 Okay.

11 BY MR. ELDER:

12 Q / Dr. Martin, are you telling me that your
13 activities have been more oriented towards
14 research in this field?

15 A No.

16 Q Okay --

17 A I am telling you that my activities have been
18 related -- rather than to doing design, and I am
19 not a design engineer and I don't pretend to be
20 one; my activities -- are you asking for what my
21 activities are?

22 Q No. I'm just trying to clear up in my own mind
23 whether you have any hands-on experience?

24 A No, I do not.

25 Q Okay, thank you. Now, Dr. Martin, I believe you

1 testified on direct that cost effectiveness is a
2 consideration that we should take into account in
3 connection with these technologies?

4 A Yes.

5 Q Doctor, did you have occasion in your report to
6 cite a publication by the Office of Technology
7 Assessment called Technology and Management
8 Strategies for Hazardous Waste Control? Is this
9 the report that you cited, sir?

10 A Yes, I believe it is.

11 Q Could I direct your attention to page 209?

12 THE COURT: Doctor, what is the title of that?

13 THE WITNESS: Your Honor, the title is Technologies
14 and Management Strategies for
15 Hazardous Waste Control.

16 THE COURT: And this -- was
17 there a particular author?

18 THE WITNESS: It is a publication by the Office of
19 Technology Assessment in the United
20 States Congress. What page number, Mr.
21 Elder?

22 BY MR. ELDER:

23 Q Yes, 209, Doctor. And can you tell the Court the
24 title of the last subject treated on that page?

25 A Are you referring to the one in bold print,

1 Excavation with On-site Treatment?

2 Q That's the one I am referring to, exactly,
3 Doctor?

4 A Yes.

5 Q Doctor, could you look to page 210?

6 A Yes.

7 Q And could you repeat for me, read for the Court,
8 the last sentence of that particular paragraph?

9 A This technology is not cost effective for large
10 amounts of low level waste, and is not effective
11 for uncontainerized waste dispersed through a
12 large area.

13 Q Thank you. Oh, one thing that I missed, Doctor,
14 and I believe you did refer to it on direction
15 examination -- I'm sorry for the confusion -- but
16 could you also read for the Court the sentence
17 preceding the one that you read?

18 A Certainly. Local population is subject to
19 additional risks inherent in the excavation and
20 exposure of buried waste as well as those
21 inherent in the mobile treatment process chosen,
22 and I believe I said that, also.

23 Q And I believe you indicated that that was a very
24 important consideration?

25 A Yes.

1 Q I have just a couple more questions.

2 A I might add on that point, that --

3 THE COURT: Go ahead, Doctor.

4 THE WITNESS: I might add on that point, to
5 reinforce it that in the McCall
6 landfill site in California, which is a
7 Super Fund site, your Honor, for which
8 the decision has been reached to
9 excavate that material, and redispense
10 of it elsewhere, the exposure your
11 during excavation was estimated to be
12 highest risk of the whole project.

13 BY MR. ELDER:

14 Q Thank you, Doctor. [REDACTED] Now, I believe, finally that
15 [REDACTED] you indicated that you yourself had not examined
16 [REDACTED] the cost in relationship to this particular
17 [REDACTED] project?

18 A [REDACTED] that is true.

19 Q I don't have anything further, Judge. Thanks
20 very much, Doctor.

21 A You are welcome, Mr. Elder.

22 THE COURT: Miss Kuder, do you have any
23 questions?

24 MR. TRUITT: Judge, I do.

25 THE COURT: The State, do you have any questions?

1 MS. KUDER: No, your Honor, no questions.

2 THE COURT: Mr. Truitt -- you have any questions,
3 Mr. Brydges?

4 MR. BRYDGES: No, the City doesn't have any,
5 either.

6 MR. TRUITT: Excuse me, Judge.

7 BY MR. TRUITT:

8 Q Dr. Martin, my name is Tom Truitt. I am one of
9 the attorneys for the Hooker interests in this
10 proceeding.

11 A Yes, Mr. Truitt.

12 Q You stated in your direct examination, I believe,
13 sir, that you believe that a proper machine
14 designed in a proper way would effectively and
15 better destroy these S-Area contaminants than
16 what has been proposed in the consent judgment?

17 A Well, no, I suggested that a proper machine
18 designed and operated in the proper way would
19 destroy contaminants such as those that are in
20 the S-Area. ~~I did not relate that to the~~
21 ~~proposed approach.~~

22 Q All right. ~~Now, have you done any cost estimate~~
23 ~~for what a proper machine designed in a proper~~
24 ~~way would cost?~~

25 A ~~Not for S-Area.~~

1 Q Am I correct then that your conclusion that
2 incineration that is in your report ---let me ask
3 the question differently. Doesn't your report
4 conclude that incineration or destruction,
5 whichever is the appropriate technical term,
6 that's really what you're here suggesting be done
7 at S-Area?

8 A Yes.

9 Q And you are suggesting that it be done against
10 costs that are irrelevant?

11 A No, I am suggesting that it -- that incineration
12 as an option for disposal or elimination of the
13 material, which all has to be considered along
14 with all other alternatives. I would be just as
15 disturbed, Mr. Truitt, if the sole consideration
16 for this location was going to be incineration.
17 It might very well be that one of the
18 alternatives one might have at the end and might
19 find cost effective, would be incineration of a
20 part of the material and part of the contaminated
21 soil, in combination with the proposed approach.
22 I am not suggesting that one is good and one is
23 bad.

24 Q Nor did I understand you to be suggesting that.
25 I am just trying to find out how -- I am trying

1 to get a handle on what it is that causes you to
2 say that a proper machine designed in a proper
3 way will do something, when I gather you have
4 absolutely no information to offer the Court
5 concerning what that would cost?

6 A I have to know --

7 Q Is that correct?

8 A I have no information to offer the Court on what
9 that would cost; that is correct.

10 Q It might cost two, three hundred million dollars?

11 A It could cost significantly more than the
12 information I have on the proposed approach. It
13 might even cost more than the figure you
14 mentioned. But again, as I indicated, one is an
15 apple and one is an orange.

16 Q Were you at EPA when the chlorodane test burn was
17 done?

18 A The one I mentioned?

19 Q Yes.

20 A Yes, sir, I was.

21 Q Are you aware that the residue of chlordan was
22 in parts per million?

23 A I am aware that that is true, yes; I believe that
24 is correct.

25 Q And is that a hazardous material --

1 A Under the regulations, no, it would not be.

2 Q Because it was a test burn?

3 A No, it would not be hazardous waste because
4 theres is no test for that organic material, and
5 that's not to say it is not a hazardous
6 material.

7 Q Would you look at page 15 of your report, sir?

8 A I don't have a copy.

9 Q I am sorry. I have got it right here, Doctor. I
10 just want to call your attention to the portion
11 of page 15 that I have underlined in red, and if
12 I could just ask you if you'd read that sentence,
13 so the Court will have -- because I have a
14 question on it.

15 A Although I do not know the annual cost associated
16 with the proposed storage system, it is difficult
17 to imagine that its cost, over a multi-hundred
18 year period, could be less than the cost of
19 eliminating the S-Area waste today through
20 incineration.

21 Q Mu question to you is, aren't you comparing
22 apples and oranges in that sentence, sir?

23 A Yes.

24 Q And I would like you to take a look at page 6 of
25 your report at appendix A, and I would like you

1 to read the sentence that I have underlined
2 there, please?

3 A While the particular containment approach
4 proposed for S-Area has not, to my knowledge,
5 been used elsewhere, similar efforts to use
6 drainage systems, capping and pumping at old
7 waste disposal sites, have not been successful.

8 Q And there is a footnote reference which I will
9 read, and the footnote says, some examples are
10 the Stringfellow Quarry in California and the
11 Occidental Chemical Company's disposal site a
12 Lathrop, California. Others have been documented
13 by EPA in a landfill performance report. My
14 question to you, sir, is have you ever been to
15 our facilities in Lathrop?

16 A No, sir.

17 Q ~~I am going to move that that portion of the~~
18 ~~report be stricken from this proceeding, as~~
19 ~~triple hearsay, at best,~~ it has nothing to do
20 with this case. It is a comment about an Occi
21 facility in California that this witness knows
22 nothing about, that is also wrong.

23 THE COURT: Mr. Sunderland, you want to say
24 anything about that?

25 MR. SUNDERLAND: The only question I have, your

1 Honor, is to ask the witness the basis
2 for -- on which he arrived at his
3 statement.

4 THE WITNESS: The basis was on published
5 information; I have not been at the
6 site.

7 THE COURT: Was there other published
8 information, Doctor, in addition to
9 what you referred to in your report.

10 THE WITNESS: Yes, sir.

11 THE COURT: And can you tell us what that was,
12 sir.

13 THE WITNESS: The report that I am referring to is
14 a report that I had access to and is
15 not a part of the open technical
16 literature.

17 THE COURT: Well, I think, in view of that, then
18 we should strike that part of the
19 report. I suppose, too, that the word
20 success, it is one of those words like
21 reasonable. You can't really get a
22 handle on what it means, until you get
23 all of the facts and figures.

24 MR. ELDER: Judge,--

25 THE COURT: I think that, it doesn't help us in

1 our analysis here to keep that as part
2 of the report.

3 MR. ELDER: Judge, for the record, may I point
4 out that the Strinfellow site
5 concerning which the United States has
6 brought an enforcement action, final
7 remedies for that site have not been
8 developed; they presently are being
9 litigated. There has been no
10 resolution reached with respect to the
11 Stringfellow site. It's a pending
12 case, which my particular section has
13 brought the case.

14 ~~THE COURT:~~ All right. Well, then, of course,
15 the drains are not there, I guess, or
16 at least what the governments wants
17 there is not there as yet. Mr.
18 Sunderland, I think that you should
19 meet with the witness, and with Mr.
20 Truitt, and Mr. Elder here, and ~~we~~
21 ~~should in some way excise that part of~~
22 ~~the report.~~

23 MR. SUNDERLAND: We will resolve the thing, your
24 Honor.

25 MR. TRUITT: Thank you, Judge. Will you indulge

1 me minute, your Honor?

2 THE COURT: Surely.

3 MR. TRUITT: I have nothing else for the witness.

4 THE COURT: I wonder, I have a several questions,
5 Doctor. One is that in your direct
6 testimony you talked about the approach
7 that you would take, the first part is
8 a need for a pilot feasibility study;
9 what do you foresee, what form would
10 that take?

11 THE WITNESS: Yes, your Honor. That was the -- in
12 the direct where I referred to the
13 four-point feasibility program. I am
14 not sure what form it would take,
15 because I am not sure who would pay for
16 such a study or how that study would
17 actually be implemented. I guess what I
18 am saying is the elements of such a
19 study should be done to examine all of
20 the available alternatives and that was
21 the four-part piece that I responded
22 to.

23 THE COURT: I see. Now, I take it that you told
24 us what documents you are familiar with
25 here. ~~You don't know the details of~~

1 [REDACTED] what the parties, the Governmental
2 [REDACTED] parties have done in detail to look at
3 [REDACTED] the various alternatives.

4 THE WITNESS: [REDACTED] That is correct, your Honor.

5 THE COURT: Now, I know you're not a chemist, so
6 that this will bring on all kinds of
7 have objections from the lawyer here,
8 but we do have -- the Government has an
9 excellent chemist who is with us, so if
10 necessary, she could give us her view
11 of this. During your testimony you
12 said that you thought that one thing
13 that could be done here is you could
14 not knock off the chlorine molecules of
15 some of these materials which would
16 perhaps reduce their hazardous nature.
17 What technique could be used to do
18 that?

19 THE WITNESS: A technique that I am referring to as
20 chemical dechlorination, your Honor,
21 There are specific compounds which are
22 used to dechlorinate molecules in the
23 same way that we built them up, in
24 reverse.

25 THE COURT: Now, in order to do that, I suppose

1 you'd have to get the material out of
2 the soil?

3 A Yes, sir.

4 THE COURT: There is no know way you could -- I
5 mean, you don't intend to put some of
6 the material into the soil in order to
7 do that?

8 A Well, there are several alternatives for
9 dechlorination. One is a chemical one, another
10 one is a catalysis one; for example, ultraviolet
11 light from the sun has a certain function along
12 those lines, but in general, you have to take it
13 out of there before you could do it in controlled
14 fashion.

15 THE COURT: Now, as I understand it, in the
16 beginning of your testimony you told
17 about the fact that there are
18 approximately three hundred
19 incinerators dealing with hazardous
20 wastes, and, on- site. Now, as I get
21 your testimony, there are only, as far
22 as use with soil material or landfill
23 material like this, there are only just
24 a few.

25 THE WITNESS: Yes, sir. The approach there, if I

1 could, -- are you finished with your
2 question.

3 THE COURT: Yes.

4 THE WITNESS: The approach there which I would use
5 would be, in this case, --

6 THE COURT: All right. I wonder -- I have the
7 testimony, but I wanted to ask you
8 something along a different line.

9 THE WITNESS: All right.

10 THE COURT: Those that -- let's say the ones --
11 let's talk a minute about the ones that
12 are dealing with soil material at a
13 landfill site, such as -- I suppose a
14 small area is different than this, they
15 are all different -- how big are these
16 devices?

17 THE WITNESS: A device to burn material such as
18 what we are talking about, would be a
19 very large machine; it would be in the
20 category of a cement kiln or an
21 aggregate kiln, and at that level we
22 are talking about hundreds of tons a
23 day of input in order to accomplish the
24 incineration in a reasonable length of
25 time; by reasonable, I mean a couple of

1 do other things as well.

2 THE COURT: First of all, as I get it, more study
3 is needed?

4 THE WITNESS: Yes, sir.

5 THE COURT: And then after you get more
6 information that, whether it is
7 engineering or other techniques that --
8 there has to be developed a technique
9 which we do not have at the present
10 time to put in place here, or have not
11 been completely developed.

12 THE WITNESS: Yes, sir. There are certainly
13 engineering -- engineering applications
14 that have to be developed before one
15 could put this into place.

16 THE COURT: Anything further; nothing further.
17 Thank you, Doctor.

18 THE WITNESS: Thank you, your Honor.

19 THE COURT: Mr. Sunderland.

20 MR. SUNDERLAND: Nothing further, your Honor.

21 THE COURT: All right. Now, you want to take a
22 break to determine what to do next?

23 MR. ELDER: We don't need to do that, your Honor.
24 We have no rebuttal witnesses.

25 MR. TRUITT: We have no rebuttal witnesses, your

1 Honor.

2 THE COURT: Miss Kuder.

3 MS. KUDER: The State doesn't have any rebuttal
4 witnesses.

5 THE COURT: I don't want to leave you out.

6 MS. KUDER: Thank you.

7 MR. BRYDGES: The City is through, as well.

8 MR. TRUITT: Could I make some suggestions then
9 concerning --

10 THE COURT: What to do next?

11 MR. TRUITT: -- what to do next.

12 THE COURT: Right.

13 MR. TRUITT: We have had some informal discussions
14 and not with everyone, but we have had
15 some discussions with Phil and Michael,
16 and I think the State, but not with
17 Earl. We would propose, at least I
18 think we would, and if Phil would
19 agree, we would propose simultaneous
20 briefs fourteen days from today, reply
21 briefs seven days thereafter, and oral
22 argument on the briefs during the week
23 that the statutory Memorial holiday
24 falls. That statutory holiday falls on
25 the 28th, and we would propose then

1 oral argument on the 31st, if that
2 would be acceptable.

3 THE COURT: Have you had an opportunity to think
4 about this, everybody?

5 MR. SUNDERLAND: We've discussed it; I think we've
6 had a little bit of miscommunication on
7 a few days -- on the fourteen day
8 initial briefs, I thought we had about
9 eighteen days with a seven-day turn
10 around.

11 MR. ELDER: Well, let me raise with the Court a
12 personal problem, Judge. I am leaving
13 the Department very shortly and Miss
14 Cleveland is leaving her job very
15 shortly. I think the schedule that --

16 MR. TRUITT: I am not leaving.

17 THE COURT: I guess we are locked in; right?

18 MR. ELDER: He gets paid more than we do, Judge,
19 and even this schedule takes me beyond
20 plans that I have previously made and
21 paid for. I will accommodate --

22 THE COURT: Sounds like a juror.

23 MR. ELDER: Well, yes, Judge, yes. That's what
24 I'm driving at; I prefer not to be
25 here. And I'm hopeful that the Court

1 and arguments on the 31st, with
2 hand-deliveries on all of the briefs.

3 THE COURT: Can we do this? We'll the 21st.
4 Then that will give you the weekend to
5 get the material to us. Then we reply
6 by the 29th.

7 MR. SUNDERLAND: On the 28th.

8 MR. TRUITT: The 28th is a holiday.

9 MR. SUNDERLAND: -- is a holiday.

10 THE COURT: It's a holiday. We reserve the
11 holiday. The 29th. All right, then
12 we'll meet on the 31st.

13 MS. KUDER: That's when all the replies will be
14 expressed or whatever is necessary, so
15 we have them before us.

16 MR. SUNDERLAND: I think that's --

17 THE COURT: Make sure that the Court gets the
18 reply. I know that you have always
19 been very kind to me into the past.

20 MS. KUDER: The Court and all of the parties.

21 THE COURT: Because there is an awful a lot of
22 material to review, and I'll be doing
23 that in the meantime, so I think we can
24 meet on the 31st, and should we meet in
25 the -- does it matter what time? Is it

1 easier if we meet in the middle of the
2 day?

3 MS. KUDER: Your Honor, I would prefer one
4 o'clock or noon, just so I'd be able to
5 fly up that morning?

6 THE COURT: There's no -- you come from Albany?

7 MS. KUDER: No, I come from New York City, and
8 the seven o'clock plane is chancey, not
9 that I wouldn't try it. Then you sit
10 in the airport.

11 THE COURT: One o'clock?

12 MR. TRUITT: Fine with me, Judge.

13 MR. SUNDERLAND: Fine.

14 THE COURT: One o'clock on the 31st.

15 MR. TRUITT: Thank you, Judge.

16 THE COURT: Would you please be sure that all of
17 the copy, at least all of the exhibits
18 are left with us so we can begin --

19 MR. ELDER: Yes, sir, we are working on that
20 right now and it will be provided to
21 the Clerk as rapidly as possible. I
22 think we can do it by the close of
23 business today, the close of business
24 today, sir.

25 THE COURT: I would expect that we maybe spend

1 some time on the 31st, you know, during
2 the afternoon. I'll set aside a good
3 part of the time.

4 MR. TRUITT: Thank you, Judge.

5 MR. ELDER: Thank you, your Honor.

6 THE COURT: Anything else today?

7 MR. ELDER: No, sir.

8 THE COURT: Please meet with Paul then to be sure
9 we have everything that we should have.

10 MR. SUNDERLAND: Thank you, Judge.

11 (Whereupon, hearing was
12 concluded.)

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I hereby certify that the foregoing pages
is a true and accurate record of my stenographic
notes.

EUGENE R. BECKSTEIN
Official Reporter
U.S.D.C., W.D.N.Y.