

DAY 18

JANUARY 15, 1996

WESTRAY MINE

PUBLIC INQUIRY

HEARD BEFORE: The Honourable Justice K. Peter Richard,
Commissioner

PLACE: Stellarton, Nova Scotia

COUNSEL:

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Ms. Ena MacDonald, document coordinator

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Solicitor for the Westray Families Group: Mr. B. Hebert

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1 January 15, 1996 - 9:03 a.m.

2 COMMISSIONER Good morning.

3 ALL Good morning.

4 COMMISSIONER Mr. Merrick?

5 MR. MERRICK Thank you, Mr. Commissioner. I'm going to
6 ask permission to change the procedure slightly this
7 morning. As a result of my meetings with Mr. Liney who
8 will be the next consultant who will testify, as a result
9 of my meetings with him on the weekend, he put to me a
10 new theory or conclusion as to how the ignition actually
11 occurred in this mine. And I thought that it would be
12 useful while we have Mr. Mitchell on the stand to have
13 his views on this proposal. And, as a result, I would
14 like to ask Mr. Mitchell a few questions about it, allow
15 all parties to understand what the proposal is, and then
16 we will pick up the sequence of cross-examination from
17 there.

18 COMMISSIONER Fine. Thank you, proceed.

19 **MR. DONALD MITCHELL**, previously sworn, testified:

20 EXAMINATION BY MR. MERRICK

21 Q. Mr. Mitchell, I know that we're hitting you with
22 this a little on short notice, but as a result of
23 discussions that I had with Mr. Liney on the weekend, he
24 has put to me the proposal that the way that the ignition
25 occurred in this explosion was that there was in fact a

MR. MITCHELL, EXAM. BY MR. MERRICK

1 layer of gas at the intersection of 2 -- Southwest 2-B
2 Road and Southwest 2-1 Road, but that the way that it
3 ignited was that the boom truck which had been travelling
4 up the return was coming through the crosscut, was about
5 to make the turn up into the Southwest 2-B Road heading
6 and may have caught the ventilation tubing out of that
7 heading, brought it down on the truck, run over it with
8 the front wheel and, as a result, either the tubing
9 itself may have ignited because it was in the vicinity of
10 the exhaust, or it may have created enough of a vortex or
11 turbulence in the air that it would have brought a vortex
12 of gas down that could have been ignited by the exhaust
13 itself.

14 I put before you the booklet of photographs taken by
15 the RCMP. These are not copied in the exhibits because
16 we didn't copy their whole booklet. I believe it's
17 Photograph 199 that shows the front of the boom truck and
18 what appears to be the coil of the tubing. If anybody
19 wants to go up and take a look at this photograph, I will
20 ask you questions over your shoulder.

21 Now looking at Photographs 199 and 200, Mr. Liney
22 has pointed out to me, and maybe we should take it over
23 to the Commissioner, because you're the one that should
24 be seeing this. Mr. Liney has pointed out to me that the
25 wiring that's all down around the left front wheel of

MR. MITCHELL, EXAM. BY MR. MERRICK

1 that boom truck is the wire support from the tubing
2 itself and that that would suggest that he's run over the
3 tubing. Are you able to respond to that suggestion?

4 A. Yes, sir.

5 Q. And does it look as if he has in fact run over a
6 piece of the tubing?

7 A. Yes, sir. He has -- there is -- I would say,
8 without question, he has run over a piece of tubing.

9 Q. Are you able to express any other comments on
10 whether this may have been the tubing that was strung at
11 the roof as part of the vent tubing coming out of that
12 heading?

13 A. No, I could not postulate that. There are too many
14 -- we just don't know enough about how this tubing was
15 supported, whether this is the tubing that was coming out
16 of the Southwest 2-B Road inbye, the second crosscut, or
17 whether this was the tubing -- and that's questionable
18 because this shows the tubing underneath the right front
19 wheel, whereas the active tubing in Southwest 2-B Road
20 inbye No. 2 Crosscut was on the left side of the entry.
21 There was an inactive duct lying on the ground on the
22 right side, whether this is part of that or not, I don't
23 know. There's no way to postulate that. There's no
24 evidence from the investigation. This could have been
25 part of the tubing that was bending, coming out of

MR. MITCHELL, EXAM. BY MR. MERRICK

1 Southwest 1-1 Road, Southwest 2-1 Road and this would be
2 the bend coming towards the fan. And that could
3 represent that, but that would be about three-to-four
4 feet above the top -- the highest point of the front of
5 the truck, and I don't see what would knock that down.

6 So I can't say. All I know -- all I can say from
7 this is there is little question that this vehicle indeed
8 ran over some duct. Whether it was duct that was
9 actually supplying air to the face at that time, a face
10 at that time, or whether it was a -- just a piece of duct
11 on the floor, I'm not capable of answering.

12 Q. You said it was the right front wheel; would that
13 not be the left front wheel in Photographs 199 and 200?

14 A. This is the -- according to my best judgment, and I
15 could be wrong, this should be -- we are looking at the
16 front of the vehicle when we look towards the right on
17 these photographs. If you will look, please, sir, at
18 Photograph 27 up there --

19 Q. Yeah.

20 A. -- it is shown rather clearly that the back of the
21 truck -- that this would be the front of the truck facing
22 into the Southwest 2-B Road inbye the No. 2 Crosscut. So
23 that would be on the right side of the vehicle.

24 Q. What do you say as to the possibility that if this
25 was the vent tubing that had been strung at the roof and

MR. MITCHELL, EXAM. BY MR. MERRICK

1 had, in fact, been pulled down over the truck, whether it
2 was possible that the ignition could have occurred that
3 way, that being that either the exhaust ignited the
4 tubing itself or that that caused enough of a turbulence
5 to bring a vortex of gas down?

6 A. I would say that there's nothing impossible. My
7 only problem with that hypothesis is that on the 8th of
8 May and, therefore, at 5:00 on the morning or closely
9 after 5:00 on the morning of the 9th of May, we should
10 have had in excess of 55,000 cubic feet of air per minute
11 flowing through the No. 2 Crosscut. And we have also a
12 zone of high turbulence here because of the bend that we
13 take from going -- from the air travelling up the
14 Southwest 2-B -- Southwest 2-B Road, taking this bend
15 into the second -- No. 2 Crosscut, we have a turbulence
16 zone which would militate against a thick layer at that
17 point. I would say, yes, that could have happened. It
18 is just another sad commentary on the inadequacy of the
19 investigation.

20 Q. So that although you have only had a very brief time
21 to consider this possibility, you haven't changed your
22 original opinion --

23 A. Well, my original --

24 Q. -- as to the sources?

25 A. -- opinion was basically speculative also. We, not

MR. MITCHELL, EXAM. BY MR. MERRICK

1 having, as I said, I believe I said, not having examined
2 the breakers in the power centre, we really don't know
3 much about what happened electrically, if anything
4 happened electrically, within this area.

5 Q. Thank you, Mr. Mitchell.

6 MR. ROBERTS I have no questions on this point. I just
7 would ask Commission counsel if you would be willing to
8 introduce those -- I guess it's 199 and 200 as exhibits?

9 MR. MERRICK I'll put those in.

10 MR. ROBERTS Thank you.

11 COMMISSIONER The other --

12 MR. MERRICK I think it was --

13 COMMISSIONER It would be now Mr. Hebert's turn.

14 MR. HEBERT Yes. Thank you, Mr. Commissioner.

15 EXAMINATION BY MR. HEBERT

16 Q. Mr. Mitchell, with respect to the photographs that
17 you have before you, had you had an opportunity to review
18 those before this morning?

19 A. Yes, sir. I had looked at all of these photographs
20 in great detail, if you will excuse the expression, a
21 week ago Friday --

22 Q. All right.

23 A. -- and Saturday. I spent about, I would say -- I
24 would estimate, within reason, conservatively, two-to-
25 three hours.

MR. MITCHELL, EXAM. BY MR. HEBERT

1 Q. Okay. And that was the first time you had seen
2 those -- that particular set of photographs?

3 A. Yes, that was a week ago Friday and Saturday.

4 Q. Okay. Now on Thursday last Mr. Roberts asked you
5 about your notes, whether you had taken any notes that
6 might be of particular relevance or interest to the
7 Commission. Did you have an opportunity to review that
8 question?

9 A. I have not had an opportunity. I believe I told Mr.
10 Roberts that the bulk of my notes, assuming such existed,
11 would be at my office and I did promise the Commission --

12 Q. Yes.

13 A. -- that when I return, I will go through that and
14 will send anything and everything that might be of
15 interest or concern.

16 Q. Okay. Thank you. With respect to the RCMP
17 investigation of the Southwest district, were you aware
18 that that was going to take place beforehand?

19 A. Yes, sir.

20 Q. What is your understanding of the date or the dates
21 when that investigation indeed took place?

22 A. I can't really remember dates except the weather was
23 not -- the weather was rather pleasant. I did stop and
24 talk to Sergeant, I believe, MacDonald or something like
25 that, and expressed my concerns about their plan. And I

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1 met with -- he had with him one or two gentleman who were
2 involved in the development of the plan.

3 Q. Okay. And so I take it you had some input, if you
4 will, to the extent that you have indicated, with respect
5 to that investigation?

6 A. I wouldn't say I had input; I opened my mouth. I
7 don't believe anybody listened.

8 Q. All right. And with respect to the plan, what
9 particular concerns did you have?

10 A. My particular concern was that if we were going to
11 make this effort, that we should have a proper
12 investigation. I offered, if I -- I hope I offered -- I
13 was authorized to offer the services of the National Mine
14 Rescue Association and the Smoke Eaters Association. I
15 know the Mine Safety and Health Administration would have
16 provided support.

17 Q. This offer of support, was this -- how did -- did
18 this take place in meetings; was it over the phone; was
19 it documented in correspondence?

20 A. No, I believe I -- I hope, let's rephrase that; I
21 trust that I gave that -- talked like -- said that to
22 Staff Sergeant or Sergeant MacDonald saying that these
23 things could be arranged if they were interested. I
24 believe I did. I hope I did. It's been quite a few
25 years.

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1 Q. Now it would appear to me that in a typical
2 investigation of this type, and I use that term "typical"
3 rather loosely, there may be a checklist of factors or
4 material, pieces of equipment, a procedure that one would
5 follow. Is there a somewhat of a basic checklist?

6 A. Yes, sir.

7 Q. All right. And is that checklist simply something
8 that, for example, yourself, you would know through
9 experience or is this documented somewhere?

10 A. Well, these are fairly well documented. At least in
11 the States we have this fairly well documented. We have
12 very specific procedures on recovery and re-entry into
13 areas such as the Southwest area, and it is not a
14 difficult job as long as conditions are not horrendous
15 and we did not anticipate such problems in the Southwest
16 area.

17 Q. Okay. And have you seen any similar kinds of
18 protocols or procedural checklists here in Nova Scotia?

19 A. No, sir.

20 Q. Was it your understanding that the, for example, the
21 Department of Labour had a checklist or any kind of a set
22 procedure for the investigation of this mine disaster?

23 A. If I had, I don't have any memory of such.

24 Q. All right. And did anyone within the Department of
25 Labour ask for your input with respect to the steps that

MR. MITCHELL, EXAM. BY MR. HEBERT

1 should be taken in a proper investigation?

2 A. We discussed this at length.

3 Q. Okay. Now when you say "we," to whom are you
4 referring, sir?

5 A. When I saw Sergeant MacDonald, Mr. White was with
6 me --

7 Q. Yes?

8 A. -- and I did express to him and other persons in the
9 Department a number of concerns related to the proposed
10 investigation. I also did discuss this with Mr. Currie
11 who, at that time, was involved peripherally, I don't
12 know how, but he had some involvement with Westray. I
13 was rather vocal about this aspect because I was quite
14 concerned with what I was hearing being planned and
15 proposed.

16 Q. And, again, perhaps I missed them, what again were
17 your concerns? Were there any different concerns?

18 A. I was never convinced that they had the equipment
19 and the people appropriate for a command centre and for a
20 fresh-air base. And I was concerned about whether they
21 would be successful in reventilating the Southwest area
22 which would be a critical prelude to an appropriate
23 investigation. In my judgement, my experience, and I
24 unfortunately have too much of experience in this area,
25 the recovery team's job is to establish a safe atmosphere

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1 so that persons trained in the forensic aspects of an
2 investigation could then enter the area and conduct an
3 investigation appropriate to the needs.

4 Q. Are you suggesting that a proper investigation could
5 not be undertaken with self-contained breathing
6 apparatus?

7 A. That is a last-resort approach. Unfortunately, I
8 don't know in Nova Scotia, but we have a rule in the
9 States, those of us, once we reach the age of 50, are no
10 longer permitted to wear apparatus. And the great bulk
11 of the people, there are one or two who are younger than
12 that, but the great bulk of the people that we have who
13 are experienced in this area are over 50. So we try to -
14 - and we are -- have always been successful in getting
15 the area ventilation and roof under control and then
16 sending in the forensic specialists, each one experts in
17 their specific area.

18 Q. Now as I -- you indicated earlier that you thought
19 that the -- it was possible to do a proper re-entry
20 investigation if certain conditions were met. Is that --
21 am I fairly characterizing what you just said?

22 A. I would say so, yes.

23 Q. Okay. And what were those conditions that would
24 have to be met for a safer investigation?

25 A. Well, one, safe travel routes, meaning that the

MR. MITCHELL, EXAM. BY MR. HEBERT

1 grounds -- the strata in those routes was secure that we
2 would not -- and that we had adequate ventilation. And
3 my major concern was in the event of a major fall of roof
4 somewhere in the Southwest 1 which could push out
5 uncontrollable toxic or potentially toxic atmospheres.
6 And we would need to do something to militate against
7 that.

8 Q. What could be done to militate against that?

9 A. One would have to examine the situation there,
10 whether we want to make entry, whether we make entry
11 solely through C-1 Road and block off -- put a stopping
12 between, for example, just immediately inbye B-Road --

13 Q. Yes?

14 A. -- Southwest 2-B Road, and one would have to look at
15 conditions, which would be the best route of travel,
16 whether we want to use the B Road from Southwest to the
17 C-1 Road and then determine how best to seal off the
18 other portions that we would not be travelling and that
19 would not be needed to be examined by the forensic
20 people.

21 Q. Yes. And what would be the options for sealing
22 those off?

23 A. What would be the option?

24 Q. Yes. What options would be available in terms of --

25 A. Well, this is something we would have to evaluate

MR. MITCHELL, EXAM. BY MR. HEBERT

1 based on what the mine rescue teams advise us as to the
2 quality of the strata in each of these routes.

3 Q. All right.

4 A. You've got to -- you don't want to expose an
5 investigation team to potential major falls of roof. And
6 the question is can these bad areas be resecured, or are
7 there places that we can enter that are adequately
8 supported that don't require some effort to re-establish
9 them.

10 Q. All right. And I take it that this -- all these
11 possibilities were not fully investigated? In other
12 words --

13 A. I don't know.

14 Q. You didn't investigate those yourself?

15 A. No.

16 Q. Okay. Are you aware of whether anybody did, in
17 fact?

18 A. No.

19 Q. So you, at this point, have no evidence that anybody
20 made these inquiries as to whether or not the conditions
21 which you feel would have allowed for a full
22 investigation had, in fact, been determined or explored?

23 A. Let me rephrase that then, I may have misspoken.
24 Subsequent to the RCMP investigation, I believe some
25 other persons entered this area and found that the roof

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1 conditions were not like they had been reported.

2 Q. And who was that?

3 A. I believe Mr. Currie, among others.

4 Q. All right. And did that relate to an unauthorized
5 entry into that section?

6 A. I have no knowledge.

7 Q. All right. And are you aware of who else was in
8 with Mr. Currie?

9 A. No. There was a report on this and I just
10 remember --

11 Q. Yes?

12 A. -- reading the report.

13 Q. And that's -- so it was the report itself that --
14 that's your basis of your knowledge?

15 A. That report is my sole basis of these gentlemen not
16 finding the roof conditions to be as adverse as we had
17 been led to believe.

18 Q. The roof conditions were not as adverse, is that --

19 A. That is what I believe that report basically says.

20 Q. Okay. And was this a formal report from Mr. Currie
21 and others to a particular organization?

22 A. I have no knowledge. All I know is I read
23 something. Don't ask me to whom or from -- all I recall
24 is his description of what he and the two gentlemen with
25 him observed.

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1 Q. All right.

2 A. I believe there were two, let's rephrase that,
3 hypothesize two people with him.

4 Q. All right. And had that information or those
5 observations been founded, in other words, that the roof
6 conditions weren't as bad as was -- had -- you had been
7 led to believe, had that been known earlier, would that
8 have changed plans for a proper investigation into the
9 Southwest district?

10 A. I have no knowledge of what they would have done.
11 This is something you decide at the time.

12 Q. I see.

13 A. And the time has already past.

14 Q. When you say "they," you're referring to the RCMP?

15 A. Yes, sir.

16 Q. All right. Now did the Department of Labour itself
17 -- were you consulted by the Department of Labour itself
18 to determine whether the Department should do an
19 investigation?

20 A. I strongly urged that the Department be involved in
21 the investigation or at least that we -- that through my
22 -- that I was able to bring in some people at no cost to
23 the Nova Scotia Government that would be experienced in
24 this type of thing.

25 Q. All right. And what, if anything, did the

MR. MITCHELL, EXAM. BY MR. HEBERT

1 Department do based on that offer and that advice?

2 A. I have no knowledge of that.

3 Q. I take it then your advice to the Department of
4 Labour at the time was that number one, if certain
5 conditions were met a proper investigation could be done;
6 number two, that you were prepared to make available
7 people and resources that might allow for a proper
8 determination of (a) whether the conditions could be met
9 and if they were, a proper investigation?

10 A. Basically. Not quite like you say, but close
11 enough.

12 Q. Okay. And in particular you mention you spoke with
13 Mr. White concerning this in the presence of Staff
14 Sergeant MacDonald. Were there other conversations or
15 were there other contexts in which those discussions took
16 place?

17 A. Oh yes, we had been discussing this since May of
18 '92. This was a subject of discussion. My first efforts
19 when I came here were related to recovery of the mine and
20 an investigation of the explosion.

21 Q. Okay. And I take it that your opinion was the same
22 throughout that entire period? The first several months
23 after the explosion, that you were prepared to make
24 available people, that if conditions were appropriate a
25 proper investigation could be done. That didn't change?

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1 A. Well, I wouldn't make them available; I know people
2 I had spoken to and I'm on the Board of Directors of the
3 National Mine Rescue Association. I'm the Chairman of the
4 Engineering Procedures Committee, and I had also spoken
5 with key people within the Mine Safety and Health
6 Administration, and I was under the strong belief that if
7 assistance was requested it would be supplied.

8 Q. And to your knowledge no assistance was requested?

9 A. I don't know. At least if there was, I didn't hear
10 about it.

11 Q. All right. And to your knowledge did the Department
12 of Labour retain other consultants besides yourself?

13 A. I have no knowledge.

14 Q. It's my understanding that a coordinated effort with
15 respect to re-entry and investigation of the Southwest
16 District was being attempted between the Department of
17 Labour, the RCMP and, indeed, this Commission of Inquiry,
18 some time during June and perhaps July, maybe even August
19 of 1992. Were you aware of those efforts?

20 A. Yes, I was involved in that.

21 Q. All right. And you were involved as consultant, I
22 take it, to the Department of Labour?

23 A. Yes, sir.

24 Q. All right.

25 A. You may remember early on, I apolo -- I let the

MR. MITCHELL, EXAM. BY MR. HEBERT

1 Commission know that I was responsible for forcing the
2 issue of flooding the lower regions of the mine.

3 Q. And that was up to which -- what level?

4 A. Just inbye Crosscut 10.

5 Q. In -- okay. And that was below then -- that would
6 have been below the Southwest Section?

7 A. Yes, because we were getting heavy -- we had
8 imminent danger from falls of roof inbye that area that
9 were flushing out toxic products of combustion, and
10 insofar as one could never predict when you'd have such
11 falls, it was my opinion that for any entrance into
12 Southwest area, it was essential that we remove this
13 imminent danger to such an operation.

14 Q. And just to -- if you could help me. The flooding
15 that you had proposed up to around the No. 10 Crosscut,
16 what sections of the mine would then be flooded or
17 inaccessible due to the water?

18 A. The North Mains including the Southeast area inbye
19 the No. 10 Crosscut.

20 Q. Yes. And the Southwest section would still be
21 accessible?

22 A. Yes, that -- the plans for that were very carefully
23 drawn out. We had a very intensive studies of the
24 elevation and the shoreline data.

25 Q. And subsequently there was further flooding, is that

MR. MITCHELL, EXAM. BY MR. HEBERT

1 your understanding?

2 A. I understand perhaps -- I believe, I can't say with
3 certainty. I did hear some time later on that when Mr.
4 Rouse was there that they put more water in.

5 Q. All right. And were you involved in any other
6 decision-making with respect to flooding? Additional
7 flooding. Or was your only recommendation to flood up to
8 No. 10 Crosscut?

9 A. My sole recommendation was not up to 10 Crosscut but
10 to have the shoreline and -- because you have to look
11 with respect to certain areas within Southwest area. My
12 -- our goal was to bring the shoreline just below
13 Southwest -- just below the No. 10 Crosscut in the mains.
14 And that, indeed, was done because when I went in there
15 subsequently, I went to the shoreline and it was at a
16 very good location.

17 Q. All right. And at no time did you see the need to
18 recommend further flooding?

19 A. No, sir.

20 Q. Okay. Now I noted early in your testimony, and I
21 think perhaps it was Mr. Merrick that referred to the
22 rescue attempt immediately following the explosion. And
23 I think you chose to refer to it not as a rescue attempt
24 but rather as a re-entry?

25 A. I don't recall how I phrased it; I take your --

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1 however you wish to call it. That is one way you might
2 call it.

3 Q. All right. It struck me though during your
4 testimony, that you specifically avoided the use of
5 "rescue attempt." Is that fair to say?

6 A. I would say so. I would not have -- had I been in
7 the command centre, I would not have conducted this as
8 a rescue attempt.

9 Q. And why would that be, sir?

10 A. To have a rescue attempt, one has to have even a
11 glimmer of a hope for persons being alive. There was no
12 basis for such a glimmer, and, therefore, it is, in my
13 judgment, and experience -- it would be foolhardy to risk
14 or put mine rescue teams in harm's way just to examine an
15 area.

16 Q. Are you now speaking from hindsight, or with
17 hindsight, or are you referring now the information that
18 would or should have been available on the date of the
19 explosion?

20 A. I am -- this is not hindsight at all. This is based
21 on the initial observations of the mine rescue teams and
22 which left no doubt as to the pressures and problems
23 likely to have been encountered in the lower reaches of
24 the mine, the fact that these men had not been trained in
25 barricading, and that there were no materials that I

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1 could find out about that were obviously available for
2 barricading. And in the absence of that, they did not
3 have self-contained self-rescuers and in the absence of
4 those things, the chances of anyone being alive in those
5 lower reaches was -- there was no chance for that.

6 Q. All right. You are referring to observations of the
7 rescue team from the Southwest 1 area?

8 A. No, from their -- when they first started going down
9 into the North Mains.

10 Q. I see, okay. And what specifically were the
11 indications which you say would have led you to that
12 conclusion? That it was a -- that no one would have --

13 A. The --

14 Q. -- survived?

15 A. -- extensive evidence of high pressure and
16 destructive forces.

17 Q. Okay. With respect to barricading, what do you mean
18 by that, sir?

19 A. "Barricading" is a technique that we train miners
20 that in the event that they are of the opinion they
21 cannot escape from an area of a mine in which there has
22 been an explosion or a fire, we train all miners to
23 barricade themselves. And we teach them where to
24 barricade, how to barricade so that during a rescue
25 activity, if we can't get to them quickly enough through

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1 the mine, we can drill holes down to the point at which
2 they barricaded or sometimes we prepare these areas in
3 advance so that we can provide them with air, food, water
4 and other things until we can reach them. We have saved
5 numerous lives -- many hundreds of lives through this
6 training. I have a paper on this that you might refer
7 to.

8 Q. I believe there was reference to barricading in the
9 CanMET report. Do you recall any -- one of -- I believe
10 it was the 1988 report. Do you recall seeing that at
11 all?

12 A. I don't recall it, but I probably did read it, but I
13 can't say with certainty.

14 Q. Fair enough. And this is fairly standard safety
15 practice, is it?

16 A. It was. We're trying to renew it.

17 Q. I see. Now there's been some evidence of the speed
18 of this explosion and the pressures to suggest that those
19 men in the North Mains would have virtually no warning.
20 And I take it in those circumstances the barricade would
21 have been of no assistance?

22 A. That's correct.

23 Q. You mention the -- was it self-contained self-
24 rescuers, is that --

25 A. Yes.

MR. MITCHELL, EXAM. BY MR. HEBERT

1 Q. All right. And what would that entail? Would this
2 be the Oxy 60s? Is that what they're referred to or --

3 A. The self-contained self-rescuers will provide a
4 typical miner with about one hour of good air.

5 Q. All right. And in the United States -- are -- first
6 of all, are these the Oxy 60s? Am I using the right
7 term? Is that one --

8 A. Oxy 60 is one of --

9 Q. One --

10 A. -- these four brands available. Three brands, I
11 believe, now, four brands available and sold in the mines
12 in Africa and the United States and Australia.

13 Q. And I understand that because of the weight of these
14 units, they are not immobile but they're located in
15 accessible reaches of the mine rather than being carried
16 on the person of the miner, is that correct?

17 A. It depends on the job of the miner. The storage
18 plants that we have in the United States, and I am
19 responsible for those, require certain persons to always
20 have them available within 25 feet, is the definition of
21 "always having them available." Certain persons we
22 permit them to be stored in places -- and these are
23 people that we believe that in the event of an ignition
24 or a fire could, by putting on their filter self-
25 rescuers, reach their oxygen self-rescuers within five or

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1 10 minutes at the very most. We have arguments exactly
2 how long we are willing to allow that distance to be, but
3 typically, it's within five minutes, though some people
4 are trying to stretch it to 10.

5 Q. Okay. Earlier in this proceeding there was some
6 suggestion that perhaps these units could be stored on
7 some of the mobile equipment such as the continuous
8 miner, the bolter. Would that be -- are there any safety
9 factors that would mitigate against that?

10 A. That is a standard practice. The shuttle car
11 operator has his right with him in his cab; he may not
12 have it on his person, but it is immediately within
13 reach. The driver of all vehicles, each one of these
14 trucks that you have, would have a -- not only one for
15 himself, he would have a box on there in which would be
16 stored a certain number of these, depending on the
17 storage plan. The continuous miner operator would have
18 one in his cab as would the -- I mentioned the shuttle
19 car, and also the bolter men. So that is standard. The
20 ones we're talking about -- then there would be
21 additional ones typically stored at the dinner hole.

22 Q. Assuming there was an Oxy 60, for example, on the
23 roof bolter, and assuming that that was, in fact, where
24 the ignition took place, can you think of any scenario in
25 which, for example, the operator of the roof bolter might

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1 have survived? Based on your knowledge.

2 A. Given my postulation of where the -- how this
3 explosion developed, which was raising coal dust from the
4 belt conveyor and possibly around the Stamler, they would
5 have a very low probability of having survived even had
6 they oxygen self-rescuers. Typically, these are -- have
7 been proven as means for escape, and they have worked as
8 means for escape, for people in entries adjoining or
9 close to but not directly associated with the place in
10 which the explosion occurred.

11 Q. All right. We've seen, I guess, little evidence of
12 a lot of physical damage in the Southwest headings, I
13 guess, I try -- I find -- I'm just trying to reconcile
14 that evidence with what you've just said. Can you help
15 me at all?

16 A. I don't follow the question.

17 Q. It appeared -- there didn't seem to be a lot of
18 physical damage in, for example, in the area of the roof
19 bolter and it would suggest that there might not have
20 been a lot of pressures from the explosion in that area.
21 And you, I think, had referred to the compacting
22 phenomenon as you come close to the head. And your
23 previous answer, as I understood it, indicated that it
24 would be the force of the explosion itself which would
25 have led to their deaths, even if they had the Oxy 60,

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1 for example. Am I understanding you correctly, first of
2 all?

3 A. That's a good question. I don't know. The
4 gentlemen in Southwest 2-1 Road, those six gentlemen,
5 were attempting escape. Had they -- they all died of
6 carbon monoxide poisoning. Had they been able to put on
7 oxygen self-rescuers, they would not have died -- in all
8 likelihood, I should say, they would not have died from
9 carbon monoxide poisoning. However, had they gotten into
10 the Southwest 2-B or A Road, then their chances of escape
11 diminish because of the forces being --

12 Q. Sure.

13 A. -- generated, and as they enter the Southwest area,
14 their forces would -- their chances decrease even more.
15 And if they were able to get into the mains, there was no
16 hope for their escape.

17 Q. If they had stayed where they were with an Oxy 60
18 and somehow barricaded themselves, whether behind a piece
19 of equipment or whatever, would that change your opinion?

20 A. That might have been a different story. For
21 example, if they had barricaded themselves in the left-
22 side split would have been a good place possibly -- it's
23 all a matter of time, how long it would take them to
24 throw up a barricade. I would say that their chances for
25 escape, to even speculate on that, is unreasonable.

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1 Q. Okay. I just wanted to ask one more -- perhaps two
2 or three questions with respect to your ventilation
3 report which was contained in those letters. And I
4 wasn't quite clear on the -- there was a list of, it
5 looked like computer data and printouts, some kind of
6 program. What exactly was that program that you were
7 using and what was the significance of it?

8 A. Well, the program that I use was -- this is a long
9 story. In 1976 the United States Government was among
10 the defendants in a case resulting from the Sunshine Mine
11 fire in 1972, which fire killed 94 people. And I was
12 assigned the task of technical -- responsible for the
13 technical defence -- development of the technical defence
14 for the United States Government.

15 As part of that, I found that we had no way to
16 analyze smoke flows and heat flows through a mine such as
17 the Sunshine Mine, that none of the computer programs
18 available were appropriate for that. I set up a task
19 force consisting of the top ventilation people in the
20 universities, in industry, and in the government. That
21 group developed a program. That was in 1977, and we have
22 been using it ever since, and each year it gets upgraded.
23 I even mention -- I believe I mentioned the data that the
24 -- the layout I show for '92 is quite different today.
25 We've made quite a few modifications to the program. It

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1 doesn't change the results; it just changes the ease and
2 conduct of the program.

3 This is a -- the only program that permits the
4 incorporation of things such as thermodynamics, gases of
5 different density -- different from air, such as methane,
6 carbon dioxide. Those types of things. We're able to
7 look at natural ventilation pressures. That's the
8 program.

9 Q. What exactly does it -- what's the end result that
10 the program solves for?

11 A. What does it solve for? Well, the one I'm using
12 here looks at a static basis -- on a static basis of what
13 are the probable quantities of air flow, the temperatures
14 of those air flows, the contaminants within those air
15 flows.

16 Q. So this was a model which was designed to assist you
17 in predicting or to hypothesizing as to what the air
18 flows were, what the make up of the body air was at a
19 particular time?

20 A. That's right and its potential toxicity or heat.
21 The amount of heat. Those things are important.

22 Q. And I understood your evidence to be is that when
23 you use this formula, this computer program, you are able
24 to take the -- a predicted velocity from that and use it
25 in your layer -- or methane layering --

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1 A. The --

2 Q. -- equation, is that correct?

3 A. Among the results -- if you will look at the output,
4 you'll see on the far right column, the velocity, in that
5 specific branch. And that's a simple thing; the program
6 just takes the quantity that it calculates and the
7 resistance that it calculates and divides one into the
8 other to come up with velocity.

9 Q. Okay. All right, thank you. Now with respect to
10 some of the known hazards in the mine as it existed on
11 May the 8th and May the 9th, I believe you had indicated
12 that the stoppings, and you didn't refer to them as
13 stoppings. You referred to them as "things" which acted
14 as a barricade, if you will, of the Southwest 1 area,
15 that -- and this was in one of Mr. Merrick's questions,
16 in response to one of Mr. Merrick's questions. You
17 indicated that you would have to know why the inspectors
18 did not close down the mine at that time in order to
19 really fully answer his question. And at that -- I got
20 the impression that the action that you saw coming from
21 that, would have -- the proper action, would have been to
22 stop production if you had seen those two things in those
23 particular places.

24 A. Assuming -- that was -- I believe I said that
25 assuming that there were not good reasons. Since I

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1 wasn't there, I can't put my --

2 Q. Right.

3 A. -- I don't know what Mr. McLean and Mr. White
4 believed. I know that they did examine that area quite
5 carefully, if you will look at their reports. They must
6 have come to a finding that was different than mine,
7 but, as I said, I hope I said, mine is biased because I
8 have seen -- experienced the implications of that
9 condition.

10 Q. Yes. And I'm not asking you to speak for the
11 inspectors that were there but for yourself. Had you
12 seen those conditions, based on what you know now, your
13 solution or your next step would have been to -- if you
14 had the power, assuming you had the authority -- would be
15 to stop production until that situation was remedied?

16 A. Yes, and to have done that would have required
17 withdrawal of all persons --

18 Q. Personnel, yes.

19 A. Inbye Crosscut 9 from the mine until the problem was
20 resolved.

21 Q. And so I take it you saw that as a significant risk?

22 A. No, I --

23 Q. A hazard, shall we say?

24 A. As I say, I would have to have been involved in what
25 was going on because obviously no one else saw that that

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1 way and they may have been more right than I.

2 Q. But based on what you know, you would have seen that
3 as a significant hazard, significant enough to withdraw
4 people from that area?

5 A. Yes, because, as I said, I am biased on the subject.

6 Q. And would the same have been true with respect to
7 low ventilation to the heads in Southwest section,
8 Southwest 2? Would that also have been of equal concern
9 to you? Then again, I'm not asking you to place yourself
10 in the position of the mine inspectors, but based on what
11 you know now, would that have been an equally serious
12 risk that would warrant withdrawing people until the
13 ventilation was corrected?

14 A. The problem with my answering your question is that
15 on April 29, which is the date that this discussion
16 applies to, conditions in Southwest 2, ventilation of
17 those faces, was not low as you indicate. It was was
18 quite different on that date than it was on the 8th of
19 May.

20 Q. Well, let's look -- rather than the 29th of April,
21 look at the 8th of May. Would that have been your
22 solution as well?

23 A. On the 8th of May, without question, I would have
24 considered the ventilation in Southwest 2 active faces to
25 be inadequate. On the 29th of April, no.

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1 Q. And you would not have allowed production to
2 continue under those inadequate ventilation conditions?

3 A. On the 8th of May?

4 Q. Yeah.

5 A. Had I been in there, I would have stopped
6 production, but only in Southwest 2 area and required
7 that additional air be directed into the active faces.

8 Q. All right, now with respect to the presence of coal
9 dust, I would take it you would see the accumulation of
10 coal dust, untreated with stone dust, and improperly
11 removed or not removed at all, that would be an equally
12 serious hazard?

13 A. I can't answer that because I have a problem. I'm
14 not so sure things are as you describe.

15 Q. But if they were?

16 A. If they were, that's a different thing.

17 Q. And if they were on, say, May 8, that would pose to
18 you an equally serious hazard?

19 A. If they were as you've described, yes, that would be
20 unacceptable.

21 Q. And I take it then that your solution would be to,
22 again, would be the same response. You would stop
23 production in those areas until the problem was remedied?

24 A. That is correct.

25 Q. Now with respect to the equipment, and I'm going

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1 back now to the scenario you described as a possible
2 cause of the -- to use your terminology, the source of
3 heat. Because I think you indicated that you needed
4 heat, fuel and oxygen. Those were the three ingredients
5 of a fire, and the only difference between a fire and an
6 explosion was the speed of the flame, if you will?

7 A. Well, the degree of confinement. I suggested you
8 consider the universal gas law.

9 Q. Yes, okay. Now I take it that we're not really
10 concerned here. We know that there was sufficient oxygen
11 for any kind of explosion, and we know that the fuel was
12 either the methane or the coal dust or both.

13 A. Yes.

14 Q. Now with respect to the source of heat, is it fair
15 to say that in any mine you can know with one hundred
16 percent certainty that from time to time during the life
17 of the mine that there is going to be sufficient heat
18 which could lead to ignition of either methane or coal
19 dust?

20 A. That is correct.

21 Q. So it's really fair to say then that the source of
22 heat in a mine is a known hazard and it's virtually to be
23 expected?

24 A. It is something that the regulations are designed to
25 militate against. I would not say that it is expected.

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1 This can be and should be controlled or at least reduced
2 so that the chance of mixing or bringing together this
3 heat and this fuel and this oxygen at the same instant
4 and place is -- does not exist. That's the whole name of
5 the safety game.

6 Q. Because we know there's going to be heat. We know
7 there's going to be fuel and we know there's going to be
8 oxygen.

9 A. That's correct.

10 Q. But it's to keep the three separate in time. Now
11 with respect to the -- and that's basic, I take it?
12 That's the fundamental safety issue in a coal mine or one
13 of the fundamental safety issues?

14 A. One of the fundamental issues, yes.

15 Q. Now with respect to sources of heat, you indicated
16 that in your scenario or your speculation, I think you
17 referred to it this morning, that a fissure, perhaps, on
18 the floor could have allowed methane to escape into an
19 impermissible area of equipment. In other words, the
20 seal or what have you was not properly sealed, which
21 would have allowed air and gas, methane gas, to invade
22 that are that was supposed to be sealed. Do I understand
23 that to be your -- one of the possibilities?

24 A. Well, explosion-proof boxes and explosion-proof
25 portions of equipment, we know that the gas can get into

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1 them regardless of how well we maintain them, at least
2 using the Canadian and American 4/1000th of a gap
3 requirement. The concept behind explosion-proof boxes
4 and containers is that should there be an ignition within
5 that box or container that there will be no flame that
6 comes out capable of igniting the surrounding atmosphere.
7 So the intention is that yes, you can have an explosion
8 or ignition within these boxes. Just don't let it come
9 out.

10 Q. So there's intended to be a self-contained
11 explosion, if you will?

12 A. Yes, that is the intent and the purpose.

13 Q. And you indicated that if in fact the equipment was
14 not in a permissible state -- I think that's the
15 terminology used, that that was -- I think you indicated
16 a high degree of certainty that that would have been
17 caused by improper maintenance of some sort?

18 A. That is how we get these things happening, is the
19 failure to maintain permissible equipment in a
20 permissible manner.

21 Q. But isn't it also true that from time to time that a
22 piece of equipment, as it's being manufactured, is not
23 being manufactured 100 percent perfectly? That there are
24 manufacturer's defects, for example? Is that a
25 possibility?

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1 A. The chance of that is extremely low. The equipment
2 that you had, for example, the shuttle cars, the bolter,
3 and the continuous miner were manufactured in the United
4 States under the Mine Safety and Health Approval. You'll
5 note my resume, at one time I was Chief of Approval and
6 Certification. We have a very rigorous quality control
7 program, and should a manufacturer, for example, let us
8 take Joy, should we find that they ship a machine that is
9 not made exactly in accordance with the approval, we will
10 lift that approval, which could very well bankrupt the
11 corporation. This is just something -- the stick there
12 is so big, and we have exercised this stick. And it is
13 very hurtful to the company when we do exercise that
14 stick.

15 Q. We know that there are stringent safety
16 requirements, inspection requirements, but you would
17 allow though that it may be possible for a piece of
18 equipment to have passed which might not have been
19 permissible. It might have been remotely possible but
20 yet it is possible?

21 A. Oh, everything is possible. The job then -- that's
22 why the mine operator has the duty and responsibility to
23 maintain that equipment in a permissible manner.

24 Q. All right, with respect to the enforcement of
25 regulations and I guess the enforcement, really, of

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1 perhaps not of regulations but the enforcement of safety
2 in the mine, I was a little bit unclear. It seemed that
3 in your testimony that sometimes you felt it was
4 appropriate to have a big stick for the inspectors and
5 that other times it might not be useful at all. There
6 seemed to be a bit of a contradiction there, and I just
7 wanted to confirm that you are in favour of having or
8 giving inspectors the means of truly enforcing
9 regulations which are put in place with such penalties as
10 large fines and possible incarceration for individual
11 managers, supervisors, and indeed, in some cases, boards
12 of directors.

13 A. That's correct.

14 Q. And I take it though that even though the inspectors
15 had such a stick, that if they were still working in an
16 environment that they feared for their jobs, that even in
17 that situation the stick may not be used and may not be
18 effective.

19 A. I don't agree. If I said that, then I'm terribly
20 wrong.

21 Q. I'm not suggesting you said it. I'm asking as a --

22 A. The application of that stick would be appropriate
23 where you have an imminent danger that is not corrected
24 or if you have a long history of what we call
25 "significant and substantial violations." In the

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1 development of that history of these significant and
2 substantial violations, there is where I am a strong
3 advocate of inspectors trying to get the mine operators,
4 the mine officials, and the miners sensitive to the
5 correction of that problem, because the inspector is only
6 there infrequently in Nova Scotia.

7 Where we have mines like that in the United States,
8 we have an inspector at that mine on every shift, when
9 we're starting to see a history of violations that we
10 consider substantial and significant. We try to get them
11 to learn to correct these things themselves because if
12 we're not there all the time, it's in the times we're not
13 there that bad things happen. So just making them
14 correct something at that instant by using a stick really
15 does not accomplish safety, in my opinion.

16 Q. With respect to the -- your understanding of the
17 extent of flooding in the Westray mine at present, I take
18 it that that would virtually eliminate any kind of
19 investigation to discover the sorts of things that you
20 find lacking in the RCMP investigation at this stage?

21 A. I have not looked at that new shoreline. The last I
22 heard, it was up around No. 8 Crosscut. I'd have to look
23 at my elevation data to see what that would have flooded.
24 8 Crosscut, if that be where the shoreline is, would have
25 the Southwest completely flooded up to the No. 2

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1 Crosscut. That's the No. 2 Crosscut in Southwest 2. So
2 depending on what it did to the roof conditions, which
3 would be an unknown, if that is as far as the water has
4 risen, one could, if you drained it and the roof
5 conditions permitted, you could examine the equipment,
6 for example, the boom truck that Mr. Merrick was asking
7 me about, and the equipment inbye that point. With that
8 assumption, of course.

9 Q. And in this case if the Southwest area had been
10 entirely flooded, including the equipment, would the type
11 of investigations that you're contemplating or you would
12 have contemplated, would that be now impossible?

13 A. I have only been involved in an investigation of one
14 area that had been flooded and de-watered. We were able
15 to -- the non-permissibility of three pieces of equipment
16 that -- as I remember it, was defined. We never could
17 state with certainty that they were the points of
18 ignition, but we were able to find that problem. And
19 then there was a tunnel in Milwaukee that we had water up
20 to our shoulder blades and we were able to define that
21 quite adequately. We were successful there.

22 Q. So depending on what -- certain things may be
23 possible to investigate, even after de-watering?

24 A. Yes.

25 Q. And other things, I would take it, might not be?

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1 A. That's right.

2 COMMISSIONER Mr. Hebert, are you just about finished?

3 MR. HEBERT As a matter of fact, I am. Those are my
4 questions.

5 COMMISSIONER Ms. Gillis?

6 MS. GILLIS No questions, Mr. Commissioner.

7 COMMISSIONER Mr. Wells?

8 MR. WELLS No questions.

9 COMMISSIONER Mr. Wilson? And then we'll go to you, Mr.
10 Merrick, on re-direct.

11 EXAMINATION BY MR. WILSON

12 Q. Mr. Mitchell, to get back to the ventilation issue,
13 in your evidence on direct, you indicated that you
14 preferred the exhaust system ventilation for this mine
15 and the auxiliary system, auxiliary exhaust?

16 A. Yes, sir.

17 Q. How prevalent is the use of auxiliary exhaust in
18 mines of this type?

19 A. Exhaust auxiliary ventilation is the most common
20 method, I would say, we dealing -- when you're using
21 auxiliary ventilation such as this, I would be
22 conservative in saying 90 percent of all systems would be
23 exhaust. The blowing system is typically limited to
24 places where we have deep cut mining. That's where we
25 allow a mining machine to advance by remote control for

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1 distances of up to 40 feet inbye the end of the duct or
2 line brattice. And in those instances, we will use
3 blowing systems of ventilation in combination with a fan
4 spray system on the miner.

5 Q. And you indicated there was a problem with the
6 blowing system when dust scrubbers were used. And what
7 is that problem?

8 A. The blowing problem?

9 Q. When dust scrubbers were used on the continuous
10 miner.

11 A. Oh, if you used a blowing system with this
12 continuous miner that we had in the Southwest 2 B-1 Road,
13 you would have been blowing the exhaust from the dust
14 scrubber back right -- in fact, you would have been
15 bringing it right across the miner operator. And you
16 would start getting extreme recirculation. With the dust
17 scrubber that they had, the location of the end of the
18 duct was correct in this -- at the specific time, based
19 on the RCMP photographs.

20 Q. Now you indicated that you noticed a change in
21 ventilation practices in May of '92 that you didn't see
22 prior to May of '92. What was the change that caused the
23 problem here?

24 A. Let's take the area down in the North Mains, and I
25 believe we went through this with Mr. Merrick quite a

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1 bit. They started to have -- well, the Southeast -- they
2 put another mining machine in operation prior to --
3 around the 6th of May. We checked that -- that
4 approximate date. They put a third mining machine in
5 operation in the mine. Until then, they had one
6 continuous miner down in the North Main area and he would
7 tram. He would mine in the North Mains and No. A, B, D
8 Road, and I have question mark road. And he would mine
9 the Southeast. And he would tram back and forth. Around
10 the 6th of May, they put another miner down in there, and
11 they left one miner down in the bottom of the main, and
12 they put the new miner in the Southeast. Or I don't know
13 which one the new miner went into. It went into one of
14 the two faces. And when they did that, the miner in the
15 Southeast, the intake was return air, and this, of
16 course, is just totally unacceptable.

17 Going down into the Southwest area, what they did is
18 they were now getting the extent of ducts were much too
19 long. They had too much resistance in the duct and they
20 were not able to -- in all likelihood, to deliver the
21 quantities of air that they thought they were delivering
22 up to the ends of the duct.

23 Q. And how much air did they think was being delivered
24 to the ends of the duct at that time?

25 A. For example, in Southwest 2-1 Road, they estimated

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1 10,500 cubic feet of air per minute being split between
2 the face, the straightaway, and the left-hand split.
3 This is postulated on having no leakage in the couplings.
4 And there would be about four couplings in that duct at
5 that stage, no leakage at these couplings and no leakage
6 in the duct itself. You were just reaching the stall
7 point for the fan, assuming it was a C70 Engart fan that
8 was being used.

9 Q. When was the -- could you tell from the records when
10 the left split was constructed?

11 A. The left split, yes, you can tell from the record,
12 and without looking at it, it too was around the 6th of
13 May.

14 Q. And up until that time, was there sufficient
15 ventilation for that Southwest 2-1 area?

16 A. Yes, there was sufficient air. There should have
17 been sufficient air to maintain the general body
18 atmosphere below 1 1/4 percent. There never was
19 sufficient air to militate against methane layering,
20 assuming that you were going to use velocity as a means
21 for reducing the probability of forming layers.

22 Q. Do you design auxiliary systems to reduce -- the
23 auxiliary ventilation system to reduce methane layering
24 or to militate against methane layering?

25 A. That would have been -- I hope I talked about this

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1 the other day. That would have been most impractical in
2 this Southwest area, in fact, in any area of this mine.
3 We would have needed not less than I -- I believe I
4 calculated one time 64,000 cubic feet of air per minute.
5 And if you want that in meters, that 64,000 would be,
6 excuse me, 64,000 --

7 COMMISSIONER I think most of us here --

8 A. -- that would be about 30 cubic meters per second,
9 Your Honour. And to do that and to have 40 percent
10 coming through, we would have needed to have a much
11 bigger motor on the main fan. You would have had to
12 produce in excess of 500,000 CFM at the main fan, which
13 would have meant that they would have -- they had a 450-
14 horsepower motor on that, and they would have had to put
15 a 900-horsepower minimum motor on that fan to develop
16 that kind of quantity and pressure.

17 Q. In your experience, does anyone design auxiliary
18 ventilation at the heads to militate against methane
19 layering?

20 A. I've never run into anybody who has done it yet.
21 I've tried, but it becomes so impractical as that most --
22 that mine operators don't -- can't agree to it. We will
23 use other techniques. We will use baffles; we will do
24 things to change cross-sectional areas, that type of
25 thing. We will use -- put line curtains in to direct

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1 air. We will use venturis. There are many ways to do it
2 other than velocity.

3 Q. Did they have venturis at this mine that you're
4 aware?

5 A. Yes, they had a number of venturis over the arches
6 in this mine.

7 Q. Does anyone regulate with respect to methane
8 layering in ventilated headings?

9 A. Not in the United States. In fact, I believe I said
10 last week that some of our laws actually lead to the
11 formation of methane layers in our -- some of our belt
12 entries and in our bleeder entries.

13 Q. I believe Dr. McPherson talked about a regulation
14 requiring 60 feet per minute velocity minimum in heading
15 areas as a method in the United States for regulating
16 against methane layering. Are you aware of that
17 regulation?

18 A. I'm aware -- I wrote the regulation, but when we
19 wrote it, the sole intent was to, at that time in 19- --
20 in January of 1970 is when we did that. We were
21 attempting, based on our best knowledge, to maintain the
22 respirable dust in active working faces below the then 3
23 milligram per cubic meter level that we were
24 establishing. Had I intended to militate against
25 layering, I would have had to require in excess of 200

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1 feet per minute for typical active faces in the United
2 States, and that would not have been possible to do.

3 Q. So that regulation had nothing to do with methane
4 layering?

5 A. No, sir. Strictly with respect to respirable dust.

6 Q. Okay. So that I have this on the auxiliary
7 ventilation straight, in May they introduced another
8 mining unit in the North section?

9 A. Yes, sir. They put a third miner, a third
10 continuous miner into production.

11 Q. And that caused problems with the ventilation in the
12 North Mains with the adequacy of ventilation in the North
13 Mains?

14 A. Yes, sir.

15 Q. And they had a split in the Southwest 2-1 Road that
16 caused a further problem with the ventilation?

17 A. Yes.

18 Q. Now prior to those actions, was there anything that
19 would indicate that there was a problem with ventilation
20 in the mine, from your review of the records?

21 A. No. In my memory I can only recall one or possibly
22 two recordings in the shift books indicating in excess of
23 1 1/4-percent methane in the general body atmosphere in
24 the returns. That's the only time that there seem to
25 have been -- and that was, I understand, was corrected

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1 because when you look at the next day's book, which I
2 did, they were back down to a normal.

3 They also had a very -- they had only a few gas outs
4 that were reported in the books. Again, I may be
5 suffering with memory. Let us say that 10 or 15 gas outs
6 in about 120 shifts, and those were only momentary. They
7 were -- they did not prevent production to continue
8 throughout the shift. They would gas out, and they would
9 re-establish ventilation or they would reduce production
10 and they no longer had that problem, because there was
11 not one instant where I read, that I can recall reading
12 about two gas outs in the same working face.

13 Q. Let's talk about that a little bit. Dr. McPherson,
14 in his report, isolated instances of gassing out, and I
15 believe he isolated as many as 12 in that time -- in 2
16 1/1-month time frame. In your experience, do you
17 consider that excessive in terms of gassing out in
18 machinery and equipment in a mine?

19 A. No, that's a very, very good record. When you're
20 developing in virgin coal such as they were with the
21 exception of the Southwest 1 area, this is when you are
22 most likely to encounter gas outs. And he said 12, I
23 said 10-15, so we're not too far apart there. That's a
24 good record.

25 Q. Have you experienced gassing out in mines, this type

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1 of mine before, of machinery and equipment?

2 A. It is quite prevalent, particularly when you're
3 driving the right side entry along a solid rib. This is
4 the entry in which you will get your typical gas outs.

5 Q. And what frequency of gas outs have you experienced
6 in your time in mines?

7 A. Well, let's take Loveridge Mine which is down just
8 across the border in northern West Virginia, near
9 Farmington, West Virginia. And I'm thinking specifically
10 of this one because this is where we have a problem and
11 we have 180,000 cubic feet of air per minute coming up
12 the intakes. And there are three intakes in a typical
13 section. And on that right-hand -- the most right-hand
14 entry, we -- I would say you have typically three to four
15 gas outs per shift.

16 Q. Now the fact that they had gas outs and then resume
17 production afterwards, what does that indicate with
18 respect to the ventilation of the mine?

19 A. Well, one thing it indicates is that the methane
20 monitors were working because when we define a gas out as
21 the methane monitor reading a concentration that it's set
22 for and thereby de-energizing the power, de-energizing
23 the machine. So the important thing is there we learn
24 that the methane monitor is working. The fact that they
25 are able to resume production means that there is enough

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1 air that comes there eventually across the sensor to
2 allow them to restart the machine.

3 Q. Which indicates what?

4 A. It would indicate adequate ventilation for mining
5 again, assuming that ventilation is not intended to
6 militate against methane layering, but solely for the
7 purposes of dilution of the methane in the general body
8 atmosphere that reaches the sensor on the mining machine.

9 Q. Okay. Now up until these practices occurred that
10 you refer to in May, are you aware of anything from the
11 record that would raise a complaint with the Department
12 of Labour's inspectors, as an example, that the mine was
13 being inadequately ventilated?

14 A. No. No, there is no evidence that I read. I don't
15 recall any interviews that -- other than people who,
16 after this explosion but never before, told those who
17 listened that when they were in the upper reaches of an
18 entry that the air there was not capable of supporting
19 their being there; they couldn't remain there. But this
20 was not something we learned. I don't see it in any of
21 the shiftbook books.

22 Q. So from the documentation that existed prior to the
23 explosion, let's say, there was nothing to indicate a
24 problem with ventilation up until the first part of May?

25 A. No, sir.

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1 Q. Now --

2 A. Now wait, they did have a problem in Southwest 1
3 where they started getting high concentrations of methane
4 when they started trying to pillar, and this was among
5 the reasons, I believe, they left the Southwest 1 area.
6 So with the exception of Southwest 1, what I said before
7 I will stand by. But with respect to Southwest 1, they
8 had ventilation problems in there and, yes, they had very
9 serious ventilation problems in there. In fact, when I
10 look at the map and how they ventilated, it looks like
11 you didn't have ventilation at the active faces at all.
12 They retreated from the Southwest 1 section, I believe,
13 sometime in March?

14 A. Yes.

15 Q. Now was the main fan adequate for the purposes of
16 the mine?

17 A. Oh, yes.

18 Q. The detection of the methane layer, I'm interested
19 in that. How easy is it to detect the methane layer?

20 A. It's extremely difficult to detect a methane layer.
21 It all depends on how thick the layer is. The thicker
22 the layer, the easier it is to detect. Thin layers,
23 layers two-to-three inches thick, which I find quite
24 prevalent in the United States, these are not readily
25 detected and not likely to be detected by a typical

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1 miner. This calls for a very special investigation, in
2 my judgement.

3 Q. And what type of investigation do you undertake to
4 detect those layers?

5 A. Where we suspect that we have such layers, what we
6 will do is go into a place, we will prohibit other
7 persons from entering the area, not because of the danger
8 but because we don't want to interfere with the flow of
9 air. And we will hang a piece of Tygon tubing to roof
10 bolts and have it come out at a number of different
11 places, the ends of the tubing. We will bring this to a
12 crosscut, take it into an adjoining entry, and two to
13 four hours later go to the portion that we have in the
14 adjoining entry, pull gas samples, and then if there's a
15 layer, we will find that we have a layer.

16 Dr. Leach described this in a British Safety and
17 Mines Research Establishment publication. In fact that's
18 where we learned all of this from, about sampling thin
19 layers and pointing out the difficulties, if not the
20 questionable approaches to doing this.

21 Q. In your experience, is it typical for a mine to test
22 for layers in the manner that you have described?

23 A. It would be quite difficult. One, they have no --
24 most -- there are very few people who would know where to
25 test the layers. We know. I know, for example, because

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1 again I followed Dr. Leach, and he says where the
2 layering index is below 2, there's where you should look
3 for layers. If it's above 2, don't bother. And so
4 that's what I've been doing, and I've been instructing
5 people to do and we find layers, maybe one out of 10 or
6 15 times, I would say.

7 Q. So even when the layering index is below the number
8 that predicts the -- there may be an existence of the
9 layer, it's still -- you don't know if you're going to
10 find them or not, I take it?

11 A. No. There are too many -- too many factors involved
12 in layering that make it a guess-and-by-gosh type of
13 thing.

14 Q. Now with respect to the Southwest 2-1 Road area, I
15 believe you indicated that, in your view, a layer had
16 been accumulating for several days prior to May 9th, and
17 I just wanted to get this clear in my mind. In the
18 Southwest 2-1 Road, perhaps in the Southwest 2-B Road
19 inbye the 2 Crosscut and in the Southwest 2-A Road inbye
20 the 2 Crosscut?

21 A. Yes, sir.

22 Q. And how long had you -- or how long do you feel that
23 the layer had been accumulating?

24 A. I don't really have any idea of how long. I would
25 just guess to get a layer as thick as I believe that

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1 layer might have been and, as I said, I hope I said, the
2 thickness that I suspect that layer might have been was a
3 function of two things, how long it took for the flame to
4 flow through that layer, and that was based on the
5 actions of the six men and which I said was that it looks
6 like they were doing things for at least 20 seconds
7 minimum. So we have a very slow-moving flame, and we do
8 know that the thicker the layer, based on work in Germany
9 and Great Britain, the thicker the layer, the slower the
10 flame propagation through that layer.

11 The other factor that led me to believe we had a
12 thick layer, and I hope I said -- don't ask me how thick,
13 it could have been maybe a meter thick, but don't ask --
14 I won't hold to that, was the radiation type of burn
15 suffered by the six men, that none of them suffered
16 direct burns, but I believe I described it as lying out -
17 - as if they had been lying out in a strong sun on the
18 beach is the type of burns they suffered.

19 Q. But in any event, is there -- are there parameters
20 in terms of the time that you're talking about in the
21 formation of the layer that you envisage was there?

22 A. Well, the parameters, yes. You have to know the
23 rate and location of various methane emission points, how
24 the methane is coming there. And when you know the rate
25 of methane emission which could have been determined in a

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1 post-explosion investigation, when you learn the rate of
2 methane emission, then with a number of assumptions of
3 air flow, you are able to make an approximation of how
4 long it would take for that layer to have formed and how
5 thick that layer would be for various periods of time.

6 Q. With respect to the theory that you have of this
7 particular explosion, how long did you postulate it would
8 have taken to form that layer?

9 A. I made a rough calculation, based on what we knew
10 about methane emission in the Southwest 1, and I believe
11 I estimated two-to-three days, maybe four. And that was
12 based on assuming a 3 foot or 1 meter thick layer.

13 Q. Okay. And how does that coincide with the formation
14 of the left split?

15 A. That was about the same time, now that you mentioned
16 it, yes, that was about the same time the left split made
17 its first cut.

18 Q. And that would have been about the same time that
19 they split the 10,000 CFM as they were going into the
20 Southwest 2-1 Road --

21 A. Yes, sir.

22 Q. To the left side. Okay, now you did an
23 investigation aimed at determining whether it was
24 possible for a layer from the Southwest 1 to move up into
25 the Southwest 2 area. And you concluded that, as we've

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1 heard, that it could not have moved up, is that correct?

2 A. That's my conclusion, yes.

3 Q. And this investigation that you undertook was based
4 on the ventilation data reported by Trevor Eagles for May
5 the 8th?

6 A. That's supplemented by analysis of where the arches
7 were located and how the conveyor belt in Southwest C-1
8 Road and the conveyor belt in the Southwest 2-B Road, how
9 they were constructed and located.

10 Q. And that analysis is contained, I think, in your
11 July letter, supplemented by your November of '95 letter?

12 A. That's correct.

13 Q. Now that applies for May 8th. Does that also give
14 an indication of what may have occurred prior to that,
15 like in April or times past?

16 A. Yes, sir.

17 Q. What would have affected that for previous -- the
18 data used was from May 8th. Did you attempt to do it
19 with data from any of the other ventilation surveys?

20 A. Yes, I did.

21 Q. And did you achieve any results from that?

22 A. Basically there was no change. What -- the critical
23 point is the No. 3 Crosscut in the Southwest where we
24 have air flowing through the No. 3 Crosscut at a velocity
25 and perpendicular to the Southwest C-1 Road in which the

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1 layer would be coming out of the Southwest 1. May I draw
2 something, please?

3 Q. Yes, perhaps you could describe why you don't think
4 that the methane would layer up into the Southwest 2-B
5 area?

6 A. All right. Well, this first point, I have a -- air
7 flowing through the No. 3 Crosscut at a velocity
8 exceeding 600 feet per minute. My calculations indicate
9 670 feet per minute, but this is coming and hits
10 perpendicularly into this postulated layer. And this air
11 has to make a 90-degree turn. This is a point of high
12 turbulence. We also have arches there which will cause
13 even more turbulence. So right at the most critical
14 point for a layer to flow out of Southwest 1 and to
15 persist, we have a zone of high turbulence. Turbulence
16 is the enemy of methane layers. That's the whole name of
17 the game of getting rid of a layer is to create
18 sufficient turbulence. So we have that turbulence.

19 Then let us say that, despite that, this layer --
20 there is a layer that's still tending to move down. All
21 right. Now we enter a zone in which the cross-sectional
22 area, and this is why the -- how the belts were located
23 and the size of the belts became quite critical, where
24 the cross-sectional area is reduced within the Southwest
25 C-1 Road by 16 square feet minimum, and in all

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1 likelihood, it is more. So we now have a zone where we
2 have the -- as the air flows down the Southwest C-1 Road,
3 we are now generating -- we go from one velocity to an
4 increasing velocity as we go down there and this, by
5 itself, generates tremendous turbulence.

6 Okay, now we hit the junction, this air -- this
7 layer and air, assuming a layer, hits the junction of the
8 Southwest 2-B Road with the Southwest C-1 Road, and right
9 there we're dumping coal off of a conveyor that is
10 suspended, close to the roof, onto the belt that's in the
11 Southwest C-1 Road. Now you have not only reduced cross-
12 sections, you have the coal dumping down. And we do know
13 that they were loading coal prior to the explosion, some
14 hour or so before the explosion, and prior -- and for
15 that period before that. So here we have this coal
16 dumping down, the air moving, the air striking all of
17 this. Now we have a zone of tremendous turbulence, much
18 more than we had back at 3 Crosscut.

19 Great. Let us say that we still get a layer
20 persisting. Now this air wants to go straight down C-1
21 Road, but, no, it can't go down there because we have a
22 box check and this box check generates a shock loss. And
23 this air hits this box check, and it reflects back
24 creating more turbulence.

25 Well, let's assume we still have a layer. Now the

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1 air to go up Southwest 2-B Road has to turn 130 degrees.
2 And if you ever go in a boat sometimes, a row boat, and
3 go rowing and try to turn yourself 130 degrees, you'll
4 see what I'm trying to say. Just look at the water where
5 your oars are stroking it, if you're not getting soaking
6 wet doing it, and -- so basically, the chances of this
7 persisting are so low as to be of no consequence. It is
8 not something that a reasonable person would consider.

9 Q. Now this is going past -- up into the Southwest 2-B
10 Road, what do you say are the chances of the methane
11 layering persisting past the, I believe it's the 3
12 Crosscut in the Southwest 1 section?

13 A. Oh, there is no question. I would say -- if I were
14 a betting man, I would -- I'd put my money on behind --
15 or inbye the No. 3 Crosscut in Southwest 1. Into
16 Southwest 1, we had layers; we had a large body of
17 methane, and it would come out possibly as a layer
18 through the upper portions of these things that covered
19 those openings.

20 Q. But I mean from the No. 3 Crosscut down the C Road
21 into the 2 area. What would you suspect would be the
22 possibility of it to layer once it got past that
23 perpendicular bit of air from the No. 3 Crosscut?

24 A. Oh no, maybe what -- No. 3 Crosscut is the crosscut
25 in Southwest.

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1 Q. Yes.

2 A. And in --

3 Q. Well, you --

4 A. And in -- what I've described is the flow from No. 3
5 Crosscut into Southwest 2. As I, of course, believe it
6 to have been. And I'm saying that in my judgment there
7 is such a -- so little a chance for a layer to persist
8 from the No. 3 Crosscut into Southwest 2-B Road that that
9 is such a low chance that's it's inconsequential. Inbye
10 that No. 3 Crosscut going into Southwest 1, there I will
11 have methane.

12 Q. Yes, that's in the old sealed-off area?

13 A. That's in that other area and nothing to do with
14 Southwest 2.

15 Q. Okay.

16 A. Now once you get into Southwest 2, as you approach
17 the intersection -- or what they -- is their No. 2
18 Crosscut, then the chances for layer increase as you go
19 deeper into that area.

20 Q. And that would be up around the Southwest 2-1 Road
21 and the A and B section -- extensions?

22 A. I would say inbye the No. 2 Crosscut -- I believe I
23 testified the probability of layering is quite high, and
24 should be a -- and I would anticipate finding layers
25 there, as I describe, quite thick layers.

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1 Q. Those layers are layers that were generated from gas
2 emissions in those areas?

3 A. Yes, the --

4 Q. Now -- and so that we're clear on this, are those
5 layers associated with gas coming from the Southwest 1
6 section at all?

7 A. No.

8 Q. Now when the gas coming from the Southwest 1
9 section, if there is -- the atmosphere, I take it you're
10 saying with the add mixed at No. 3 Crosscut?

11 A. That's correct.

12 Q. And would -- then you would have the general body
13 atmosphere going into the number -- to the Southwest 2-B
14 Road?

15 A. That's correct.

16 Q. Now would that atmosphere be at all explosive?

17 A. No, sir.

18 Q. Why is that?

19 A. Well, the measurements of -- now this assumes that
20 these things are up there and that the measurement of
21 5,000 cfm into the Southwest 1 from the area is a correct
22 measurement, you would have 5,000 cfm -- if 5,000 cfm go
23 in, then you will have 5,000 cfm coming out.

24 Mr. Eagles was measuring the concentration of
25 methane in that atmosphere. Albert McLean on the 29th of

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1 April measured the methane atmos -- content of that
2 atmosphere. They found, if I can recall correctly, one-
3 half per cent in the general body atmosphere coming out
4 of the Southwest 1. They did find higher concentrations
5 in the immediate vicinity of the plywood, plastic thing.
6 But in the general body atmosphere outbye the -- these
7 things, they had a half a per cent in the concentration.
8 So when you add mix 5,000 cfm containing a half a per
9 cent methane into an air flow of about -- bear with me
10 one second -- an air flow of 60,000, approaching 60,000,
11 going by that -- is that the right number? Let me be
12 sure. Yeah, 60,000 going by that. So 5,000 and .5 per
13 cent gives you 25 cubic feet of methane that you're now
14 mixing with 65,000, and you have .04 per cent methane in
15 the general body atmosphere assuming the sole source of
16 methane is from Southwest 1. And that would not be even
17 indicated on a methane monitor of the type used by the
18 inspectors and the miners.

19 Q. So the general body atmosphere would not be
20 explosive coming into the Southwest 2-B Road?

21 A. No.

22 Q. And there -- and in your view there would be no
23 layer?

24 A. That's correct.

25 Q. Now you described, and you referred to them just

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1 now, the stoppings inbye No. 3 Crosscut in the Southwest
2 1 section -- and that's the B and C Roads going in -- and
3 you described in your testimony a number of times that
4 this was of concern to you, correct?

5 A. That's correct.

6 Q. And that you would have corrected that -- I believe
7 I understood right. That you would have corrected that
8 problem by reversing the air flow through the Southwest
9 section?

10 A. That is correct. That's the only means by which
11 that can be corrected.

12 Q. And you would have removed the overcast at the No. 9
13 Crosscut?

14 A. That's right.

15 Q. And you would have put an overcast at the No. 10
16 Crosscut to carry the air going -- coming -- whatever was
17 coming out of the Southwest 1 back into the return by
18 that route?

19 A. That's correct.

20 Q. And that would, in your view, have solved the
21 problem?

22 A. Yes, sir, because then you would have air going into
23 Southwest 2 area returning into the Southwest and the air
24 flow past Southwest 1 would be return air, and they could
25 have then either ventilated the Southwest 1 area or

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1 sealed it.

2 Q. And the -- okay. And you said that would have
3 solved the problem if there was a problem. What did you
4 mean by "if there was a problem"?

5 A. Well, as I read the Nova Scotia Coal Act
6 Regulations, it says that intake air shall not pass
7 abandoned areas, and Southwest 1 was an abandoned area.
8 Therefore, to comply with that Act, the air has to go the
9 other way if you're going to take intake air into
10 Southwest 2.

11 You had an alternative, of course, and that was to
12 stop Southwest 2. That would have been another
13 alternative but, of course, that was not a practical
14 alternative. The only practical alternative, in my
15 judgment, was the reversal of air as I just described.

16 Q. So that the conditions as existed would have been in
17 good practice except for the air reversing back through
18 the return air?

19 A. That's correct.

20 Q. Now your theory of the explosion, as I understand
21 it, involves the creation of a layer in the Southwest 2-1
22 Road being ignited from some source, and you've
23 identified -- and the ignition was from a slow moving
24 flame through the Southwest 2-1 Road?

25 A. That is my belief. That's the most likely origin of

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1 this explosion.

2 Q. And that in order for that explosion to propagate,
3 it needed to come and pressurize at some particular area;
4 to -- start to create pressures to lift the coal dust
5 into suspension?

6 A. Yes, sir.

7 Q. And I believe you identified three places where you
8 saw that there may be room to create pressures, the fans
9 at No. 2 Crosscut?

10 A. Yes, sir.

11 Q. The boom truck, the Stamler feeder and possibly
12 arches at the start of the Southwest 2-1 Road?

13 A. Yes, sir.

14 Q. Were areas where pressures could be created that
15 would raise the coal dust in suspension and cause an
16 explosion. I believe you indicated the most probable
17 place for that was the Stamler feeder. Now why is that?

18 A. That was basically because the Stamler feeder was
19 the beginning source of a major -- where we could get
20 coal dust into suspension.

21 Q. Okay.

22 A. And to have an explosion such as occurred, it was
23 essential that coal dust be raised into suspension and be
24 ignited. And it had to be a large quantity of coal dust.

25 Q. And the coal dust that you're talking about comes

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1 from where?

2 A. The coal dust would be the dust -- primarily the
3 coal dust associated with the loose coal that had been
4 mined and dropped into the Stamler. The Stamler is a
5 machine that breaks large lumps. So you have things on
6 it that generate and create dust. You have these rollers
7 that break the coal and feeds this coal and dust onto the
8 conveyor belt. That -- one of the major sources of dust
9 that we find in a mine is right around this -- these
10 feeder breakers. So that makes the -- as a very good
11 site to get dust into suspension. The wave hits a solid
12 -- basically, a -- you close off -- you're closing off
13 that area, the cross-sectional area of the B Road. And
14 so you have a place for this wave to hit and create the
15 turbulence that raises dust into suspension. That is not
16 an uncommon occurrence.

17 The second location is -- should it miss that, would
18 be causing the belt to -- moving the belt which -- and
19 causing -- if you throw the belt around, and we observed
20 the belt being thrown around, that would bring coal dust
21 into suspension.

22 Q. Now those sources of coal dust that you described,
23 are those sources that are normally treated with stone-
24 dusting?

25 A. Those sources -- we do not do anything about stone-

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1 dusting. No, sir. That's not part of a stone dusting
2 program.

3 Q. Now as I understood it the methane provided the heat
4 and that -- and it was the stone dust that was ignited
5 that caused the explosion, is that correct?

6 A. I'm sorry, I didn't follow that.

7 Q. The methane provided the heat and the stone dust
8 really provided the explosion?

9 A. The coal dust.

10 Q. Or the coal dust, I'm sorry. Yes. Is that -- am I
11 understanding that correctly?

12 A. That -- to me, the major thing. Typically, if coal
13 dust doesn't enter into an explosion, we -- (1) we don't
14 see the pressures that would generate it; and (2) the
15 length of flame seldom will exceed four times the length
16 of the original body. Now we know, therefore, all the
17 evidence is that coal dust was the primary fuel that led
18 to the pressures that in turn caused the destructive
19 forces that flowed throughout this mine.

20 Q. And that coal dust would have been ignited somewhere
21 around the Stamler feeder is --

22 A. That is my best guess.

23 Q. And the Stamler feeder was located where with
24 respect to the Southwest 2-B Road?

25 A. Stamler feeder was about, and this is -- oh, I have

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1 to check my maps, but about 40 or 60 feet -- well, I'd
2 say -- let's say within 100 feet of the No. 2 Crosscut.
3 It was closer than that, I believe.

4 Q. So close to the No. 2 Crosscut then?

5 A. Yes. It was just -- say within 100 feet of the No.
6 2 Crosscut. I believe it was 40 -- about 40, but --

7 Q. Okay. From that point on, what role did methane
8 play in the continuation of the explosion?

9 A. It's role was of minor consequence.

10 Q. Minor, in what sense?

11 A. It might have added slightly to the length of flame;
12 it didn't need to. I mean, what happened, you can do
13 without methane. The methane -- any involvement of any
14 methane, say methane coming out of Southwest 1, methane
15 in cavities, methane coming from Southwest 2-A Road, any
16 of that methane might cause an extension of flame. Don't
17 ask me how much extension of flame. It actually might
18 have caused a quenching of flame because you have too --
19 an excessive fuel concentration, and you now have a fuel-
20 rich mixture with insufficient oxygen to support
21 combustion. We don't know these things.

22 So for all practical purposes, I'd say forget the
23 influence of methane once you got that coal dust in the
24 Southwest 2-B Road going.

25 Q. And I believe in your direct examination you

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1 described the influence of the Southwest 1 District as a
2 "drop in the bucket" in terms of its addition to the
3 explosion?

4 A. That's correct. What we could anticipate is that
5 flame would enter from the Southwest, would go up into
6 Southwest 1. That we do know. We will find evidence of
7 that, that we see flame will enter into those places
8 where there had been methane. We do not find flame in
9 places where there had not been methane -- when we're
10 looking at blind ends such as Southwest 1 would be.

11 Q. Now with respect to the Southwest 1 area, assuming -
12 - in terms of the explosion that you described, and the
13 potential addition of methane from that area mixed in
14 with the explosion, would it have made any difference at
15 the point when Southwest 1 would become involved, whether
16 that section was on return air or intake air?

17 A. No.

18 Q. And why is that?

19 A. Well, you're dealing -- an explosion such as this,
20 we may be looking at pressures that could approx -- could
21 reach, we don't know how much the pressures were, but the
22 pressures we -- that you could get with a coal dust
23 explosion such as this might reach as high as a 140
24 pounds per square inch.

25 Now the ventilating pressure, we don't talk in terms

MR. MITCHELL, EXAM. BY MR. WILSON

1 of pounds per square inch, we talk in terms of inches
2 water gauge. And an inch water gauge, and I'm not going
3 to -- I know these things by heart, but I'm not going to
4 tell you by heart. Let's see. Inch water gauge is --
5 you would multiply pounds per square inch by 27.7.
6 27.68. So when we're dealing here -- and the best -- the
7 most water pressure we would have had in this section is
8 about a quarter of an inch water gauge, if I recall my
9 ventilation studies. So you're not even -- they're miles
10 apart and so it's of no consequence. There's not enough
11 energy in the ventilation. It's minuscule compared to
12 the energy in the explosion.

13 Q. So how would the explosion bring the methane from
14 Southwest 1 into it, regardless of whether it was an
15 intake or the return air?

16 A. Well, what might happen, and this is postulating,
17 the forces of the explosion coming out of Southwest 2,
18 they will go into the Southwest and some of those forces
19 will go up towards Southwest 1. Now when they go into
20 Southwest 1, they're going to push gases out of Southwest
21 1 and those gases are going to go into the Southwest C --
22 B Road. And one would have to look at -- compare the
23 flaming in Southwest B Road with those -- the flaming in
24 Southwest C-1 Road to see if it added up to a hill of
25 beans, and I have a suspicion it wouldn't.

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1 Q. So it doesn't matter what side of the air flow
2 you're on, you're still going to get it involved?

3 A. That's right. Once you have an explosion, it stops
4 the air. It's like a gorilla; it goes where it wants to
5 go.

6 Q. This would be --

7 COMMISSIONER Is this a good place to break --

8 MR. WILSON Yes.

9 COMMISSIONER -- Mr. Wilson? We'll recess for 15
10 minutes.

11 INQUIRY RECESSED (TIME: 11:00 a.m.)

12 INQUIRY RESUMED (TIME: 11:18 a.m.)

13 COMMISSIONER Now, Mr. Wilson?

14 MR. WILSON Before we move on, Mr. Mitchell, there is
15 one early question on Southwest 1. Had explosion-proof
16 stoppings been built in the portals of the Southwest 1
17 entry, and that would inbye the 3 Crosscut, would that
18 have affected or prevented the explosion from occurring
19 as you have judged it to be?

20 A. No. No, the sole purpose of an explosion-proof seal
21 or bulkhead, at least as we understand it in the States,
22 is -- its purpose is intended to keep an explosion on one
23 side from entering into the other. So what you would
24 have done is, as I said, we don't know about the
25 difference in burning in this B Road, Southwest B Road,

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1 but again the involvement -- the coal dust is such a
2 powerful force that all of that methane is not of too
3 much consequence. It might have lengthened the flame
4 somewhat. Don't asked me how much; don't ask anybody how
5 much. It might have increased the pressures somewhat,
6 what, 5, 10 psi? But when you're already talking about
7 the types of pressures we can believe we saw here, 5 and
8 10 psi are nothing.

9 Q. And I believe, in addition to that, your evidence of
10 how you envisage the explosion developing, you didn't see
11 much flame coming out of the Southwest district?

12 A. No. No, the evidence was that we had very little
13 flame. We had quite a bit of heat, but we know there was
14 no important flame that went inbye No. 10 Crosscut, and
15 that's based, as I said, on those remnants of the rock
16 dust bags that we found above the arches there. And
17 there is no evidence of important heat outbye the No. 5
18 Crosscut in the mains. There's coke but no important
19 heat.

20 Q. Let's turn to stone dusting and you discussed the
21 value of the stone dusting plan in your earlier evidence,
22 and I want to get some clarification on that. When you
23 talked about the stone dusting plan, you described this
24 plan as specifying frequency of sampling and location of
25 samples. And that that was being requested of Westray

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1 management, a plan showing location of stone dust
2 sampling and the frequency of the sampling. Is that a
3 type of plan that you were talking about when you were
4 talking about the need for a stone dusting plan?

5 A. Yes, that was the type of plan that the Department
6 of Labour was asking for. I would add one more thing to
7 that requirement, to that plan, not a requirement. There
8 was no requirement for that plan. I would add how and
9 where the samples would be analyzed.

10 Q. Okay. Were you able to determine -- is that the
11 type of -- is that required by legislation?

12 A. Not in my opinion, from what I've read in the
13 legislation, no.

14 Q. Is that required in jurisdictions that you are
15 familiar with, the filing of a plan of that type?

16 A. Not in the United States, not in Australia, not in
17 Alberta, not in British Columbia, among other places.

18 Q. What do they do in the United States with respect to
19 stone dust sampling?

20 A. Well, if an inspector really believes that the rock
21 dusting is inadequate and he does not get the mine
22 operator's attention by issuing an order about rock
23 dusting, he will call his district and they will send out
24 a rock dusting team that will go through the mine and
25 they will take rock dust samples about every 100 feet.

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1 And on the basis of that -- what they find from that
2 sampling program, they will come up with whatever they're
3 going to come up with which could be issuance of an
4 immanent danger order, or it could be a series of
5 violations of what we call 75.400 of the Code of Federal
6 Regulations, Part 30. It depends on how severe or they
7 may find that the rock dusting is fine. Typically when
8 we go to that extent where we send in a team, we're
9 fairly certain that the rock dusting is substandard.

10 Q. What do you up to that point in time before you send
11 in a team to do the --

12 A. We'll issue an order and say rock dust this area and
13 give a period of time in which it's to be done.

14 Q. I see. And was an order issued with respect to the
15 Westray Mine situation that you're aware of?

16 A. Yes, there was. I believe -- maybe I'm wrong, but I
17 -- didn't Mr. White issue an order on the 29th of April
18 when he was there?

19 Q. Well, I think the record will show Mr. McLean, I
20 believe, issued the 29th order.

21 A. Oh, okay. I'm sorry, I forgot about that.

22 Q. Prior to the team coming in and doing a dust sample
23 of the mine when it's suspected that there is not enough
24 stone dust present, what happens with the mine operation?

25 A. Nothing. But the turnaround is generally within 24

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1 hours.

2 Q. How long does it take to conduct a mine test, a mine
3 dust sampling test?

4 A. Well, it depends on the size of the mine. I've just
5 been involved peripherally with one and MSHA was in there
6 for about five days, four to five days. And there were
7 six or seven inspectors.

8 Q. Okay. Now there is also -- when we're talking --
9 and you talked about this as a stone dusting plan, what
10 about a plan for applying stone dust or the frequency of
11 actual dusting, is it your experience that mines have
12 those types of plans?

13 A. No. No, that's something that is required of the
14 section foremen. I'm not quite sure what you call them
15 here in Nova Scotia. I know in Australia we call them
16 deputies. We call them section foremen. And that's the
17 man responsible for that section, that area, the people
18 working in that area. And it is -- our mine examiners,
19 fire boss's pre-shift examination, that man will report,
20 lady, will report areas that they consider deficient in
21 rock dusting, and then the section foreman when he comes
22 on will have that area rock dusted if he's a good section
23 foreman. Of course, this is what the inspector will look
24 for, that the examiners' book indicate areas deficient in
25 rock dusting for that day that he's coming to the mine,

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1 and then examine those areas to see if the rock dusting
2 has been done. And if it has not been done to his
3 satisfaction, he will issue what we call a 104-D order
4 which says rock dust this area; stop all work until it's
5 done. But this is based on the fire boss, the shift
6 foreman, pre-shift examination indicating an area
7 deficient that has not been treated by the time the
8 inspector gets there.

9 Now your other thing is the section foreman during
10 the conduct of the shift, the regulations require rock
11 dusting to within 40 feet of the active face, so it's the
12 -- since the faces are constantly active and moving,
13 except longwalls, of course, and shortwalls; these don't
14 apply, that's interesting. You know, we have these
15 longwalls and shortwalls which we've got some walls now
16 1500 feet long and we don't rock dust. But that's
17 neither here nor there. But you don't rock dust within
18 40 feet of the face. And it's his job to keep it up.

19 Q. Now is -- do you normally see somewhere within the
20 company a plan that sets out the frequency and the method
21 of stone dusting?

22 A. No, the regulation requires it because the section
23 foreman, should he not comply with this, he might be
24 decertified by the state in which the mine is located.
25 Our section foreman are certified by the State. And,

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1 typically, failure to maintain rock dusting is a basis
2 for decertification which means the guy loses his job as
3 a section foreman.

4 Q. Now in your report, your September 12th, 1992
5 letter, you mention that the Department and Westray
6 officials discuss rock dusting at least 15 times. Now
7 when you make that comment, were you talking about the
8 rock-dusting plan that you described or rock dusting
9 generally?

10 A. Mainly, the great number of those were relative to a
11 plan. I would say maybe there were a few that dealt with
12 inadequate rock dust, but I believe the great majority
13 were specific to, hey guys, let's come up with a plan for
14 sampling this dust so we can determine the adequacy of
15 the incombustible.

16 Q. What did the records indicate to you with respect to
17 stone dusting or do you recall?

18 A. At the very beginning I remember reading in the
19 inspection reports they got stone dust down into the
20 mine, and they were stone dusting around certain areas,
21 and then at the beginning I would say the stone dusting
22 was not too great, according to the inspector's reports
23 when they were still in the rock tunnel. And later on I
24 remember saying -- reading things like "rock dusting
25 good." Things like that. So it went back and forth.

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1 There were periods that it was good and periods where
2 they were saying let's come up with a plan. I would have
3 to go back to the original records to be certain, but the
4 great bulk of it was, say, hey, come on, let's get a plan
5 up for this mine.

6 Q. Now with respect to inspection reports, I take it
7 you've had experience with reading inspection reports for
8 mines or --

9 A. Yes, sir.

10 Q. Is the subject of the adequacy of stone dusting in
11 an inspection report common, uncommon? Is it something
12 that's mentioned seldom, often? What -- can you say
13 anything about that?

14 A. Well, you quoted my report, '92 report, saying it
15 was brought up 15 times, at least 15 times, that I
16 observed it. And that would be about, let's say a year,
17 that's at least a year, maybe more. Actually, that goes
18 a little more than a year. I would say it was a common
19 thread of almost -- of the great majority of the
20 inspection reports among -- that was one of the things
21 the inspectors were noting and showing that this was
22 something that the inspectors were concerned with, in
23 addition to things such as roof control, water, and
24 methane.

25 Q. What about inspection reports, generally? Do you

MR. MITCHELL, EXAM. BY MR. WILSON

1 generally -- in other situations, in other mines, do you
2 generally see comments in inspection reports about rock
3 dusting, stone dusting?

4 A. In the States you will find, I would say, I doubt if
5 there's ever an inspection report that doesn't say we
6 need more rock dusting.

7 Q. And why is that?

8 A. Well, typically what you have, particularly on your
9 shuttle car roadways and belt entries, they're extremely
10 difficult to maintain your rock dust in belt entries and
11 on shuttle car roadways. And so the typical inspector
12 will always walk the belt and, of course, when he goes in
13 the section, he will be travelling on the shuttle car
14 roadways and these, invariably, in a matter of a few
15 hours after a shift starts or after rock dust, in a few
16 hours they need to be re-rock dusted, in people's
17 opinion.

18 Q. So it's a frequent topic of conversation between
19 inspectors and mine owners, I take it?

20 A. Oh, yes. This is a common thing, let's get more
21 rock dust in here.

22 Q. Now when you were looking at the records with
23 respect to this mine and the stone dusting that was being
24 mentioned, did that indicate to you that there was no
25 stone dusting in the mine?

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1 A. No. No, I believe I said just a short while ago I
2 remember reading comments like, "stone dusting good,"
3 things like that. So where the inspector travelled, at
4 least on those trips, to make a remark like that, he must
5 have been pleasantly -- he must have found it nice.

6 Q. Now does stone dusting have any effect on a methane
7 fire?

8 A. No. Methane is -- stone dust has no efficacy
9 against a methane flame.

10 Q. From what you have determined, from your reading of
11 the records, the lack of a stone dusting sample plan
12 which, I take it, is what you're really referring to when
13 you talk about a stone dusting plan, is that correct --

14 A. That's correct.

15 Q. -- leave this mine in imminent danger at any time
16 that you're aware of?

17 A. No.

18 Q. And why do you say that?

19 A. The normal incombustible in the dust, in the absence
20 of stone dusting, was in excess of 50 percent. I hate to
21 say it; all the stone dust in the world would not have
22 prevented this explosion from propagating as it did.

23 Q. And why is that?

24 A. Because we had all of that coal dust on the belts.
25 There is no protection in any mine for the coal dust that

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1 we have on belts and in mine cars and raised off of a
2 shuttle car except by means of very major barriers, rock
3 dust barriers. And the only barriers that I'm aware of
4 that are applicable to belt entries is the barriers used
5 in Poland.

6 People have a -- the sole intent of rock dust --
7 rock dust does not stop an explosion. We define the
8 concept, for example, of 65 percent incombustible as
9 being the amount of rock dust that will stop a flame
10 within 650 feet of its point of origin. Now 650 feet
11 from the point of origin here would have put it well past
12 the Stamler, and by that time we would have raised coal
13 dust into suspension, and rock dusting would have had no
14 effect. Then when you deal with float dust, you can have
15 rock dust up to your knees -- I've had rock dust -- we
16 ran tests with 95 percent incombustible, and we had
17 horrific explosions when the float dust -- a thin layer
18 of float dust overlaid the rock dust and the igniting
19 source was weak. Now when you have a strong igniting
20 source, then that gets the rock dust into suspension and
21 will combat the float dust. But the weak source, the
22 flame will just keep going until it becomes so powerful
23 that 95 percent incombustible will not stop the
24 explosion.

25 Q. What's "float dust?"

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1 A. "Float dust" we define as coal dust, 100 percent
2 finer than 74 microns.

3 Q. And you discussed earlier that you don't rock dust
4 feeder breakers or shuttle cars or the conveyor belts?

5 A. That's correct.

6 Q. I believe you mentioned in your report letter that
7 you had some rock dust or stone -- dust sampling done. I
8 think that was your September the 12th letter in Exhibit
9 48?

10 A. Yes, sir.

11 Q. Who did those samples?

12 A. We had a team brought in from Devco, the same team
13 that does the rock dust sampling at Devco Mines. We
14 brought them down and had them conduct sample -- make
15 samples on, I believe, 150-foot spacings in the North
16 Mains between the No. 5 and 10 Crosscut on the intake
17 road, not the belt road.

18 Q. Okay. And Exhibit number 122 at tab 7 --

19 A. Yes, sir?

20 Q. -- does that show the results of those tests?

21 A. Yes. We took those samples and we had the samples
22 brought to TUNS in Halifax. And I had asked the people
23 at TUNS to analyze these by both the technique we use in
24 the United States and by the technique used in Nova
25 Scotia.

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1 Q. And you summarized those results in your September
2 12th report?

3 A. Yes, sir.

4 Q. And that appears on page 2 in the second paragraph?

5 A. Yes, sir.

6 Q. And what did you conclude from that?

7 A. I concluded that this indeed was a mine in which the
8 incombustible content of the coal and the material being
9 mined was awfully high. We found the incombustibles in
10 the floor dust ranging from 55 to 92 percent and
11 averaging 74 percent, and yet we found very little
12 evidence of carbonate in that dust. And the absence of
13 carbonate would indicate that this is the nat -- the dust
14 natural to the mine rather than resulting from rock
15 dusting.

16 Q. Did that have any value in your thinking in terms of
17 how much stone dusting was in the mine?

18 A. Actually no, because this is the same area that was
19 the main transport route for people and equipment through
20 the mine and also, this is an area that would have been
21 affected by dust brought out of the Southwest into that
22 area, so I found that these readings, being as high as
23 they were, I found that rather remarkable. I would not
24 have anticipated it. They are much higher than what
25 others found in the belt entry. But, as I said, I

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1 wouldn't have wasted time sampling in the belt entry.
2 There was just too much coal, definitely, from the belt,
3 so -- on the roof, the ribs, and the floor so that
4 anything you get would be of no impor -- have no meaning.

5 Q. Okay. You were referred to the Kilborn study and
6 asked some questions on the Kilborn study, and I think
7 you referred to the Kilborn study as a "wish list"?

8 A. Yes.

9 Q. What did you mean by that?

10 A. Well, actually that's -- it's not derogatory.

11 Q. I see.

12 A. I hope I explained that at the time. It was not
13 derogatory. The people looked at the things they knew
14 about this coal deposit and the boundaries of its lease,
15 and they said well, if things are good -- they don't say
16 that, but this is -- this Kilborn plan is saying if
17 everything is good, we should be able to mine these
18 areas. And from that they can come up with a possible --
19 how many tonnes of coal could possibly be mined. They
20 can also lay out, and I believe from this they were able
21 to lay out well, gee, if everything goes right we might
22 be able to have four, maybe as many as five, active
23 sections. But this is -- this is why I'm saying it's a
24 wish list. If, if, if. And if all "ifs" and "buts" were
25 horses and carriages -- anyhow.

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1 And my major criticism of it was that they went
2 ahead and built a preparation plant without knowing the
3 quality of coal that was being -- going to come to that
4 plant. That is the only thing wrong with the Kilborn
5 plan that I found.

6 Q. So they might have been building a facility that
7 wouldn't be used, if their assumptions in mining had not
8 been correct?

9 A. That is correct.

10 Q. And I believe you -- in answer to a question, you
11 made the comment "it's still the basis for beginning a
12 mine." And what do you mean by that?

13 A. Well, it was the basis -- the Kilborn plan was the
14 basis for the purchase of the main fan. In other words,
15 from the Kilborn plan, and I checked that, and the
16 numbers are more than satisfactory. It says we can put
17 this fan in with this size motor, and this will provide
18 enough air for us to operate for perhaps these many years
19 with two to three -- in the development of this mine.
20 And subsequently we'll put a bigger motor on that same
21 fan, and we'll be able to operate more sections. That's
22 all it's saying. So you get a capital cost.

23 Then it gives you -- well, to do this, we need to
24 buy this kind of equipment. That's what the Kilborn is
25 doing; it enables you to come up with "I need X number of

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1 dollars to start this operation." That's all it does.

2 Q. And as -- in order -- do you need anything more to -
3 - before you start mining?

4 A. No, you need money and you need to know what you're
5 going to spend your money on. Am I going to buy
6 Volkswagens or Rolls Royces?

7 Q. Now as a regulator was there anything more needed
8 before one would be allowed to mine in that area?

9 A. No, it is -- the plan is saying if everything goes
10 right, these are the areas within this coal lease that I
11 am going to be able to mine. And the regulator, like the
12 Department of Natural Resources, I assume, their concern
13 is will I get maximum recovery of this reserve? And this
14 says yes, if everything goes right, this is what we can
15 recover, and they show it covering up almost all the
16 coal.

17 Q. What about -- you picked out Natural Resources.
18 What about the Department of Labour; what would they need
19 to know?

20 A. I'm sorry, I didn't --

21 Q. What about the Department of Labour, the safety
22 inspectors, what would they need to know?

23 A. I don't know what it has to do with the Department
24 of Labour. The -- it doesn't lay out a ventilation -- it
25 doesn't say I shall put X number of cubic feet of air per

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1 minute at X -- this point, that point, the other point,
2 which are the basis for the Department's evaluation of
3 the adequacy of ventilation.

4 It doesn't say I shall support the roof this way and
5 that way. In fact, we know if anybody ever said that
6 based on the Kilborn plan, they would have been rudely
7 surprised. There's nothing in the Kilborn plan relative
8 to the health and safety of miners which is the duty of
9 the Department of Labour.

10 Q. Now one thing that -- one opinion letter that we
11 didn't get to is your letter relating to diesel
12 equipment, and that's in Exhibit 122, tab -- I believe
13 it's tab 1, page 3. Are you familiar with the use of
14 diesel equipment in mines?

15 A. Yes, sir.

16 Q. And how did you gain that familiarity?

17 A. Well, as I said a number of times, at one time I was
18 Chief of Approval and Certification, and as Chief of
19 Approval and Certification I was responsible for
20 approving any and all diesels that went into coal mines
21 under our Schedule 31 and I believe 32. I was also
22 instructed, at that time, in 1976, to initiate the draft
23 of regulations that would impact the use of diesels in
24 underground coal mines. I understand that those
25 regulations might be promulgated in the near future; but

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1 with the present Congress, I doubt it.

2 So let's see -- we're talking about 20 years ago we
3 started drafting regulations for the use of diesels in
4 mines and they're still not implemented. I'm more than
5 familiar with diesels in underground coal mines in the
6 United States, sir.

7 Q. And what are the restrictions of diesels in
8 underground coal mines in the United States?

9 A. The only re -- there are two key restrictions. The
10 first restriction deals with the quality of the air. And
11 that is if you take a diesel-powered vehicle into a mine,
12 that the air flow coming from that diesel, downstream
13 from that diesel, shall contain at least 19 1/2 per cent
14 oxygen, less than 500th of a per cent carbon dioxide, and
15 less than quarter per cent methane. And it shall not
16 contain -- and then the Regulations detail the other
17 gases and fumes that -- but they're -- like nitrous oxide
18 and that type. So as long as a diesel does not
19 contaminate the air, you can take -- you can go to the
20 nearest car dealer and buy a diesel-powered vehicle,
21 pick-up truck or Kabota tractor, or whatever. I went
22 down into a mine in a Volkswagen Rabbit. And as long as
23 you don't take that inbye the last open crosscut, there
24 is no law presently that prohibits its use.

25 Interestingly, we have had only one fire, and that

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1 was of minor consequence, involving such a vehicle in the
2 mine since 1976.

3 Q. So --

4 A. Then -- if you take it inbye the last open crosscut,
5 then it must meet the requirements in Part -- in Schedule
6 31 and I think 32 and 36. I'm not sure of those numbers;
7 it's a long time since I had to enforce that.

8 Q. So you've been in mines, you say, in a diesel Rabbit
9 and you've gone down as far as the last open crosscut?

10 A. Yes, sir.

11 Q. What other kinds of diesel vehicles have you seen in
12 a mine?

13 A. Well, we have a lot of pick-up trucks. The same
14 type you see out on the street, except diesel-powered.
15 And, of course, these are wonderful units to bring
16 supplies into the mine, to bring people into the mine.
17 Bluntly, I was shocked when I first got -- saw that
18 diesel -- when I went -- my first trip in with a vehicle
19 like that was that Volkswagen Rabbit. I'll never forget
20 it, and I was shocked because it was against everything I
21 ever believed. But, basically, we are convinced that
22 these are a lot safer than trolley wires. We have
23 frequent fires in our transportation roads as a result of
24 trolley wire haulage, and we don't have that problem with
25 diesels. And so we are convinced in the States that

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1 diesels are a far safer means for transport in mines than
2 any other piece of equipment.

3 Q. When was the first time that -- you said you were
4 shocked the first time, when was that? The first time
5 you were in the mine.

6 A. I hope I don't make a short -- long story too shor -
7 - long. It was right -- soon after I retired from MSHA,
8 and I was on a consulting job in Colorado, and I go down
9 in the mine in this Volkswagen Rabbit and I'm shocked.
10 And I see these Isuzus roaming all over. And it's a
11 longwall operation, and they take an Isuzu with chocks to
12 build cribs up the tailgate, but at least the tailgate is
13 on intake air too.

14 And as soon as I got out of the mine, I went to
15 Denver to my buddy, John Barton, who was district
16 manager, and I raised the devil with him, how is he
17 permitting this. And that's when I learned that when he
18 first came to the district, he closed a mine because of
19 the diesels, and he wasn't back in his office for two
20 hours when he got a call from Jim Westfield, who at that
21 time was head of Health and Safety, saying what's your
22 basis for closing that mine. And Jim said they weren't
23 breaking any law. What law are they breaking? And John
24 had to lift the withdrawal order.

25 And they've been running around the mines ever

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1 since. And they -- going from the west, they're in every
2 State in the Union now where we mine coal, with the
3 exception of West Virginia. We now have a few in
4 Pennsylvania.

5 Q. What year was that? You say it was when you quit --

6 A. '78. That was August of '78 that -- my experience.

7 Q. You're -- are you familiar with the conditions that
8 were attached to the use of diesel -- non-flameproof
9 diesel equipment in the Westray Mine?

10 A. Yes, sir.

11 Q. And how did they compare to the conditions that you
12 describe applicable in the mines that you're familiar
13 with?

14 A. Oh my gosh, they're far more rigorous. We -- in the
15 States we don't have any other than if we find a diesel-
16 powered vehicle inbye the last open crosscut, then we'll
17 issue a withdrawal order on the mine and this becomes a
18 very serious -- I mean, there is a \$100,000 fine without
19 even blinking an eyelash. We have no other written
20 regulations other than the quality of air that apply. So
21 as long as you maintain that and keep it out by the last
22 open cross-cut, fine.

23 But here, you require -- well, first of all you say
24 no closer than 300 feet to the face, and there will be
25 times that -- now at the time of the incident, the face

MR. MITCHELL, EXAM. BY MR. WILSON

1 was more than 300 feet inbye where the boom truck was
2 parked in the intersection there. So we won't talk about
3 down in the North Mains. But there, at least where the
4 ignition started, the boom truck was in accordance with
5 your requirements. You do have a requirement for 85 per
6 cent incombustible in the roadway and all the other
7 things. Your -- you've got rig -- very rigorous
8 regulations, or rules pertaining to the use of diesels
9 compared to any other country where they use -- like we
10 use them in the States.

11 Q. Now you mention the incombustible in the roadway --
12 and I neglected to ask you when we're talking about rock
13 dusting, the way that one determines the incombustible,
14 is it -- how difficult a matter is it to visually
15 determine the extent of stone dusting in a mine?

16 A. In our opinion, based on very major studies, and
17 these were intensive studies because it was the
18 impression -- we all believed that if we could get a
19 means for visual evaluation of the adequacy of stone
20 dusting that this would make our inspectors jobs a lot
21 easier; it's no longer a judgment call. Or it would be
22 less a judgment call. So we instituted a major program,
23 and the end result was that there was no way that you
24 could evaluate the adequacy of rock dusting by visual
25 examination. It was a function of just too many things.

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1 How moist the dust was. How wet the dust was. What the
2 source of the dust was, whether it was from the coal seam
3 being mined or whether it was material coming from the
4 roof or from rider seams. And -- but the worst things
5 was in one mine that we went to, we found that the -- if
6 we took a sample that we mixed ourselves, where we took
7 the dust from that section and mixed it with various
8 concentrations of stone dust, we found -- and there were
9 10 different working places in that mine, and when we
10 mixed it up and showed it to people, no one could make a
11 judgment of adequacy or inadequacy. It was impossible
12 within a given mine because there were so many variations
13 within that mine. So we threw up our hands.

14 And then they started to try to come up with
15 instruments for a mine inspector. They've come up with
16 radioactive-type instruments and other types of
17 instruments where he could try that, and they haven't
18 worked. There have been several -- many millions of
19 dollars spent in this area that have come to naught.

20 Q. Are you familiar with the shift that mines operate?
21 Whether it be an eight-hour shift, a 12-hour shift, or
22 whatever. What's the situation with respect to shift
23 work in the mines that you're familiar with in the
24 States?

25 A. Well, in the States we're going -- the tendency,

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1 particularly in longwall mines, the tendency is towards a
2 10-hour shift. And in mines where we operate
3 supersections, if you recall I defined a "supersection"
4 as having two separate splits of air. We have one belt,
5 two separate splits of air so we can put two mining
6 machines in that place. And in there we have typically,
7 what we call, "hot seat changes" where the crew stays on,
8 keeps working until the next crew comes on. And this can
9 range anywhere from eight to 12 hours depending on where
10 in the mine and on how quickly the next shift comes on
11 and that type of thing.

12 One correction or addition. Gen -- we're talking
13 about face workers; general labourers typically have an
14 eight-hour portal-to-portal shift. That's your general
15 labourers, people working on track, people doing clean-
16 up, people doing general contracting, levelling roads,
17 that type of thing. That's an eight-hour portal-to-
18 portal.

19 Q. Now from your review of the records that you've seen
20 prior to the explosion, was there anything in that that
21 indicated that the inspectors neglected or sacrificed
22 safety issues in favour of coming to terms with the roof
23 control?

24 A. No, nothing in those records; the opposite is what
25 you observe reading the records. There was great

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1 attention paid to that, among other safety factors.

2 Q. Like what? What have you noticed from that review?

3 A. Well, in almost every inspection report, you will
4 read about the types of bolts being used, particularly
5 with the changes in type of roof support being used. And
6 you will read comments regarding what they're being told
7 about the efforts to improve roof control. But this is
8 just one of the things given in the reports. It is not
9 undue attention. I would not give it -- characterize
10 that as undue attention to one facet of safety at the
11 expense of others.

12 Q. You were mentioning and you were directed and asked
13 for comments relating to the Department getting "snowed."
14 And in response to that you talk about the rock dusting
15 plan. And by getting "snowed," I take it you mean being
16 promised something would be done that wasn't done and
17 carried on over a period of time?

18 A. Yes, and always with the good excuse that would tend
19 to say gee, the next time I'll do it.

20 Q. Now with respect -- other than with respect to the
21 rock dusting plan issue, was there anything else that --
22 and by that, I mean the rock dusting sampling plan, was
23 there anything else that you noticed where the Department
24 was being continually promised something that didn't come
25 about or that the Department was being snowed?

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1 A. No. No, I'd say not -- no. Ex -- no. That's not
2 a --

3 Q. Now you were asked about the climate that existed at
4 the Westray Mine. First of all, had you ever been to the
5 Westray Mine prior to the explosion? I believe you said
6 you hadn't, but you'd never been there prior to --

7 A. No, I'd never been to Westray until after we've had
8 the explosion.

9 Q. And I take it when you were here that -- I guess
10 it's fair to say that things were rather stressful?

11 A. To say the least.

12 Q. And when you talked about this climate, you said
13 that "it was a situation where the inspectors appeared to
14 want to do their best to keep these men employed and keep
15 the mine going in a positive direction. They figured..."
16 and I believe from your quotes that "They figured they
17 would achieve this goal with a little patience, a little
18 perseverance, a lot of perseverance, and a little bit of
19 positive..." "...patience. They were dealing with people
20 that they were trusting," and you went on. That climate
21 of wanting to keep the mine going and wanting to keep it
22 open, is that a problem common to inspectors of mines?

23 A. That's something every inspector I know is faced
24 with and they try their darndest to keep that mine going
25 if they can.

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1 Q. Is there a balance in there?

2 A. When the number of violations becomes so great or
3 the extent of the violation becomes so severe, then you
4 start seeing them giving up. But I wouldn't say "giving
5 up," then you start seeing them bringing people in, other
6 inspectors in to try to -- Like the rock dusting sampling
7 program, we can't get this guy to rock dust, in our
8 belief, adequately. What do I do? I have no
9 alternative. I bring in a team of people, specialists to
10 rock dust.

11 If I have questions about the quality of the
12 electrical system, I will bring in a team of electrical
13 inspectors and electrical engineers who will do a
14 complete evaluation of the entire mine. When you start
15 doing this type of thing, this creates -- not only are
16 you achieving safety because now you're defining the
17 deficiencies, but, more importantly, you've so disrupted
18 the operation of the mine for the four-to-five or six
19 days that this type of inspection takes place that the
20 mine operator is now suffering economically just from the
21 fact that you're bringing in these huge number of people
22 who are stopping -- because when you're -- if I'm doing
23 an electrical inspection, you can't operate any
24 electrical equipment. And if you can't operate
25 electrical equipment, you can't mine coal. If you can't

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1 mine coal, you're losing money. So you get -- they get
2 their attention even if after you're finished they find
3 nothing seriously wrong, the next time the inspector
4 says, gee, I think you need more rock dusting, you will
5 be surprised how rapidly most operators will get rock
6 dust down even if they find they don't need it.

7 Q. But I take it from that, the more close to an
8 imminent danger you see a situation, the more action you
9 would expect from the inspector?

10 A. That's correct.

11 Q. And is it fair to say up until that point you see
12 the -- you would be working with management in order to
13 attempt to alleviate problems that may occur in a mine?

14 A. That is correct.

15 Q. Now Mr. Merrick suggested in his questionings, I
16 believe, that there may have been some sort of a
17 political atmosphere that impacted upon the inspectors.
18 And I believe your response was that you wouldn't
19 disagree with this. And the question is in your
20 discussions with the inspectors, Mr. White or Mr. McLean,
21 who I believe are most directly involved in this, was
22 there ever an indication that they were influenced by
23 politicians or anyone else in the way that they carried
24 out their duties with respect to the Westray Mine?

25 A. Mr. White and Mr. McLean, no. In fact, I would say

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1 the opposite. Definitely with Mr. White.

2 Q. Why do you say that?

3 A. Excuse the expression, he was one of these "damn the
4 torpedoes, full speed ahead" type people. He would -- he
5 was trying to get these things corrected, and he didn't
6 really -- I got in trouble politically when I first came
7 here, and, actually, had it not been for Mr. White, I
8 would have left the area.

9 Q. How did you get in trouble politically? What are
10 you referring to?

11 A. Well, I've used that -- when I first came here a
12 couple of members of Parliament were castigating me in
13 Parliament and newspapers and they were -- even had a
14 cartoon of me in the paper being a -- they had a --
15 showing the Prime Minister, I think it was the Prime
16 Minister. They showed his tie and on it he was operating
17 a puppet or marionette, I don't know which one, who was
18 the Minister of Labour and in his hand was this character
19 Mitchell. It says ask -- something, "ask me whatever you
20 want" or something. "I'll tell you whatever you want,"
21 something like that. It was very embarrassing to me, and
22 it was making my work with the Westray people quite
23 difficult. I was not able to -- I was having trouble
24 forcing my way on what they wanted to do.

25 And I spoke to a number of people in the Department,

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1 and I got the idea that, well, coal is politics in Nova
2 Scotia. I did not get that from Mr. White though. And
3 had it not been for his perseverance, let's keep going on
4 this, Mitchell, let's keep going in this direction, I
5 would have caught the next plane out.

6 Q. Now you were asked by Mr. Merrick and perhaps I will
7 like to get that -- about the level of confidence
8 provided to the Westray Mine, I think, where the
9 proposition was put to you, "We as a Province were not
10 providing a level of confidence in our inspection of the
11 coal mine, the Westray Coal Mine..." and this is the
12 questions with Mr. Merrick, "...that we should have
13 been." And your answer was, "If you will restate that
14 without the 'should have been' because, you know, life is
15 full of should have beens." Why did you want that
16 modified with the deletion of "should have been?"

17 A. Well, if you remove the phrase "should have been"
18 from that sentence, I could go along with it. With the
19 "should have been," I couldn't because, in my judgment,
20 at that time when I spoke here the other day, in my
21 belief the Province were not provided the backstopping
22 that would be needed to operate -- to inspect mines such
23 as Westray.

24 Q. And I think you provided a list. And perhaps you
25 could just address that again. What types of things

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1 should have been provided that were not provided?

2 A. Well, see, there again that "should have been." I
3 don't believe we could -- that there is a cost benefit to
4 justify this type of expense for the Province. You don't
5 have enough mines that you could fruitfully benefit from
6 having these people on board, ventilation engineers who
7 would examine plans, roof control, strata control people
8 of the calibre, for example, of Dr. Salamon. We have
9 them in MSHA. But you're also talking about an
10 organization with a budget exceeding \$200-million a year
11 and a capital base exceeding several billion. You -- I
12 can't visualize this type of organization -- justify this
13 type of organization in the Province of Nova Scotia with
14 the few coal mines you have. Therefore, if I were a Nova
15 Scotian, I would say, mine operator, this is your job and
16 all I'm going to do is make sure you do your job.

17 Q. So in terms of who should have provided that
18 experience or expertise, what is your view in terms of
19 the Nova Scotia situation?

20 A. It's the mine operator. He should have the roof
21 control specialists, the ventilation specialists, who
22 come up with meaningful plans that they are willing to
23 stand by.

24 Q. In terms of the competence provided by the Province,
25 with respect to what was provided, did you consider what

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1 was provided to have been provided at a competent level?

2 A. I believe I said last week that I found people like
3 Mr. White, Mr. McLean and John Smith, because those were
4 the three men I worked with most closely, I found them
5 the equal of anybody in comparable jobs that I've ever
6 known, and I would call that competent.

7 Q. One moment, Mr. Commissioner.

8 COMMISSIONER One more question.

9 MR. WILSON Pardon me? I just want a quick run-
10 through here. Some of these -- Thank you, Mr. Mitchell.

11 COMMISSIONER Mr. Merrick?

12 MR. MERRICK Thank you, Mr. Commissioner.

13 EXAMINATION BY MR. MERRICK

14 Q. Mr. Mitchell, you were being asked about the
15 Southwest 1 district earlier this morning and your view
16 of the seriousness of the condition that that was left
17 in. And you said something and I just wanted to clarify
18 your answer, that at that time you hadn't learned
19 anything that would have moderated or changed your
20 opinion as to the seriousness of that Southwest district.
21 I take it that you haven't learned anything right up
22 until this morning that would have changed your opinion
23 about that?

24 A. Yes, I would take it the same way.

25 Q. All right. So you would still view that with the

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1 same seriousness you always have?

2 A. Yes, sir.

3 Q. And we've talked a lot about the seriousness being
4 because of the way the old Southwest 1 workings were left
5 off. One thing that we haven't talked about but I would
6 like your opinion on is that when we look at the
7 Southwest district, and I'm now looking at that blow-up
8 of the ventilation system in Exhibit 45, tab whatever it
9 is, we also see headings here entitled "Southwest Mains,
10 1 and 2." They weren't sealed off at all, were they?

11 A. No, sir.

12 Q. They would make gas. Should they not have been
13 sealed off?

14 A. Yes, sir. Unless you reverse the air flow as we
15 discussed and then either ventilated that area and your
16 alternative to ventilating is to seal with explosion-
17 proof bulkheads.

18 Q. Because those are down dip, right?

19 A. That's correct.

20 Q. Gas would come out of those headings?

21 A. Yes.

22 Q. Into your intake system?

23 A. Yes.

24 Q. It's pretty obvious, walking by the entrances to
25 those headings that nothing has been done with them?

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1 A. That's correct.

2 Q. And it would also be obvious that if you've got
3 abandoned workings, you should do something with them.
4 And I'm talking now about from the perspective of mine
5 management?

6 A. Yes, sir.

7 Q. And indeed that would be the same perspective by any
8 mining person with any degree of experience in the mines?

9 A. From my position, yes, but I can't say for other
10 people's position, level of experience.

11 Q. Let me suggest this to you, a mine inspector from an
12 inspectorate should have queried that, should they not?

13 A. Yes, sir.

14 Q. And not to do so would be a failure to perform their
15 job competently?

16 A. You're right.

17 Q. We've talked about the layer -- just give me a
18 second, I'm having to work off technology this morning,
19 you talked about the layer and you were asked questions
20 this morning about the duration of the layer and how long
21 you postulated that this layer in the Southwest 2-1 Road
22 may have been there, and you gave the estimate of a
23 couple of days. And as I listened to you, I took that to
24 be based primarily on your consideration of how long it
25 would take to build up a layer of your postulated

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1 thickness, is that right?

2 A. That's correct.

3 Q. Given the -- not only my postulated thickness, but
4 the information I had for the rate of methane -- what I
5 think might have been the rate of methane emission in the
6 Southwest 1 area that had been experienced because that
7 was the only good data we had as to abnormal
8 concentrations of methane in the general air body.

9 Q. Would it not be fair to assume though that it was
10 entirely possible that because ventilation was such that
11 layering was possible in that heading, that layering was
12 forming from the time they began working that heading?

13 A. I believe I testified to Mr. Wilson that, I guess it
14 was maybe Mr. Hebert or Wilson, that this would be a time
15 function that as the No. 1 Road got longer, driven
16 deeper, the ventilation, quality of ventilation
17 decreased. So I wouldn't say with respect to the
18 beginning of 1 Road, I would say -- because at the
19 beginning of 1 Road, the ventilation in 1 Road was, I
20 would have guessed would have been good with respect to
21 general air body dilution of methane. Again, it was not
22 great enough to militate against layering, but the
23 location of the arches -- you had so much turbulence at
24 the mouth of 1 Road, I would say you had to get in at
25 least five or six cuts, maybe more, before layering would

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1 become something that would be obvious or could start
2 becoming obvious.

3 Q. But that's a dead heading as you start in? General
4 air body movement will not generally go into a dead
5 heading, right?

6 A. That's correct.

7 Q. So that we couldn't rely on general body air
8 movement to do anything about layering, and it wasn't
9 going at the required velocity at that point anyway, I
10 assume?

11 A. That's right, but you could obtain the general air
12 body outflow from that area at the fans, the auxiliary
13 fans in the No. 2 Crosscut.

14 Q. But you agree that the auxiliary fan that they had
15 in there at the time certainly wasn't enough to generate
16 velocity or turbulence to prevent layering?

17 A. No, the initial fan that they had in was the small -
18 - the 18 1/2 kilowatt fan and that could generate, at
19 most, about four cubic meters per second if the
20 resistance of the duct was not too great.

21 Q. In any event, it's hypothesis at this point as to
22 just how long back in time a layer may have existed in
23 that heading?

24 A. That's correct.

25 Q. And it may well have been back to the days when they

MR. MITCHELL, EXAM. BY MR. MERRICK

1 first began to cut in on that heading, some feet in?

2 A. It could have been. Let us say that the probability
3 increased with days after that.

4 Q. All right.

5 A. Each day you -- the probability probably leapfrogged
6 expedientially, as a guess.

7 Q. Now let's come to the Southwest 1 workings and your
8 opinion as to whether or not there was a layer coming out
9 of there that would have gone up to Southwest 2-B Road.
10 You will agree, I take it, that -- or I've heard evidence
11 and I would like your confirmation or rejection of it,
12 that once -- prior to putting the stoppings in, there
13 still would have been some degree of air circulation in
14 the old workings, is that right?

15 A. There was always some air circulation in the old
16 workings, regardless of what you put in.

17 Q. Agreed. Once you put the stoppings in, that
18 restricted or reduced that air circulation?

19 A. Yes, they act as a resistance and thereby will
20 reduce but will not stop.

21 Q. But have -- once having reduced that air circulation
22 through that area, the methane that would come out would
23 be of a higher concentration?

24 A. Yes, one would anticipate -- the methane would be a
25 lot higher once you reduced it than before.

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1 Q. And the higher the concentration of methane that may
2 be the source of a layer, the harder it is to disperse?

3 A. Yes.

4 Q. And a layer will more likely form and propagate on
5 an inclined heading?

6 A. Yes.

7 Q. And are you aware of research that has been done by
8 and I forget the names of the two British researchers,
9 Leach and -- what are their names?

10 A. Well, you have Leach and Bakke, you have Leach --

11 Q. That's it.

12 A. -- and Slack, Leach and Barbero --

13 Q. Leach and Raine. Leach and Rain-ey or Raine?

14 A. Yes, Raine did a little work. The best work in that
15 area was the work of Leach's with either Slack or Bakke;
16 those are the basic works.

17 Q. Well, taking Leach and Raine as the combination, are
18 you aware of some research that they have done that have
19 indicated that arches themselves do not adequately
20 disburse layers?

21 A. That is correct, in the arched roadways.

22 Q. Yes.

23 A. That's where the difference is, the --

24 Q. Now -- sorry, did I cut you off?

25 A. There was a difference and they do discuss that in

MR. MITCHELL, EXAM. BY MR. MERRICK

1 one of the papers, the difference between rectangular and
2 arched roadways.

3 Q. Let me come now to your letter of November the 14th,
4 '95. It's at Exhibit 122, tab 1. I just want to check
5 and make sure I understand a couple of the assumptions
6 that have gone into your calculations. To begin with, in
7 talking about width of roadways, the formula that you
8 have at page two, what potential width of heading does
9 that formula cover?

10 A. Width of heading?

11 Q. Yes.

12 A. This formula, if you will go to the paper I gave and
13 they gave me back today, "Fire Damp Layers" by Leach and
14 Slack, yeah, Leach and Slack, this is the cross-sectional
15 area, the effective cross-sectional area of the entry.
16 It is not the -- you don't consider the width of entry as
17 you do in the formula that, for example, Dr. McPherson
18 presented and that Slack and Raine, I believe, in their
19 paper based on a study in a Cambrian Colliery or
20 something like that. I lose memory of these things, but
21 they give a formula there where -- and I discussed that,
22 where the value of velocity -- methane is not the methane
23 concentration in the general body but is the rate of
24 methane emission into the layer.

25 And this is something no one can really determine

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1 except in a laboratory or under very controlled
2 conditions. We could go into, for example, the mine,
3 Westray Mine, and determine that in a rather -- in a
4 study.

5 As Leach and Slack say in their paper, "Fire Damp
6 Layers," which you now have a copy, this is a much more
7 practical formula. This is the type of formula that
8 could be used by National Coal Board inspectors and by
9 miners because it's using the technique -- the things
10 that they normally use. They know how to measure the
11 cross-sectional area. They know how to measure the
12 general air body.

13 Q. My only point, Mr. Mitchell, was that your formula
14 is therefore not width sensitive? In other words, it
15 will theoretically take in -- have input data of a
16 heading that would be, for example, 10 feet high and 20
17 feet wide or five feet high and 40 feet wide or 2 feet
18 high and 100 feet wide and give you the same result?

19 A. Yes. And, of course, as we know, then when you
20 start getting to such extremes as you're giving, one
21 would -- I would question the additive value of this
22 layer, this formula. This is for typical mine
23 passageways. And one of the things we found in the
24 States, that this is quite good with respect to the
25 typical cross-sections we find in our mines. And they're

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1 -- the only difference between those and Westray is that
2 your Westray mine is a much higher mine -- mined to a
3 much higher level. But the widths are the same.

4 Q. My only point being though that I would assume that
5 the formation and continued existence of a layer may well
6 be affected by the shape, the width of the heading and
7 the shape of the roof of the heading.

8 A. Oh, definitely. That is well established in the
9 literature.

10 Q. All right. I just want to double check your cross-
11 sections that you use on page 2. You're giving cross-
12 sections or square area, I guess. As we look at the top
13 of page 2, you've got Southwest 2-B Road outbye 1
14 Crosscut, and you've got a square foot area of 140 square
15 feet. Is it your position that that is the actual cross-
16 sectional area of that heading in that location?

17 A. In my opinion, based on the description of the
18 conveyor and the drawings of the conveyor in some
19 exhibit, I haven't any recollection of, this is, as I
20 said last week, not the cross-section, but the effective
21 cross-sectional area.

22 Q. Well, we'll hear further evidence on that, I guess,
23 but that's what you're saying is the net cross-sectional
24 area, having deducted for the size of the equipment in
25 that location?

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1 A. The size of the equipment and the influence of that
2 equipment in our determination. That's why I used the
3 word "effective." We have certain numbers of percentages
4 that we multiply these things by to come up with what we
5 call "effective cross-sectional area."

6 Q. So that if, indeed, on further reflection it's
7 determined that the cross-sectional area in that location
8 is significantly higher than 140 feet, that's going to
9 change the result of your formula, I assume?

10 A. It will change the result -- not change the formula.
11 It will cause a higher minimum velocity to be required to
12 achieve the same thing. But nowhere will you find the
13 670 feet per minute, for example, that we see in No. 3
14 Crosscut in Southwest.

15 Q. I'm not talking about that right now, and just to
16 make sure I've understood you, that if, indeed, that
17 cross-sectional area is greater than 140 feet, it may
18 well change your conclusion as to whether at that
19 location a layer could continue to exist.

20 Q. But please, sir, don't keep saying cross-sec --
21 effective cross-sectional area. There is a vast
22 difference from the ventilation point of view between
23 effective cross-sectional area and what one might
24 measure.

25 Q. Admittedly. And that's my loose use of terminology.

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1 I just want to make sure I've got your point that if in
2 fact the effective cross-sectional area is significantly
3 higher than 140 feet, that may affect your opinion as to
4 whether a layer could exist at that point?

5 A. Yes, sir.

6 Q. And the same thing in the Southwest 2-B Road, 1
7 Crosscut to 2 Crosscut?

8 A. Yes, sir, the places where it will be most critical
9 will be in the Southwest 2-B Road where the difference
10 between minimum velocity and calculated velocity are
11 quite the same.

12 Q. If I read your formula, the value that you put in
13 for methane, I see the CH₄ symbol in the formula and I
14 look down at your footnote, and you're putting in there
15 .24 percent. That is not a measured general body
16 quantification, is it?

17 A. No, except if you have more than that, then the
18 atmosphere is illegal, so one is assuming that you have a
19 legal atmosphere. You could put any number you want in
20 there, but anything over that, forget the layer. You've
21 got to make other corrections.

22 Q. Well, we're trying to figure out if a layer exists,
23 not whether it's a legal layer. So let me ask you this
24 question. If we put in the actual measurements of
25 general body methane that we got on occasion such as .6,

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1 that may well change your conclusion?

2 A. No argument, but we don't have a persistence of .6
3 in the intake air in Southwest 2-B Road.

4 Q. Nevertheless -- so you've picked a legal number as
5 opposed to an actual number for your general body
6 content?

7 A. That's correct.

8 Q. All right. The index number that you use at that
9 location, Southwest 1, 3 Crosscut, to Southwest 2-B Road,
10 index of 2, am I correct, and I had great difficulty
11 following these calculations, but am I correct in
12 presuming that that index predicates or presumes that it
13 is at that point that a layer may begin to be affected by
14 the air velocity? In other words, that if you have an
15 index number 2 at a particular location that you're doing
16 your calculation, you will begin to affect the layer.
17 You will not be necessarily destroying the layer at that
18 point?

19 A. According to Leach, in a level roadway, and you'll
20 notice that 2 was selected because of the slope being
21 approximately zero. It's a level entry. And Dr. Leach
22 teaches us that where the layering index is less than 2,
23 that in those places, that is where you look for layers.
24 Where the layering index exceeds 2, that the chance of a
25 layer is so low that you shouldn't -- it would not be

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1 appropriate to be searching for layers in those places.
2 So I follow Dr. Leach's teachings, and he says put a 2
3 there to find out whether the velocity that you have is
4 adequate.

5 Q. But my question is this, at that location where you
6 were calculating that it gives you an index of 2, am I
7 correct in understanding that the conditions would be
8 such that a layer may be affected by the ventilation at
9 that point, but not necessarily destroyed at that point?

10 A. I guess you're not incorrect. So since you're not
11 incorrect, I guess we could say you may be correct. I
12 don't know. I'm a little confused. It's kind of
13 splitting hairs there. We're treading a tightrope.

14 Q. Have you tried a calculation of whether a layer
15 would exist in any of this roadway where we have actual
16 road measurements, using your formula?

17 A. We have actual road -- we have no -- I am not
18 remembering -- well, why worry about remembering, let's
19 look.

20 Q. Well, we know there were ventilation surveys taken
21 just inbye the C-1 Road, the junction of Southwest 2-B
22 and, sorry, B Road.

23 A. There are no air measurements in the path that I
24 show here.

25 Q. All right.

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1 A. Made by Westray.

2 Q. I'm going to come back -- we'll come back a little
3 later -- not with you. I'm going to have to take some
4 time to analyze your formula, but let me ask this.

5 A. That's not my formula.

6 Q. Not your formula, your opinion using that formula.

7 A. Okay.

8 Q. Notwithstanding, even accepting the opinion that you
9 have stated, and I think you agreed with me with this on
10 direct. I just want to make sure. You've agreed that
11 this explosion was the result of the ignition of a layer,
12 correct?

13 A. Yes, sir.

14 Q. That the ventilation was such at least in the
15 headings or the areas where we think the ignition
16 occurred that it permitted the establishment of a layer?

17 A. Yes, sir.

18 Q. There was thus inadequate ventilation in that area?

19 A. Yes, sir.

20 Q. That the Southwest 1 was in fact a potential danger
21 because of the build-up of gas there?

22 A. Yes, sir.

23 Q. That it was not properly sealed or otherwise dealt
24 with to minimize that danger?

25 A. Yes, sir.

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1 Q. That intake air should not have been allowed past
2 it?

3 A. Yes, sir.

4 Q. And that all of that was apparent to anybody with a
5 reasonable degree of mining experience?

6 A. Yes, sir.

7 Q. You've said to Mr. Wilson that there was nothing
8 prior to May 6 that indicated to you that they had a
9 problem in this mine with ventilation, and I wanted to
10 just make sure that you aren't changing what I had
11 understood your evidence to be the other day. Layers
12 obviously did exist in this mine prior to May 6.

13 A. Where?

14 Q. Southwest district 2?

15 A. I don't know, and there's no evidence to support
16 belief of a layer in Southwest 2-B Road prior to May 6.

17 Q. I would try it on you this way. We haven't measured
18 for it so we don't know, but the ventilation was such
19 that, taking a quick look at it, you would presume that
20 layers could exist prior to May 6?

21 A. I recall, this is again going back three years,
22 looking at the shift reports, looking at this very
23 question. And the general body atmospheres that I recall
24 in the Southwest 2-B Road would not lead me to believe
25 that there would be -- there is no reason to expect a

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1 layer, given the methane concentrations reported in the
2 shift reports for that period.

3 Q. In any event, the exhausting system that was being
4 used may well have led to the potential of layers
5 existing prior to May 6?

6 A. Yes, in the 1 Road and A Road, yes.

7 Q. Southwest 1 was certainly there prior to May 6?

8 A. Oh, yes, but the conditions that I believe would
9 militate against a layer persisting from Southwest 1 to
10 Southwest 2 existed prior to May 6. They existed at all
11 times.

12 Q. I take it that you expressed opinions about the gas
13 outs and the fact that they would clear and that they
14 would begin to mine again and that that suggested to you
15 that there was some degree of adequate ventilation. I'm
16 assuming you're having to base that on the premise that
17 at least in the vicinity of whatever sensor had cut out
18 had cleared, that they would start mining. Not that they
19 had necessarily cleared the heading of layered gas.

20 A. Oh, I believe I stated that with respect to the
21 sensor and its location.

22 Q. So we don't know in those gas out situations where
23 they might not have begun mining again when there was
24 still in fact a dangerous layer of gas in those headings?

25 A. That we don't know and there's a good chance, based

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1 on hindsight, that you are correct.

2 Q. And the frequency of gas outs that you said were not
3 unusual, in fact, you were surprised that they only had
4 that number of gas outs, that's based, of course, just on
5 the ten, I think, that you identified that were recorded
6 gas outs?

7 A. That's correct.

8 Q. You talked about the dusting plan and the fact that
9 very few -- I guess no jurisdictions, to your knowledge,
10 required a dusting plan. I take it though that all
11 jurisdictions required that a mine be dusted?

12 A. Yes, and of course, I believe I specified which
13 jurisdictions I was referring to that did not require a
14 plan for sampling.

15 Q. And while jurisdictions may not require an inspector
16 to confirm that a plan exists, all jurisdictions require
17 or expect that the inspector will ensure that, to his
18 satisfaction, dusting is being done?

19 A. That's correct.

20 Q. And no operator who runs a safe operation should be
21 expected to delay more than six months after coming into
22 operation before they have some sort of a plan to ensure
23 that adequate dusting is done?

24 A. I would hope not.

25 Q. So that Westray was in fact delinquent, if you will,

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1 or certainly behind schedule in getting that plan put
2 together?

3 A. If Westray wanted to produce a plan, they were
4 delinquent. Or if they didn't want to produce a plan,
5 they were delinquent.

6 Q. You were asked a question that surprised me for a
7 second until I thought about it. You were asked whether
8 the lack of a plan put this mine in imminent danger, and
9 you said it did not. But I assume that does not change
10 what I took to be your evidence earlier that stone
11 dusting a mine is a primary safety requirement?

12 A. Of course it is, yes.

13 Q. And if you do not adequately or properly stone dust
14 a mine, that does put a mine in danger?

15 A. Yes.

16 Q. The boom truck that you were talking about the
17 exemptions, I'm not sure if we've had clear evidence on
18 this yet, but you said it wasn't within 300 feet of a
19 face. Now to me a face includes the extension of
20 Southwest 2-B Road where the roof bolter was. Is that a
21 face?

22 A. Where the bolter was is an active face, yes.

23 Q. Wasn't the boom truck within 300 feet of that face?

24 A. If I measured wrong, I apologize. I did measure
25 that at some time in the past three or four years, three

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1 years or whatever now, going on four. And I thought it
2 was a little -- just a little beyond 300, but I could be
3 wrong.

4 Q. Well, we can do that later. All right. We see
5 though from the photographs that that truck seems to have
6 been turned up into that entry. Is that your
7 understanding of how it's located?

8 A. Into the B Road inbye 2 Crosscut, yes, sir.

9 Q. Suggesting that somebody was intending to drive up
10 there.

11 A. I don't know what it suggests. It's where it is.
12 That we do know and --

13 Q. It is unusual to just park it right in an
14 intersection where it would interfere with the shuttle
15 car coming out to load coal on the Stamler?

16 A. Most unusual.

17 Q. And any miner who does not want another member of
18 his crew yelling obscenities at him wouldn't park a boom
19 truck there.

20 A. If -- and there my question -- we do know that Myles
21 Gillis and Doyle were in that truck and Gillis went into
22 the No. 1 Road, and Gillis' job would be to repair a
23 piece of equipment. So let us assume, I mean, if we're
24 going to speculate, let's speculate that the equipment
25 that needed repair was the shuttle car. So in those

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1 cases, nobody -- the shuttle car operator won't be
2 yelling obscenities at him. So I can't answer your
3 question. We just don't know enough to make any
4 judgments whatsoever about why he left the vehicle there.
5 I do agree it would be really nice to know, but we're
6 going to never know, so let's not worry about it.

7 Q. Let me get to, I think the key point is this. If
8 you allow diesel equipment into a mine, I suppose there
9 will always be the risk, greater or lesser, depending
10 upon the safety mentality of the mine operator, that that
11 equipment will be misused?

12 A. Definitely.

13 Q. And an inspectorate that issues exemptions that
14 allow that sort of thing should be aware of that sort of
15 temptation?

16 A. It's -- my problem is it's really difficult to
17 believe miners and mine officials would be like that. I
18 have a real problem with that.

19 Q. I guess my only point was I wanted your views as to
20 whether or not, if you're going to issue exemptions to
21 your regulations, particularly something like that, it
22 may be hard to police. Is that something that they
23 should think about or take into account or perhaps have
24 special safeguards in relation to?

25 A. Well, we talked about that. You, in Nova Scotia,

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1 have far more safeguards than we in the United States.
2 So there's where my problem is. We're trusting our mine
3 operators and our miners. Of course, we have -- oh,
4 you've got the same thing. You've got safety committees
5 at the mine. You've got miners who are safety conscious.
6 One would expect that if these things were going on,
7 somebody would tell somebody.

8 Q. Mr. Commissioner, I've still got about another ten
9 or fifteen minutes, but I would intend to keep going, if
10 it's convenient, or do you want to --

11 COMMISSIONER Well, I think we may as well make a clean
12 cut with Mr. Mitchell and then we'll got from one until
13 two for lunch, okay?

14 A. Thank you.

15 MR. MERRICK We'll finish up Mr. Mitchell.

16 Q. You were asked about the inspectors or comment about
17 the inspectors being "snowed." And you were asked
18 whether there was another examples or areas that you may
19 have seen them getting snowed. And you started to answer
20 and then pulled back. What was the other thing you were
21 thinking about?

22 A. I was thinking about all these consultants Westray
23 had on the roof control.

24 Q. Yeah?

25 A. And I just don't know because I had -- I've really

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1 never -- I don't know what people were telling other
2 people about what these consultants -- I mean, outside
3 the official management of Westray, there's been no
4 evidence I'm familiar with as to what the rest of the
5 world knew about these consultants' opinions and
6 suggestions or recommendations. But when you have people
7 of the calibre that were doing this consulting work,
8 these are top people in the world. I would kind of feel
9 that outsiders would get a feeling of security and sense
10 of everything is good. And gee, maybe the things I'm
11 observing in the Southwest 1 area in particular aren't as
12 bad as I think they are because all of these top quality
13 people, they're in there. They're doing their thing.
14 And surely Westray is doing what they're telling them to
15 do.

16 Q. So in this kind of a situation with these number of
17 consultants in, based on your investigation and
18 interviews and discussions, is it your view that there
19 might have been a tendency on the part of our
20 inspectorate at whatever level to have deferred, in a
21 sense, and to have assumed that things must be all right?

22 A. Well, to put it -- I like to wear moccasins and I
23 sure as heck would. I don't believe I would argue with
24 some of the people that I know personally and their
25 calibre who were involved in that.

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1 Q. Is one of the lessons that we should learn from this
2 though is not to hold back, that if there are questions
3 in our minds, we should raise them until somebody answers
4 to our satisfaction, our questions?

5 A. That's a good question and I don't know the answer.

6 Q. You did say that in a province such as this with our
7 limited resources that an option that was always
8 available to our inspectorate, and I'm broadening that to
9 include both the Department of Labour and Department of
10 Mines, to bring in consultants to back them up. Is that
11 something we should have done here?

12 A. Did I say to bring in consultants?

13 Q. Well, you said "to bring in others to back you up."
14 If you think there's a ventilation problem, get somebody
15 that can tell you whether you've got a ventilation
16 problem.

17 A. Maybe I misspoke then, what I was saying is I don't
18 believe you can afford to do that. And it should become
19 a responsibility of the mine operator to get that -- pay
20 for that calibre of person. They're not cheap.

21 Q. But if an inspector is concerned about a particular
22 aspect of a mine, for example, walks by that Southwest 1
23 several times on a visit, and has a nagging doubt about
24 those stoppings, or walks by the open entrances to
25 Southwest mains, 1 and 2, if that inspectorate wasn't

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1 confident of what they should do, were you suggesting
2 that one of the options they had would be to ask somebody
3 to come in who is a consultant to tell them that, yes,
4 Mr. Inspectorate, you have legitimate reason to be
5 concerned, and you have a legitimate reason to take
6 action.

7 A. Well, that's a management thing and I'm really not
8 involved in the management of your people. It's a
9 question of what's desirable and what's practical. From
10 a desirable point of view, you're 100 per cent right.
11 Whether it's do-able, I don't believe you're right.

12 Q. That raises, I guess, another question. If you have
13 inspectors who may well be faulted or not, but assume
14 that there is at the end of the day evidence that
15 inspectors did not act on information that they should
16 have acted on, but in fairness to the inspectors, they
17 really weren't up to it, what degree of responsibility
18 should there be in your hierarchy to ensure that your
19 inspectors are able to deal with the situations that
20 they're sent into?

21 A. We discussed that last week with you, sir. And I
22 said we have the same problem in the States and this why
23 we have an academy for our inspectors where, when they
24 first start working, they will go for at least three
25 months for basic training in these areas and every year

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1 they go for, I think it's six weeks, and they -- in
2 certain -- on certain subjects. There is a constant
3 training program, and we have found this is critical.

4 And, in fact, I believe I mentioned that the Mine
5 Safety and Health Administration would be honoured to
6 extend the availability of this academy to the Province
7 of Nova Scotia. I do note Mr. Kessler, who's the
8 Superintendent, has said that to me, as has Bob Elam,
9 who's the number two man in the -- charge of the
10 inspection group.

11 Q. So it's -- that's an issue of training? You see --

12 A. Yes, sir.

13 Q. -- that as an issue of training?

14 A. Education --

15 Q. All right.

16 A. -- and training is the name of our game. We have
17 found that this has been the most effective way to
18 achieve safety in the miners and in our inspectors.

19 Q. Let me move on quickly to the rescue operation. You
20 expressed some criticisms as to the fact that this -- the
21 entries that went into that mine, at least after the
22 initial ones, went in as rescue operations and not as, I
23 guess, investigation operation. Do you have any other
24 criticism or comments or commendations as to how the
25 rescue operations were conducted?

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1 A. Boy, don't get me in trouble on this one. You're
2 just lucky you didn't lose a couple of teams. You had
3 people going into areas in which there could have been
4 fires, in which there turned out to be flammable
5 concentrations. There was no control of the ventilation.
6 There was no communications. Firm communications. You
7 had people going around and over and through arches that
8 were down that could have very easily destroyed their
9 self-contained breathing apparatus and rendered the teams
10 -- and put those teams at the -- the teams that went down
11 into the North Mains, in my judgment, all went into
12 harm's way. And that is something you never should allow
13 mine rescue teams to do.

14 Q. What should we have done differently? Specifically.

15 A. Taken a little more time. Know what you're doing.
16 Have standby teams. Send one team in at a time. Send
17 them in solely to go a certain distance; get that certain
18 distance re-ventilated, recovered, keep extending your
19 fresh air base as you go in and do this in a controlled
20 manner. What -- in my opinion, and I discussed this with
21 mine rescue teams, what we had was an uncontrolled re-
22 entry operation, particularly in the North Mains.

23 Q. Would that have been changed in your opinion though
24 if there had been a reasonable belief at that time that
25 somebody might have been alive down there?

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1 A. [No audible response]

2 Q. Surely, under those circumstances time is critical?

3 A. Time is critical but you can't risk the lives of 10
4 to 15 people or more -- I don't remember now any longer
5 how many people we had down there at one time. You can't
6 risk those lives on the faint possibility of saving one.
7 We train mine rescue people -- that is one of the goals
8 of mine rescue is to save the survivors. One in the -- I
9 use the phrase very deliberately, the command centre.
10 And the people in the command centre must make -- and
11 they're the only ones who can take that horrible balance,
12 and believe me it's a horrible thing to sit there and
13 make that balance of what are the chances of someone
14 being alive. And when we have made misjudgments, we have
15 killed mine rescue people.

16 Scotia Mine is the perfect example. Seven mine
17 rescue people died because of bad judgments in the
18 command centre.

19 Q. Any other comments on the rescue operations?

20 A. No, sir.

21 Q. Tell me about the investigation. The RCMP excursion
22 into the Southwest District. You have been critical of
23 that. How should it have been done?

24 A. I thought I explained that to Mr. Hebert. I hope
25 that I'm not mispronouncing it.

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1 Q. Well, I don't need you to give me that again; let me
2 try to shorten it up here a little bit. Your answer to
3 him was based on the premise that you'd go in and
4 establish the area securely so that fresh air
5 investigators such as yourself could have access, I take
6 it?

7 A. That's right. A team of forensic specialists who
8 would look at all aspects.

9 Q. And this is where I wasn't completely clear. You
10 say that help was offered. What specifically was
11 offered?

12 A. By who? I did discuss this -- before talking to
13 Sergeant MacDonald, I had discussed this with other
14 members of the National Mine Rescue Association and also
15 with people in the Mine Safety and Health Administration,
16 and it was my impression that if the Province of Nova
17 Scotia desired, that the -- we could send in from the
18 Mine Safety and Health Administration -- they would send
19 their invest -- one of their two investigation teams
20 assisted by people like John Urosek, Clete Stephan, who
21 are forensic specialists. The National Mine Rescue
22 Association people told me that they would supply people
23 for -- for example, in operating the command centre and
24 planning the operation.

25 Hopefully, I don't remember it's been a long -- I

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1 hope -- because I expressed my concerns to Sergeant
2 MacDonald about what they were planning to do, from what
3 I had heard they were intending to do, and I thought I
4 suggested to him that, hey, let's bring on some of this
5 additional help.

6 Q. And what was the response?

7 A. I don't recall. I let -- so, therefore, since it
8 wasn't done, as I believe I said, I'm not so sure I was
9 heard or understood.

10 Q. I take it that in your opinion it could have been
11 done that way? That the whole Southwest District,
12 Southwest 2 at least, could have been secured and a
13 thorough, usual investigation could have been carried
14 out?

15 A. Yes, based on the RCMP photographs and based on the
16 subsequent re-entry by Mr. Currie, among other people,
17 there is no question in my mind that a proper
18 investigation could have succeeded in defining some of
19 the questions that this Inquiry is addressing.

20 Q. What would have been the reaction time to be able to
21 do this and what would have been the cost?

22 A. I haven't figured that out. I --

23 Q. How long would it have taken, roughly?

24 A. Well, if the forensic people came from the States, I
25 don't know what the agreement would be. I know people

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1 like Bill Parisi who was with the National Mine Rescue
2 Association, Walter Vincinelly is another gentleman, they
3 would have come up here for their expenses. I would have
4 come up for my expenses and my expenses alone; I offered
5 that.

6 The MSHA, well, that would be something -- I can't
7 speak for them what -- I know, for example, we had a fire
8 at Devco in the late '70s or thereabouts and MSHA sent
9 their teams here. I don't believe that cost the Province
10 or the government anything.

11 Q. Did you communicate this offer and this suggestion
12 to anybody other than Staff Sergeant MacDonald?

13 A. You check with Mr. White and he'll -- only I don't
14 remember. I can't believe I didn't discuss -- I must
15 have discussed it, but --

16 Q. With Mr. White?

17 A. I don't know; I suspect I would have. So ask Mr.
18 White that question.

19 Q. All right.

20 A. Don't forget it's -- you're talking about three --
21 more than three years ago, and I've been to too many
22 since then.

23 Q. Just one other topic I want to explore with you just
24 to make sure I've got all of your evidence on it. You
25 made the comment that you've come to understand or people

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1 suggested to you, I forget what your answer was, that
2 coal is politics in Nova Scotia. What do you base that
3 on?

4 A. Well, I don't remember the man's name; he was on the
5 6th floor of the building there on -- whatever that place
6 is where Labour is located, and he was to the right of
7 Lagasse's [sic] office. And the reason I went to him is
8 he and I had been doing a lot of talking, and he was the
9 guy I was giving my bills to. And I said I was leaving,
10 and I wanted to decide whether -- I wouldn't charge for
11 my time. I would charge for my expenses up to that time,
12 and we had quite a discussion. And there was somebody
13 else involved and they talked me out of it. And he is
14 the one who said well, in Nova Scotia -- I don't remember
15 whether "politics is coal" or "coal is politics" -- words
16 to that effect. And then interestingly, I heard that
17 from another man up in Sydney and so after I hear it
18 twice from two different people, I believe it.

19 Q. You said that you got in some difficulty when you
20 were first here following the explosion and that Mr.
21 White may have stood up for you or run interference for
22 you or saved you, or at least kept you from going home.
23 What -- are you aware of -- do you have knowledge of
24 somebody trying to remove you or suggesting you be
25 removed?

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1 A. No, but when a member of Parliament gets up and
2 castigates the Department -- the Nova Scotia government
3 for hiring this character Mitchell and says all these bad
4 things -- he quotes Joe Mains, who's the Safety Director
5 for the United Mine Workers, and Joe and I at that time
6 were having some very major disagreements with respect to
7 belt air in mines and also the methane concentration in
8 mined-out areas. And I was being accused of being a
9 murderer -- and he was quoting me and -- kind of
10 embarrassing. You don't like to have par -- people in
11 Parliament and then the newspapers. And then there was a
12 whole host of people wanting to interview me, and I
13 didn't want any of that and it was just very
14 uncomfortable. I'm not used to that.

15 COMMISSIONER I would think, Mr. Mitchell, that anyone
16 would lose such sensitivities being brought up in the era
17 of Newt Gingrich.

18 A. Very true, very true. And I may get in trouble for
19 this one. There was another incident where -- that
20 almost made me leave, without question, when I talked the
21 Department into issuing an order regarding the mine and
22 the order got lifted. And I am firmly convinced that we
23 were exposing -- one person, who was a dear friend of
24 mine, we were exposing him to imminent -- to
25 unquestionable imminent danger.

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1 Q. Explain that to me, please. What was the incident?

2 A. The incident was a major outrush of toxic gases from
3 the mine. My calculations indicated that should this
4 ever occur again, we would have an irrespirable
5 atmosphere that was immediately lethal or lead to
6 immediate collapse of any person exposed to this down and
7 around the mouth of the Southwest area. And I understand
8 that the Department, at my insistance, issued a order
9 forbidding people to go in there until we could resolve
10 the problem. And I describe flooding the mine was my way
11 of resolving the problem. And despite that, people went
12 in. And boy, if they -- if anybody got killed I'd be
13 crying.

14 Q. At what point in time was that? Can you place it
15 for me in time?

16 A. Sometime after the explosion. That's about all I
17 remember.

18 Q. But you say the order got lifted?

19 A. Pardon?

20 Q. You said the --

21 A. No, I -- all I know is the people, despite this
22 order being given, people went in, which just goes to
23 reinforce my belief that, gee whiz, we'll do what we want
24 to do regardless of what the Department of Labour tells
25 us should be done.

MR. MITCHELL, EXAM. BY MR. MERRICK

1 Q. All right. Mr. Chairman, I just want to take a
2 second and review some notes that --

3 COMMISSIONER While you're doing that, Mr. Merrick, I
4 just want to request Mr. Mitchell -- a couple of things.
5 During your -- during part of your cross-examination you
6 mentioned something about barricading and procedures
7 recommended by the, I believe, the National Rescue Centre
8 and you said an article that you had written or had been
9 written on that subject?

10 A. Yes, sir.

11 COMMISSIONER Could you provide a copy of that to the
12 Inquiry?

13 A. I will send you a copy yes, sir.

14 COMMISSIONER I'd appreciate it. And also, just as a
15 general thing, if there are any other articles that you
16 are aware of in the general field of mine rescue
17 operations or the composition of appropriate forensic
18 teams or rescue teams, I would appreciate getting that
19 too. If you have them.

20 A. Well --

21 COMMISSIONER Or if you'd even give me a bibliography of
22 where they are.

23 A. In my third edition of my book Mine Fire there's
24 going to be an appendix with that and I happen - I may
25 have a copy of this and I will leave it with you.

MR. MITCHELL, EXAM. BY MR. MERRICK

1 COMMISSIONER Thank you very much. I appreciate it.

2 Mr. Merrick, sorry.

3 MR. MERRICK Just a couple of questions.

4 A. Now this is rough draft; the final is better
5 written.

6 Q. In this particular case, Mr. Mitchell, where we know
7 that the Southwest District was going up to the boundary
8 of the old Allan Mine or the boundary pillar that was to
9 be left on the old Allan Mine, and that that was a topic
10 of some concern, as we can see from the documents with
11 the Department, as a Department of Labour inspector,
12 would you not have expected that they would want to be
13 assured that that boundary pillar was being respected?

14 A. My investiga -- study of that, it wasn't an
15 investigation; it was a study, I was satisfied that they
16 were indeed concerned and that they in -- were following
17 the survey. There was a good survey, we believe, in that
18 area and they were --you can see the spads. The spads
19 are shown on the mine maps, so we have an engineer or
20 even an inspector or a miner would have a clearer
21 understanding of exactly where the faces in the Southwest
22 1 were.

23 Q. But would that not suggest then that an inspector
24 inspecting the Southwest District should be asking
25 himself and be concerned about whether he is actually

MR. MITCHELL, EXAM. BY MR. MERRICK

1 looking at an approved plan and in an approved area?

2 A. Here we go again on that approved plan, and I'll say
3 it for the -- hopefully, for the last time, there is no
4 correlation, in my opinion, between the plan that Westray
5 was submitting to the Department of Natural or Mineral
6 Resources or whatever and I what I would call an approved
7 plan. It was a -- this is what we intend to do here, and
8 then they proceeded to do something else entirely.

9 The Department's role, I am firmly convinced, maybe
10 they'll tell you otherwise, but my opinion of their role
11 is solely will we recover for the people of Nova Scotia
12 as much of the coal that's available in this block as
13 possible.

14 Q. I'm talking Department of Labour inspector now.

15 A. Oh. Well, the -- he doesn't see this plan. I don't
16 know how he can evaluate that plan. They don't have
17 competence to evaluate that plan because this is a roof -
18 - this is that -- where I said you have to bring in roof
19 control specialists. Well, heck there were, what, eight
20 or nine of them hired by Westray. I believe in the six
21 companies that were involved, there were eight or nine
22 top quality people.

23 Q. Well, I don't think you and I are on the same wave
24 length, but I'm not going to pursue it at this point.

25 You did make a comment to Mr. Wilson, I just want to make

MR. MITCHELL, EXAM. BY MR. MERRICK

1 sure I've got it clear, that the Department of Labour was
2 concerned about a -- and I think you said a sampling
3 plan. Would you not agree with me that from the minutes
4 and the records that we've got that the Department of
5 Labour inspectors were really concerned about a stone
6 dust application plan?

7 A. No, sir. I looked into that question personally and
8 it was simply -- they kept asking for a plan that would
9 give the frequency of sampling, the location of sampling,
10 and how the samples would be analyzed. Now that's what I
11 understood from my discussions. You may learn otherwise
12 later.

13 Q. All right. Those are all the questions I have.
14 Thank you, Mr. Mitchell, for coming up and giving us your
15 time and your professional opinion. Thank you.

16 A. Thank you, sir, you've been very gracious.

17 COMMISSIONER I'll echo those thanks also.

18 A. Thank you, sir.

19 COMMISSIONER We'll adjourn until 2:15.

20 INQUIRY RECESSED (TIME: 1:12 p.m.)

21 INQUIRY RESUMED (TIME: 2:17 p.m.)

22 COMMISSIONER Mr. Merrick?

23 MR. MERRICK Thank you, Mr. Commissioner. The next
24 witness will be Mr. Liney who is the consultant who was
25 retained by the RCMP to assist them in their

MR. MITCHELL, EXAM. BY MR. MERRICK

1 investigation. We have elected to call him as a witness
2 because he brings a different perspective to some of the
3 issues that we will be dealing with.

4 **MR. ANDREW DAVID LINEY**, sworn, testified:

5 THE CLERK Can you please state and spell your name for
6 the record?

7 A. It's Andrew David Liney, A-N-D-R-E-W D-A-V-I-D L-
8 I-N-E-Y.

9 EXAMINATION BY MR. MERRICK

10 **Q.** Mr. Liney, you are a mining engineer and a mining
11 consultant now?

12 A. I'm a mining engineer but I only consult in coal
13 mining ventilation.

14 **Q.** So you're limited to ventilation aspects of coal
15 mining?

16 A. Yes.

17 **Q.** Give me a brief background of your history and your
18 qualifications and experience.

19 A. I joined what was then called the National Coal
20 Board in the United Kingdom in 1965 as a mining craft
21 entrant, which is basically the lowest juvenile entry for
22 mining work. I did the normal institutory training
23 required by our legislation in the United Kingdom.

24 **Q.** Now I want to stop you there for a moment because
25 training is something that we are interested in. Tell me

MR. LINEY, EXAM. BY MR. MERRICK

1 what the training program was that you would have gone
2 through and was it typical for somebody entering the coal
3 mine industry?

4 A. In the United Kingdom, for coal mining, the training
5 is laid down by Act and Regulations of Parliament, so
6 it's not only typical, it's exactly the same as the
7 training that everybody else would have been taking and
8 still does. I spent five days training for surface work
9 because I was too young to go underground for underground
10 work.

11 Q. How old do you have to be to go underground?

12 A. 16.

13 Q. All right.

14 A. And I worked on the surface for the few weeks before
15 I quite was 16. I then went to a fully reserved training
16 centre for training for underground work where, at my
17 age, you have to spend 50 days. Or if I was above 18 I
18 would have only spent 20 days. I spent 50 days. They
19 have their own underground mining operation specifically
20 for training purposes, so I spent 50 days in a classroom
21 undertaking tasks, underground learning about
22 ventilation, methane, coal dust, stone dust, stone dust
23 barriers, that type of thing, but they're mostly safely
24 related.

25 I then went back to my own colliery. I had to spend

MR. LINEY, EXAM. BY MR. MERRICK

1 20 days underground on what's called "close personal
2 supervision" which means I wasn't allowed to do any task
3 on my own. I had to move within arm's reach of an
4 approved person who signed for me on a daily basis. So I
5 did what he did. He showed me how to do it, then he let
6 me do it, but he was never -- I was never doing it on my
7 own. I then commenced work as a conveyor belt man which
8 was going around maintaining belts underground.

9 I then became a roadman which was the maintenance of
10 roads underground. And when I was 18 I put my name down
11 for coal face training, which is a completely new avenue
12 of training now. You can't go coal face training until
13 there's an anticipation that you would be 18 by the time
14 that the training was completed.

15 Q. That first round of training that you talked about,
16 the 50-day period and the 20-day period --

17 A. That's just to get you underground.

18 Q. That's not to get you at the coal face itself?

19 A. No, it's just to get you working underground.

20 Q. All right. So to go to the face you need a whole
21 new set of training?

22 A. Yes. I then went face training. That's 100 days.
23 It's a fully reserved training face which is entirely
24 laid down for the purposes of training. Every man has a
25 job on the face, but he also has a trainee with him and

MR. LINEY, EXAM. BY MR. MERRICK

1 it operates on a similar basis to the one I've just
2 described. The purposes of the training face are not for
3 the getting of production so that people who work on it
4 specifically are trained. The first purpose is to
5 demonstrate in the coal rather than to achieve colliery
6 targets.

7 After that 100 days, you go back to your own
8 colliery. You then have to go into improvership which
9 means that you spend another 40 days, if you're
10 successful in a period of 40 days, demonstrating that you
11 can achieve what you've already been taught about your
12 own colliery, still under a period of close personal
13 supervision. And after a period of another 40 days, this
14 whole procedure having taken just around six months by
15 now, taking into account weekends, you are then trained
16 for face operations. It doesn't entitle you to operate
17 machinery at that point in time. You are now on the
18 face, but it doesn't -- you are not allowed to operate
19 machinery.

20 Q. And that takes additional training as well?

21 A. Yes, if -- you have to spend a minimum of six months
22 on the face, and then you are allowed to train as a
23 machine operator which means that you accompany a machine
24 operator under close personal supervision for a further
25 period of 20 days, and if that period of 20 days has

MR. LINEY, EXAM. BY MR. MERRICK

1 elapsed satisfactorily, you then get a certificate that
2 allows you to operate a coal face machine.

3 Q. The two training levels that you -- training
4 programs that you described, first to get you
5 underground, second to get you at the face.

6 A. Uh huh.

7 Q. The detail of that is mandated in legislation?

8 A. It is. The legislation only says how many days you
9 will spend in total, but it subdivides them according to
10 the different types of activity to make sure that you're
11 obliged to spend -- work on packing which is an activity
12 in the United Kingdom different than what you do here.
13 To get you into the roadhead which is equivalent,
14 perhaps, to that Dosco operation in North A Road, you
15 know, and the various of the mining techniques, setting
16 supports, et cetera, you know, activities related to coal
17 face operation.

18 Q. So very extensive, detailed set of statutory
19 regulations mandating specifics of the training itself?

20 A. Absolutely.

21 Q. All right. Continue on with telling me about your
22 own experience and training.

23 A. Well, I then went to work on the coal face and when
24 I was old enough to become considered for the next rung
25 on the ladder which was the lowest level of supervision

MR. LINEY, EXAM. BY MR. MERRICK

1 which we call a "deputy," and I think may be analogous to
2 your fire boss. You then, if you're selected, and you've
3 had a minimum of two years on the coal face. You then go
4 back to the training place again for potential deputy's
5 training, and you have to spend 20 days on a potential
6 deputy's training course when you learn all the
7 additional aspects, other than the activities you're
8 already familiar with, aspects in relation to the
9 supervision and monitoring of safety. So you would have
10 a deeper insight into the taking of measurements, the
11 understanding of layers, the understanding of the
12 importance of general body, the institutory requirements
13 for taking the various regions which have to be taken on
14 a rather frequent basis.

15 You then have to go shotfiring training because
16 mining operations sometimes require the firing of
17 explosions underground. That takes a further 10 days.
18 And if you pass all that, you have to have an interview
19 with the colliery manager back at your own colliery.
20 Sorry, you spend a week then at another colliery on close
21 personal supervision with a deputy. Then you go back to
22 your own colliery, and you're interviewed as to what
23 you've learned on that little preceding piece, and if you
24 satisfy the colliery manager and you've acquired the
25 shotfiring deputy's certificates, he may appoint you as a

MR. LINEY, EXAM. BY MR. MERRICK

1 colliery official.

2 You also have to have a first-aid certificate and a
3 certificate as to your hearing and a certificate as to
4 your ability to recognize 1 1/4-percent methane on the
5 lower flame of the safety lamp.

6 Q. All right. And you went through that?

7 A. Yes, yes.

8 Q. Okay. And continue on with your experience and
9 trainings?

10 A. Well, by this time British Coal had a sort of job --
11 on-the-job education training program. They tended to
12 take their input from relatively uneducated people in
13 those days, myself included, but they didn't like leaving
14 people at that level. So anybody who showed interest
15 could acquire technical qualifications in parallel to
16 what I've just been describing to you, and I, at various
17 times, acquired an ordinary national certificate in
18 mining.

19 I then acquired a higher national certificate in
20 mining. These were day release activities where I worked
21 one day at Technical College and five shifts at my own
22 mine and two nights at Technical College. When I
23 acquired those certificates, I was selected for a block
24 release course which meant I went to Technical College
25 full time. This was the first time in my life I could

MR. LINEY, EXAM. BY MR. MERRICK

1 relax because I could actually spend some time not trying
2 to work and study simultaneously.

3 I then spent three years doing a higher national
4 diploma in mining which qualification in the United
5 Kingdom is the minimum qualification required to issue a
6 colliery manager's certificate. Most senior jobs in the
7 United Kingdom, including colliery manager, obviously,
8 but including ventilation engineer, safety engineer, and
9 various other jobs required to the holder of my manager's
10 ticket. So I sought that.

11 I was then selected to go on a link course to Leeds
12 University for people who had done sufficiently well
13 enough at the higher national diploma. And I effectively
14 converted my higher national diploma into a Bachelor of
15 Science Degree as an extension of the higher national
16 diploma. I got a degree in mining. This takes you up to
17 about 1974, at which time I decided to specialize in
18 mining ventilation.

19 Q. Why?

20 A. Well, for two reasons. Rather more people in
21 British -- it wasn't British Coal then, it was National
22 Coal Board, so I apologize for referring to its present
23 name. A lot of people in the National Coal Board had
24 acquired that load of qualifications I've just described
25 to you, so there was rather more people with mine

MR. LINEY, EXAM. BY MR. MERRICK

1 manager's tickets than there were jobs for them. It was
2 a fairly arduous responsibility.

3 I had a quite serious accident to work in which
4 seven of my colleagues were killed, and it sort of took
5 the edge off my ambition, I suppose, in terms of mine
6 management because it was a very much, you know, a fairly
7 aggressive sort of way to spend your life, and I decided
8 that life was for living. And a lot of people did
9 specialize and I specialized in ventilation. It was
10 something I enjoyed and I found myself to be quite good
11 at it. And for the last 22 years I've made a career in
12 ventilation. I became a ventilation officer at a
13 colliery having been back to Technical College and stood
14 in for a ventilation officer's certificate which is
15 another qualification in the United Kingdom.

16 I then became the area -- an assistant ventilation
17 officer at area which just meant, effectively, one of
18 several people.

19 Q. For what area? What scope of responsibility?

20 A. This was the Doncaster area, the National Coal
21 Board. We had 17 collieries at that time, each turning
22 more than a million tonnes. So you would be looking at
23 about a 20-million tonnes enterprise.

24 I then became deputy ventilation engineer in North
25 Nottinghamshire area which had 14 collieries at that

MR. LINEY, EXAM. BY MR. MERRICK

1 time. The National Coal Board restructured and became
2 British Coal and North and South Nottinghamshire has
3 merged into one giant area of 24 collieries, and I became
4 the area ventilation engineer, so I was in charge of all
5 ventilation for the 24 collieries.

6 I then became Headquarters Ventilation Engineer for
7 the whole country at which time we had something like 250
8 collieries, and we were turning something in the order of
9 130-million tonne of coal.

10 At that time I -- my expertise had been sufficiently
11 welcome, let's say, that one or two people abroad were
12 asking for me to be sent out on loan from the National
13 Coal Board, and the National Coal Board are always
14 willing to do that. And I came to Canada. I came to Cape
15 Breton Development Corporation, Lingan Mine, Phalen Mine.
16 I went to Australia three times. I went to Columbia in
17 South America. And I enjoyed that type of work, and
18 eventually I joined a subsidiary of British coal called
19 International Mining Consultants and took on the role of
20 being a world-wide ventilation specialist, an appointment
21 as senior mining engineer, because they didn't actually
22 have a ventilation engineer so they effectively created
23 that post to absorb my ventilation capability.

24 Then I had another turning point due to an accident.
25 I had a very serious accident when I was working in

MR. LINEY, EXAM. BY MR. MERRICK

1 Australia on June the 10th, 1992. I was involved with a
2 roof fall and fractured my spine and became paralyzed so
3 I never was able to go down in the mine again. So I
4 formed my own company. Pardon me for being a bit
5 emotional because it always upsets me saying it, but I
6 formed my own company and started specializing in
7 ventilation.

8 I have a couple of employees who I send underground
9 and who take measurements for me and this sort of thing
10 to replace -- they are my legs. And I work all over the
11 world now.

12 I have just recently come back from New Zealand
13 where I was investigating an explosion at the Huntly West
14 Mine in North -- in the North Island of New Zealand. I
15 investigated the Kozlu explosion. This was before my
16 accident, actually, which killed 262 men in Turkey in
17 1992, which was a coal dust explosion.

18 I do a lot of work in Canada, just to relate it to
19 Canada. I'm a professional engineer in Canada. I'm a
20 member of the Association of Professional Engineers of
21 Nova Scotia which I found was necessary to get
22 engineering work in the Province.

23 I worked for Devco. I did a job for the Department
24 of Supply and Services of the Canadian Government which
25 was to design and direct their research activities in

MR. LINEY, EXAM. BY MR. MERRICK

1 relation to coal mining and the, sorry, the ventilation
2 of coal mining and methane. And I'm now on a rolling
3 six-month contract with CanMET which is the research arm
4 whereby I direct their -- I designed their ventilation
5 related research program that they're currently on and on
6 a six-monthly basis I supervise that it's being correctly
7 followed and give them guidance.

8 I worked for Stewart, McKelvey, Stirling, Scales in
9 Canada on another litigation involving Eastern Canada
10 Coal Gas Venture which is a civil case. I worked for the
11 RCMP. And that brings us to being here today.

12 Q. When were you retained by the RCMP?

13 A. January, 1993.

14 Q. And briefly tell me what -- I don't want it all in
15 detail but, generally, have you had access to all the
16 information you require in relation to the Westray
17 explosion? Let me back up. The purpose of your retainer
18 was what?

19 A. Well, Herman Felderhof, who was the Crown Attorney
20 at that time for the first trial, and Ches MacDonald, who
21 you all know, wanted really to extend their knowledge of
22 ventilation and also to have my input into, you know, the
23 matters relating to the explosion. So they came to the
24 United Kingdom in January, 1993, and spent a week with
25 me. At least they were going to spend a week with me,

MR. LINEY, EXAM. BY MR. MERRICK

1 but I had got them worn down by the Thursday dinner time
2 so they gave it up on a Thursday dinner.

3 But basically they brought with them what they could
4 carry. It included some of those photographs, and it
5 included plans, although they were very sketchy at the
6 time. It was still at an area when people couldn't even
7 actually be clear what the names of various roads were
8 because they passed by so many names. I mean, the plans
9 you have now have sort of got the final word on the
10 names, but it was a very confusing area at that time.
11 And I produced this report on the basis of the
12 information that they were able to carry by hand. So I
13 certainly at that time had a relatively small amount of
14 information. I certainly didn't have the million
15 documents that I understand comprise the whole bag of
16 rations. But I thought they brought a very sensible
17 choice and, in hindsight, I still believe that because it
18 in fact helped me make my opinion and the new information
19 that came to light after that, although it added depth,
20 didn't fundamentally alter my opinion. So on that basis
21 I would say I had a very good selection.

22 I came to Canada and met with them a couple of times
23 over here during the proceedings. And on each visit I
24 acquired more information. I then began to get testimony
25 from the trial and then on the day that the Judge stayed

MR. LINEY, EXAM. BY MR. MERRICK

1 the trial, of course, the testimony effectively ceased,
2 and I was asked to temporarily cease my involvements
3 until such time as the Appeal had been heard. And I'm
4 now obviously back on board in terms of the new Crown
5 team which has been put together to do the next trial.

6 Q. And in addition you have been provided with evidence
7 and information that's come out of this Inquiry to date?

8 A. Ena MacDonald provided me last Saturday with a
9 fairly thick pile of stuff which I think is 37-A, 37-B.
10 You will have to help me on the other names, a series of
11 plans which I found very useful. I think it's 45.

12 Q. All right.

13 A. I can't remember, one or two other items. Oh, and
14 Dr. McPherson's testimony, 37 to 38-B which are the
15 exhibits that go with his testimony.

16 Q. Based on all the information that you have seen and
17 as we go through your evidence, we can identify if there
18 are any areas that you may still want to look at, but
19 based on all the evidence that you have seen, have you
20 been satisfied that you can develop an opinion as to the
21 ignition and propagation of this explosion?

22 A. I'm satisfied that I can put a cohesive theory
23 together --

24 Q. Yes.

25 A. -- which fits all the facts that I know. I think we

MR. LINEY, EXAM. BY MR. MERRICK

1 have a reasonably large number of facts even despite the
2 fact that we haven't been underground and maybe taken
3 every last piece of evidence out of the mine. I think
4 it's extremely supported by the unbelievably competent
5 set of photographers that the RCMP provided which are
6 almost like a film to me. You know, I have looked at
7 them sufficiently to feel I've been down that mine which
8 is clearly as close as anybody's going to get to actually
9 going down in the mine. And, yes, I think I have added
10 together a reasonable theory which I think fits all the
11 known facts, and it's supported by all the evidence
12 that's come to light, to my knowledge, to this date.

13 Q. All right. Now I'm going to ask you to give us an
14 overview of that theory from sort of start to finish and
15 then we will go back and look at detailed portions of it.
16 You may be assisted by the fact that on the bulletin
17 board or peg board we have a blow-up of the Southwest
18 district and the North Mains, and you should have in
19 front of you on the desk somewhere a little laser pencil.

20 A. Yes, I see it. I brought my own, but if -- you've
21 beat me to it.

22 Q. Fine. Tell us your theory of how this explosion
23 initiated and propagated?

24 A. To use that map I would have to get closer to it. I
25 can't see it from here.

MR. LINEY, EXAM. BY MR. MERRICK

1 Q. Or you can operate off Exhibit 45. Is that a big
2 one?

3 COMMISSIONER Would you sooner move over?

4 A. I have to move over. I can't see the map from here
5 so I would have to -- can I point to --

6 MR. MERRICK Whatever --

7 A. -- it directly rather than --

8 Q. Sure. Sure.

9 COMMISSIONER What number --

10 MR. MERRICK It's exhibit -- well, he's just looking at
11 the ventilation blow-up. Tab 11, Exhibit 45.

12 COMMISSIONER Which of the plans are you going to work
13 on?

14 A. The whole mine. That's not a full mine plan, is it?

15 MR. MERRICK No, that's just the two districts. If you
16 want the full plan, there is a colour-coded one that will
17 just lean up against the stand that will fill in the
18 missing pieces.

19 A. If you people could see to that level, that would be
20 great for me. Is that okay for everybody?

21 Q. That's fine.

22 A. Okay.

23 Q. You're now referring to the colour-coded chart that
24 is in Exhibit 45-2 or plan.

25 A. Well, as you've asked me to restrict myself to a

MR. LINEY, EXAM. BY MR. MERRICK

1 walk-through version of the theory, I won't dwell on the
2 evidence that makes me believe what I believe. But
3 suffice it to say that every piece that I'm going to say
4 to you I can justify why I believe it.

5 Q. We will go back and do that once you've taken us
6 through --

7 A. Okay.

8 Q. -- the whole piece.

9 A. We're aware that a very large area of coal here had
10 been heavily mined down to narrow pillars and was causing
11 a lot of roadway collapses. So we've got a huge
12 fracturing area of coal here in Southwest 1 which is
13 known to have been the source, and it was bound to have
14 been the source of quite a large continuous flow of
15 methane into the mine atmosphere. When the mine withdrew
16 from there, as everybody knows, they went up Southwest 2.
17 And this part of the circuit remained on the upstream
18 side of the Southwest 2 ventilation, so in fact formed
19 part of the intake.

20 There is evidence from the somewhat sporadic
21 ventilation data that was acquired at the mine, so I'm
22 afraid you don't have a daily record or even a
23 necessarily a weekly record, so you have to go with spot-
24 point analysis. But there is evidence that approximately
25 200 liters per second of pure methane was being generated

MR. LINEY, EXAM. BY MR. MERRICK

1 in this area and was passing into the intake and passing
2 around the Southwest 2 district. Not necessarily in
3 cognizance of the figure 200 liters per second, but
4 certainly cognizance of the fact that a large methane
5 percentage was available and measurable at this C-1 Road
6 position.

7 The mine walled off this area in about a month
8 before the accident, sometime in April. They used two
9 plywood seals of a fairly ineffective type on B Road and
10 C-1 Road. They apparently placed no seal whatsoever on
11 the third entry into this region which is 2 North A, I
12 understand, in the belief that the fact that there was a
13 fall down there may or may not have been effecting a
14 seal, but I find that very unlikely. So I considered
15 that effectively the area was not sealed off and that
16 there would be a natural tendency for air to flow round
17 the piece and outflow through the C-1 stopping.

18 Q. How adequate was it to assume that a roof fall would
19 act as a ventilation stopping?

20 A. It's a completely false premise. I've never known a
21 fall -- unless the fall guttered to the edge of the roof.
22 In other words, it was the type of fall where the roof
23 remained stable and then there was sufficient very, high
24 level activity to gutter down to the roof and therefore
25 cause a nick point in the ventilation. The typical fall

MR. LINEY, EXAM. BY MR. MERRICK

1 which spreads out over a long horizontal length and
2 vertical length doesn't make any effect on the
3 ventilation at all.

4 Q. So there is no reasonable basis for anybody to
5 assume that was a proper stopping?

6 A. Oh, no. Far from it.

7 Q. Or not stopping but would have interfered with the
8 ventilation flow. All right. Sorry, keep going.

9 A. There is evidence to suggest, in fact, that the
10 figure of the leakage that was going around there was
11 5,000 cubic feet a minute. I would prefer to refer to
12 metric figures if that's acceptable?

13 COMMISSIONER Sure, yeah.

14 A. Okay? Which is 2 1/2 cubic meters a second, which
15 is quite a substantial air flow to be going around a so-
16 called sealed-off district. The ceiling of the district,
17 to the extent it was sealed, would not have affected
18 either the production of 200 liters per second, because
19 clearly it would have no influence on that; that was
20 being generated by continuing de-stressing of the -- this
21 rather large body of coal, but equally clearly, it
22 wouldn't have affected the amount of that 200 liters that
23 flowed out. What it would have done is seriously
24 increase the purity at which it flowed out because the
25 mixing point was now, effectively, the C-1 wall itself

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1 rather than some more inbye circuit such as that where
2 the mixing point would have been inbye and effectively
3 the air would have represented itself at the return at
4 some lesser percentage.

5 Q. So that --

6 A. To --

7 Q. Just make sure I've got that. Before they put the
8 stoppings in, it would have been mixing as it circulated.
9 So there wouldn't have been just one mixing point; it
10 would have been the whole circuit, wherever that was, in
11 there?

12 A. Yes.

13 Q. Mixing the whole --

14 A. I would --

15 Q. -- way?

16 A. -- think -- I would think principally around the
17 nearby circuit but for sure gas coming from there would
18 have to pass through a sort of a sluggish mixing point
19 where reputedly there was 10 cubic meters a second going
20 round, so it would have had a good chance to mix up a
21 little bit before it reached the ultimate mixing point at
22 No. 3 Crosscut.

23 So I rather feel that the placement of that wall
24 there was, effectively, a retrograde step if the wall was
25 not to be a thorough stopping. I think basically they

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1 had two choices at that time was to put a stopping on or
2 to leave well alone for the -- and cure the problem by
3 some other means, which I can discuss later.

4 Q. So the stopping made it worse, potentially?

5 A. The stopping as created, yeah. I mean, I would have
6 said let's get that area stopped off, but that's not what
7 happened.

8 200 liters coming down Southwest 2-B Road in the air
9 flows claimed by the mine, which I have my suspicions
10 about some of these air flows which, again, I'll talk at
11 later. But in the air flows claimed by the mine would
12 have represented about .5 to .6 per cent methane in
13 Southwest 2-B Road. And quite clearly, on several
14 occasions in the succeeding month, .5 and .6 per cent
15 methane were found in Southwest 2-B Road.

16 Now when it was .5, .6 per cent in the general body,
17 that's exactly where it was, in my opinion. On those
18 days we were talking about the 200 liters being
19 effectively diluted into the general body. During this
20 period, unfortunately, and notwithstanding the fact that
21 they occasionally saw fit to interrupt the ventilation to
22 the Southwest 1 by leaving various doors open or stopping
23 the surface fan for unauthorized reasons, leaving the
24 overcast open, passing cables through doors, et cetera.
25 So there's very, very many reasons to suppose that the

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1 airflow got interrupted on a relatively transient basis.
2 And people commented on the variability of it and the
3 records show a huge variability.

4 On April the 23rd, a regulator that was sited
5 between numbers eight -- sorry, No. 9 and 10 Crosscut in
6 No. 2 Main which had been intended to regulate the North
7 districts in favour of the Southwest; in other words, to
8 take air from the North and put it onto the Southwest,
9 that regulator was substantially dismantled. This
10 consisted in fact of plywood nailed up over wooden laths
11 all over the roadway and round the conveyor, and most of
12 that was removed on that date, because the North was now
13 getting into trouble and had an increase in production
14 expectation. They'd opened up a new face in the
15 Southeast which was in severe trouble.

16 So on that day in the general variability of
17 Southwest 1 ventilation -- so we accept that even before
18 then it was going up and down a lot. It's now going up
19 and down on a lower base level.

20 Now again, even accepting the ventilation claimed by
21 the mine to be passing through No. 3 Crosscut on the day,
22 which was almost exactly 35 cubic meters a second, we
23 have to -- the figure actually adds up 72.5 cubic meters
24 a second coming up here at this measuring point, but we
25 have to accept the two and a half cubic meters that was

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1 going round the piece. So, in fact, the bit that was
2 left to come down here was 35. Sorry, I've mixed up CFM
3 -- I knew I would end up doing that. There was 72,800
4 CFM there and 5,000 of it went round here, so we ended up
5 with the difference between the two which was 35 cubic
6 meters a second.

7 Now 35 cubic meters a second in that roadway is
8 trying to dilute and mix the 200 liters of pure methane
9 coming out of C-1 Road. Now this is not a right angle by
10 any means, although I heard this said this morning. It's
11 very much more than a right angle. It's quite a neat
12 turn, actually, if you're trying to avoid turbulence.
13 But you're not talking severe turbulence in that type of
14 air flow. None of the velocities we have talked about
15 today or I shall talk about this afternoon are, by any
16 stretch of your imagination, high. They're all shades of
17 low. So I mean, the concept of junctions creating
18 serious turbulence and this sort of thing does not apply
19 in these types of air flow. So, effectively, we are
20 asking ourselves whether -- am I making sort of making
21 this too long or --

22 Q. No, just keep going. Give me the overview; I'm
23 going to take you back and --

24 A. Okay.

25 Q. -- pick up at a few places where I'm falling off.

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1 A. Well, basically, we're saying did this 35 cubic
2 meters per second succeed in destroying this layer at
3 various times. I won't dwell on my opinions on this road
4 because you'll ask me about them later, but in my opinion
5 from that junction onwards, the likelihood of being able
6 to disturb the layers got less. So we had one chance and
7 one chance alone. This was the highest velocity region
8 in the piece. Any constrictions, which were very minor
9 here, were more than offset by the leakage that was lost
10 to the air flow through this belt airlock. So for sure,
11 that was our only opportunity to destroy these layers.

12 Now calculations suggest to me that on the very high
13 highest air flow ever suggested for that piece, and that
14 certainly didn't apply on May the 8th, but on the very
15 highest air flow ever suggested for that piece, layering
16 could have been interfered with to the extent of
17 destroying it before it got down to that junction.

18 But in my opinion on the -- May the 8th, with the 35
19 cubic meters, it would have taken -- the layering index
20 that I calculate for that roadway is about 3.2, and that
21 would have taken something like 50 to 60 meters of
22 roadway length to successfully disperse the layer. So in
23 other words, nothing like enough length of roadway
24 occurred for the layer to be disturbed. A layering index
25 of something in excess of 5 would have destroyed the

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1 layer almost immediately on mixing. But, for sure, never
2 was there a layer index of 5 available to that roadway
3 site. So in my opinion, the layer persisted down to this
4 junction on the days when the air flow was at its lowest
5 ebb and may, occasionally, have not been destroyed -- and
6 may occasionally have not survived down to that junction
7 on the very highest air flows that were claimed for the
8 mine.

9 So I see a position where when we found .6 per cent
10 in this roadway, the layer had probably been destroyed,
11 and when we found much fresher air in this roadway, and
12 everybody rubbed their hands and said the problem has
13 gone away, almost certainly the same gas, the same 200
14 liters, were sitting above their heads as a very
15 substantial roof layer.

16 Q. So that on days when we see a higher general air
17 body layer of methane, that's when you feel there had
18 been sufficient velocity, if I can, outbye, in a sense,
19 but near the junction point, to have mixed it into the
20 general body. But on days when that dropped and we see a
21 low general air body measurement of methane, in your
22 opinion, all that indicated is that it hadn't been mixed
23 enough and it was still there, but it was now up there?

24 A. Exactly.

25 Q. All right, got you so far.

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1 A. This layer which -- and I won't, you know, bog down
2 at this stage because you'll come back to it, but I think
3 was about a meter thick at its worst, would have
4 gradually reduced in methane concentration, but wouldn't
5 have reduced in methane content, if that makes sense to
6 you. It would have become slightly thicker and would
7 have become lesser -- less concentration as it proceeded
8 down the road. This is an uphill 13 degree gradient, in
9 fact. But by the time it reached this junction, it would
10 have thickened a little bit, but it would still have
11 contained all the methane that it originally contained.

12 I've done some calculations, which we'll refer to
13 later, taking the assumption that some of the methane
14 exited via the first crosscut along with an equal
15 proportion of air. Although I find that unlikely
16 because I think it's likely the methane would have stayed
17 in the road and the air would have preferentially exited.
18 But, in fact, I based my calculations on a -- the worse
19 case assumption, that an equal proportion of the methane
20 went with the leakage at that point. I'm still talking
21 about substantially more than a meter thick by the time
22 we get down to this junction.

23 When it reaches this junction, it will enter all the
24 headings that were exhaust ventilated by the two fans
25 that were situated just downstream of this junction.

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1 Q. Why is that?

2 A. Because it's -- that is the only motivation to send
3 air in any direction from that junction. These fans
4 actually consume or handled about 60 cubic meters a
5 second of air between them. And the evidence suggests
6 that there wasn't a lot more than 60 cubic meters of air
7 left by this point after the various leakages of one
8 thing or another. You've got a leakage here and a
9 leakage here.

10 But regardless of that, the exhaust fans are
11 designed to take air out of this road. It's designed to
12 take air out of this road --

13 Q. Pull it into the headings?

14 A. Sorry?

15 Q. And pull it into the headings?

16 A. Right. Now this heading is initially on the rise
17 and then levelling off. And this heading is initially on
18 the rise, I think, a little bit and then levelling off.
19 And, basically, if the layer reaches that junction, it
20 would just pour into the headings with the very, very
21 sluggish air flow that was available in those headings.

22 There are various ways of looking at it. I can
23 explain mathematically to you how thick that layer would
24 have become in the circumstances, et cetera, but in
25 simplistic terms, it would have filled up the heading

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1 until it could run out the other end by filling up at the
2 roof, and the only thing that's going to get it out at
3 the other end is the exhaust ventilation. So, in fact,
4 whatever layering was taking place would have been
5 enhanced in here.

6 The remaining 100 liters, as I've got it now, of
7 methane would divide between the headings according to
8 the air flow that was going into those two headings. And
9 in my opinion, about 58 liters went up this heading.

10 Now all this, except people were checking for
11 layering, would have gone on undetected because the
12 general body wouldn't show it. And they left the
13 ductings back in these headings so far that I don't
14 believe this layer ever got to the head end; I believe it
15 only got to the duct end. And that anybody who operated
16 at the head end would have been seeing a completely
17 different atmosphere. The atmosphere there and the
18 methane created there would have been the creation of
19 that own headings' particularly mining activity on the
20 day. But they were in their own little environment fed
21 by the fresh air that underlay the layer. So this layer
22 is coming around the mine, going out this duct, and going
23 out the mine unnoticed, in my opinion, on a regular basis
24 for a period of about a month. The period of a month
25 being solely related to the length of time it was since

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1 they drew out of this piece.

2 Q. I want to make sure I understand it. So that in
3 that heading, this is in the Southwest 2-1 Road heading,
4 the methane is coming in that heading -- the Southwest 1
5 methane layer is coming in that heading as far as the end
6 of the tubing which is exhausting?

7 A. Yes.

8 Q. It is then being drawn into the end of that tubing.
9 At that point I assume it's being mixed down to some much
10 lower concentration?

11 A. Yes, it would have been well below the explosion
12 range when it entered the duct. Again, I've got all the
13 calculations to back this up -- based on some premises,
14 obviously. But, you know, if you accept the 200 liters
15 premise, then all the other calculations flow from that.

16 The layer, for sure, couldn't pass the end of the
17 duct. If there was a layer from the end of duct to the
18 head end, it was the creation of the head end; it wasn't
19 the creation of the layer coming from outbye. The layer
20 coming from outbye couldn't be at the duct end except,
21 and only "if" there was more gas coming in than the
22 ventilation handled. Well, the ventilation we know
23 handled about two and a half cubic meters a second. So
24 in comparison to the gas at about 200 liters, which is .2
25 of a cubic meter a second, the ventilation would more

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1 than adequately have taken out of the heading all the gas
2 that was sent into the heading. And a steady state
3 occurs where 200 -- well, sorry, 58 liters goes in and 58
4 liters comes out, and between the two is just a whopping
5 log of gas. Do you follow that?

6 Q. Yes.

7 A. The same would have applied in Southwest 3 Road.
8 When --

9 Q. Just before you leave Southwest 1 Road extension.
10 Is your opinion changed at all by the fact that the
11 exhausting tubing in that heading was in the down side of
12 the roof and that there was quite a slope? As you can
13 see in photograph of 26 that the RCMP took?

14 A. No. The only difference that makes is that a
15 thicker layer would be likely to have accumulated before
16 it reached the duct and was able to be removed by the
17 ventilation system. So, in fact, the layer in this
18 heading could have occupied as much as 6.1 cubic meters,
19 which is the total volume of roadway above the duct -- or
20 above the bottom of the duct. So the worst case scenario
21 is that that layer was well over a meter thick in that
22 heading, down the tall side of the heading to --

23 Q. If it was that --

24 A. -- level with the duct.

25 Q. If it was that thick, surely some of it would have

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1 extended past the end of that ducting up to the working
2 face?

3 A. Not at all.

4 COMMISSIONER Is this 25 you're showing him?

5 MR. MERRICK I believe so.

6 COMMISSIONER Maybe he --

7 MR. MERRICK Yes.

8 COMMISSIONER -- should take a closer look at here.

9 Have you seen -- you've seen --

10 A. Yes, I saw it.

11 COMMISSIONER Oh, okay.

12 A. Not at all. It's a well -- it's -- thanks very
13 much. It's an often supposed hypothesis that methane
14 going up a heading is going to have some motive force of
15 its own, but we're talking about a level heading at this
16 point in time. I do believe it might have motored past
17 the duct in the Southwest 2-B bolt heading, but it's not
18 going to motor past the duct in a level gradient. It's
19 got no imperative to do that.

20 Q. All right.

21 A. So as far as I'm concerned, the duct -- the layer
22 stops either where it's own buoyancy stops it or where
23 the ventilation stops it. In this case there's no
24 particularly buoyancy driving it, and the ventilation,
25 quite clearly, would want to take it and pull it into the

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1 duct.

2 Q. At least enough of it to keep the buoyancy of the
3 rest of it held at that limit?

4 A. Yeah. Well, so you've got a steady state control.
5 You've 200 liters coming in, or --

6 Q. All right.

7 A. -- 58 liters going up the heading and 58 liters
8 coming out.

9 Q. Okay, let's keep going with the overview of your
10 theory.

11 A. Right.

12 Q. So we have a layer.

13 A. This layer would be equally into the Southwest 2-B
14 Road. The sum total of the gas that had reached this
15 point which we've said may be 100 liters if some of it
16 went west in the first crosscut. I shouldn't use the
17 expression "west."

18 Q. That's south.

19 A. Went away. Went south. All the gas then passes
20 through the fans in a mixed state and then leaves the
21 mine by the normal return system and passes a methane
22 detector at No. 5 Crosscut, which fairly basically it
23 shows about .31 to .35 per cent on high days and
24 holidays, which is one of the reasons I believe that the
25 bulk of the gas was coming from here because .31 per cent

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1 in their claimed air flow is about 310 liters a second,
2 and there's no way that the mining activity in this mine
3 was making more than 100 liters per second on a good day.
4 So there's a missing 200-odd liters per second arriving,
5 24 hours a day, at this monitoring point out here. And
6 in my opinion I've just described to where -- what its
7 route to travel is.

8 So we now have a persistent, maybe not continuous,
9 but continual occurrence of a methane layer in that piece
10 all the way to the fan discharge.

11 Q. Let me just stop you there so people aren't
12 confused. When you say "may not be continuous," you're
13 talking about day after day after day?

14 A. Continuous in time not -- yes.

15 Q. That's right. But on days when there was a layer,
16 it was a continuous layer?

17 A. It was a continuous layer, yes.

18 Q. Yes.

19 A. They continually had a continuous layer.

20 Q. All right.

21 A. If you understand the distinction between
22 "continual" and "continuous."

23 Q. So we have a layer. Tell me the rest of your
24 theory.

25 A. Right. Clearly, that layer was ignited and,

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1 therefore, the zone in which it was ignited had to be in
2 that length I've just described to you as being where the
3 layer persisted. I absolutely say that the layer didn't
4 persist past the exhaust fans and, therefore, any
5 ignition source on the downstream side can be ignored
6 absolutely. So we've got it nailed down to somewhere
7 between the fans themselves and the occurrence of the
8 layer in the first place, which is quite, in mining
9 terms, quite a tight little piece of mine. So, you know,
10 we are down to maybe half a dozen to a dozen potential
11 sources, likely or not.

12 Q. Including the headings?

13 A. Including the headings. Now the mine didn't have
14 many ignition sources at roof level. They didn't
15 habitually place the cables in the roof, for example. So
16 more or less this layer passed undisturbed on its travels
17 without being interfered with by mining activity.

18 I'm absolutely sure that it didn't occur at
19 Southwest 2-1 head end, which is a point we can come back
20 to, and the only feasible ignition sources I can see are
21 the roof bolter at Southwest 2-B or the boom truck parked
22 at the junction at Southwest 2-B and the second crosscut.

23 Now due to photographic evidence, I favour the
24 opinion that the boom truck started the ignition.

25 Q. Why?

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1 A. My opinion is that the duct which was on the left-
2 hand side looking inbye at Southwest 2 second crosscut
3 and entered this heading, and opinions vary as to which
4 side of this heading it was on, but it must have crossed
5 this heading sooner or later because it was T'd off and
6 went up the No. 3 Road. So it's not clear whether it
7 only did that here or whether it actually swept round the
8 junction and went up the right-hand side of the heading.
9 There are ducts in the heading on both sides. But this
10 duct, in my opinion, the boom truck, which contrary to
11 what I have heard some people say, but I think in
12 compliance with 90 per cent of opinion, must have been
13 travelling up the return, because having moved the
14 conveyor into this road I think about a week before and
15 then placed in a non-travellable airlock on C-1 Road,
16 which the boom truck clearly couldn't have passed
17 through, and the boom truck certainly couldn't have come
18 around this way, even if it went through the return and
19 got back underneath the conveyor there, so the boom truck
20 presumably was going down the return. Although, that
21 isn't necessarily germane to my theory. It comes up the
22 crosscut and appears to me to have made an attempt to
23 turn left into Southwest 2-B.

24 Q. Do you know what it was carrying?

25 A. It was carrying what are described as roof bolts and

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1 other spares. Nobody -- I've not seen specified what
2 those other spares were.

3 Q. But if it was carrying roof bolts, that's where the
4 bolter was? Where one of the bolters was.

5 A. Well, that's right. If it was carrying roof bolts,
6 and given that there's evidence that they used to drive
7 the boom truck into the headings anyway, I'm quite
8 surprised that it was stopped on the junction. Although
9 I'm not surprised in view of what I'm going to tell you.

10 I think what happened was -- the ducts -- there's
11 clear evidence, and I don't think anybody disputes it,
12 that the duct was hung on mesh in the roof using what are
13 called "pigtailed" which are the very soft metal
14 sacrificial hooks which are built into spiral reinforced
15 ducting. They're intended to be very weak for the
16 purpose that the if the duct gets pulled on, instead of
17 damaging the duct, the duct just comes down and you can
18 always -- there's loads more hooks than you ever use.
19 They're all over the top of the duct, so you just use
20 another hook. Unfortunately, if you hang them on mesh,
21 and you've got a scabby junction where there is no sort
22 of systematic meshing, it's -- you don't find as many
23 places to hang it. So it's quite likely that the duct
24 was already relatively low as it went across the
25 junction. But it would only have needed, say, one hook

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1 to have parted to get lower still.

2 COMMISSIONER Would that be an illustration of the two -
3 - like, the --

4 A. This is hooked on --

5 COMMISSIONER -- the wires, the hooks, up there?

6 A. I don't think you can actually see the hook -- yeah.

7 COMMISSIONER Two hooks showing there, eh?

8 A. Do you see that with your own eyesight?

9 COMMISSIONER Oh, no.

10 A. No, I only see one right at the top. It would have
11 been right at top, dead center. This is something else.

12 COMMISSIONER Okay.

13 A. That is a hook, yeah. And there would -- they're at
14 regular intervals right through the length of the duct.

15 COMMISSIONER Okay, thank you.

16 A. Yeah.

17 MR. MERRICK That's Exhibit --

18 COMMISSIONER That's Exhibit 25 -- photograph 20 -- or
19 pardon me. Exhibit 59, photograph 25.

20 MR. MERRICK All right, thank you.

21 A. I believe for reasons of photographic evidence, I
22 mean, I would never have dreamt up this theory just out
23 of the blue, but on the basis of photographic evidence, I
24 believe the boom truck as it was travelling around the
25 corner, under the duct, which it clearly had to do to

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1 arrive in the position that it was, the back end of the
2 boom caught the duct which at that time was maybe hanging
3 a bit low. If it pulled on it at all, it would have
4 pulled it down for some length, and it would have laid it
5 down on top of the boom truck, which is, in fact, where
6 it is in the photograph, and I think then the piece of
7 the duct that dropped down in front of the driver, or in
8 front of the right-hand side passenger, should I say, on
9 the exhaust side of the boom truck, the duct that dropped
10 down there was run over by the machine, wrapped round its
11 wheel in a fairly tangled and messy way, quite a
12 considerable length of duct. So it must have been
13 hauling it back out of the heading to achieve that
14 objective, almost like a winch. And it must have
15 travelled then at least another couple of meters, because
16 the duct is quite clearly -- in the photograph to which
17 I'm referring which is number 200, which you've put in
18 exhibit book. This also shows more clearly in 199, but
19 that's maybe --

20 MS. MACDONALD Exhibit 70, 110.

21 MR. MERRICK Yeah, we'll him bring back to the
22 photographs in a minute. All right, so it tangles up the
23 duct.

24 A. But it's underneath the boom truck. So, clearly,
25 the boom truck ran over the duct. I don't believe that

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1 duct could possibly have been a duct that was laid on the
2 floor because if you're storing duct on the floor, you
3 store it in its concertinaed fashion, as is evidenced
4 from all the photographs further up the heading. I mean,
5 this duct occupies no space at all if it's just stood on
6 its back and allowed to concertina down. So to stretch
7 it out right round a corner just for some storage purpose
8 would not seem to me rational. To me, if it was in its
9 open and stretched out state, it was open and stretched
10 out for the purposes of ventilating the place.

11 I think the men may then, having realized they'd
12 just run over the duct that was feeding the heading and
13 there was a bolting operation taking place, quite rightly
14 -- perhaps "panicked" is a strong word, but realized that
15 they ought to immediately alert the -- those in the
16 heading as to what had occurred, and I think they would
17 have jumped off the boom truck and gone -- I understand
18 this was Doyle and Larry, was it? The second one, I
19 can't remember his name.

20 Q. Myles?

21 A. Larry Bell, I think. Anyway, the two -- apparently,
22 the two men on the boom truck, and I think they would
23 have gone up the heading to alert the drillers as to what
24 had occurred: (a) to stop drilling, presumably; and (b)
25 you know, what do we do now. That would, in my mind,

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1 explain why they parked in such a otherwise unusual
2 position.

3 Q. Why is it unusual?

4 A. Well, it's unusual because if they were delivering
5 stuff into this heading and having got to where they got,
6 they'd broken enough rules already to not want to be
7 bothered about breaking another one and go up the
8 heading. And also, if they stopped there parked with the
9 engine running, they would have been in the way of the
10 shuttle car as it came down Southwest 2-1 presumably
11 within the next five minutes because the shuttle car in
12 Southwest 2-1 Road is variously reported as being 70-85
13 percent full, although I've seen 30 percent as well. It
14 depends which report you believe. It looks, to the
15 photographs, to be three parts full anyway. So pretty
16 well, actually, cars were going to be coming down here
17 and going to be interfering with the boom truck.

18 Now unfortunately, one of the many facilities it
19 doesn't appear to have is a dead man switch, which means
20 that when you take your foot off the dead man, the
21 vehicle automatically stops, which is a mandatory
22 requirement of normal, underground approved diesels.
23 This is a pit top type diesel and in fact they were able
24 to leave it running.

25 I believe then as they were in the heading, probably

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1 hadn't got very far into the heading, either the duct
2 ignited, which is, in my opinion, entirely feasible,
3 although I have no scientific evidence to suggest that
4 the heat generated by the exhaust would ignite it. I do
5 know that a relatively low temperature will ignite this
6 type of duct. Or the gas that was entrained in the
7 activity of pulling the duct down was ignited. And I
8 favour the duct being ignited myself. And it ignited the
9 layer at this point.

10 Now the layer would have burned maybe a little bit
11 more turbulently just there because of the fact that it
12 had already got a good start if it had been stirred up by
13 the duct being pulled down. But the layer would then
14 have burned back in towards the men in Southwest 2-B and
15 back up the hill towards the men in Southwest 2-1, and at
16 the same time back down Southwest 2-B Road.

17 At this point in time, Romeo Short, who was clearly
18 on the bolter -- there's some dispute as to just what
19 activity was taking place, but the booms were up and it
20 would appear likely to me he was about to put, what you
21 call in this country, nut runners to thread up an already
22 inserted roof bolt.

23 And the gentleman behind him was apparently handling
24 mesh because mesh was burned to his helmet and his helmet
25 was found burned to the mesh.

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1 And I think these two people would have been
2 overtaken fairly quickly by this flame burning down here
3 because Romeo Short stood on top of the bolter, which is
4 significantly higher than anybody else in the heading.
5 And all the evidence suggests that he was taken where he
6 stood and dropped straight down into the walkway of the
7 bolting machine.

8 Presumably everybody else turned heels and tried to
9 get back towards the junction. I doubt they would have
10 got through the junction because, although the layer
11 where it was burning quiescently in the heading would
12 have been fairly stable and travelable with difficulty
13 with some heat, when you got towards the junction, they
14 would have found this rather more messy burning operation
15 taking place with the flame dipping and diving, because
16 it already started in a turbulent fashion.

17 The men up here, in my opinion, would have seen this
18 burning, may not have known what it was immediately. In
19 a rather more organized fashion removed -- in time, I
20 mean, removed their self-rescuers around the machine.
21 So, to my mind, they were of the opinion, for a very
22 short period of time, that they had that opportunity.
23 They didn't throw the bits of the tins as they run. They
24 actually threw the bits of the tins down around the
25 continuous miner. So, in my opinion, they saw what they

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1 considered to be a fire in what was a reasonable distance
2 away from them and commenced donning their self-rescuers
3 in a relatively organized fashion.

4 I don't think these people did, because I think they
5 recognized the danger as being a bit more close to them.

6 These men all set off and run and Ferris Dewan was
7 the most outbye of them, my guess being because he was
8 the most outbye of them when he started running. He,
9 being the fire boss, would have been one person who was
10 entitled to be anywhere he liked to be, and therefore he
11 may just have been on his way into the heading.

12 As he approached the junction, he couldn't get onto
13 the -- they're running under the layer. They're getting
14 scorched and they're getting radiant heat, but as he
15 approached the junction, he couldn't have gone under the
16 layer any more than these people could, and he apparently
17 went down on his hands and knees in what was described as
18 a praying position, and he got no further.

19 Meanwhile, during the period of time which may be in
20 the order of ten seconds, I heard twenty seconds
21 mentioned this morning, and I have no reason to argue,
22 about ten to twenty seconds, the flame has burned down
23 here. And I should, incidentally, point out that at no
24 place in the whole of this piece could this have been an
25 explosive mixture of gas if mixed up into the general

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1 body. In other words, while it was a high concentration
2 layer burning to its boundary, if turbulence had been
3 sufficient to mix it into the general body at that point,
4 for example, it would not have been an overall explosive
5 mixture. You would have been back to your .6 percent
6 effectively, if that's what logically ties it up here.
7 It wouldn't have been five percent, not by a hell of a
8 long way.

9 So in fact it's just going to burn down there. It's
10 going to burn right back, go back up to where it came
11 from, going to go straight through the plywood wall,
12 which we know the top of which was broken. A little bit
13 of weight had come on the plywood wall. It had snapped
14 and parted company with the roof. So in fact there's a
15 letter box over the top anyway, both for the gas to come
16 out and the flame to go in. Not that a plywood wall
17 would have stopped the flame in the first place.

18 It's back in here now. Now it's now facing an
19 accumulation of something in the order of 50,000 cubic
20 meters of methane, which is a considerable body of
21 methane. I estimate, just to give you an idea, there was
22 enough methane in there to run a 2,000 power station for
23 about five minutes, which is a lot of methane. When it
24 got in there, it, for the first time, met a surplus of
25 gas over air. So we've got a position here where there's

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1 too much air and not enough gas to cause an explosive
2 mixture per se, into an area where there's too much gas
3 and not enough air to create an explosive mixture per se.

4 And what it would have been obliged to have done is
5 created some turbulence and mixing at that boundary and
6 put those two items together and blown off just a
7 relatively small proportion of this huge amount of gas
8 that was present. It would have been impossible for it
9 to have ignited all that gas because there was no oxygen
10 sufficiency to have done so. So it would have blown off
11 a big chunk off the front of the piece, allowing this
12 area, where there was the opportunity to mix into an
13 explosive mixture, and it would have then collected quite
14 a -- quite a decent explosion, not a devastating
15 explosion, but it would have meant for the first time
16 violence associated with what was taking place.

17 I think at that point in time, and certainly during
18 this period there would have been sufficient oxygen for
19 these people to have survived, had they been wearing
20 their rescuers. I think from that point in time,
21 consumption of oxygen occurred, but not up here. Maybe
22 some more CO was sent back down here because I don't
23 believe these people would have been killed by CO walking
24 under a burning layer. Because the CO would be produced
25 at very high temperatures and would tend to stay up at

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1 roof level. So I think these people would have been in a
2 respirable atmosphere up to that point. I think when
3 that blew, it would have blown sufficient, you know,
4 percentages of carbon monoxide back up there, so anybody
5 not wearing his self-rescuer at that instant would have
6 been killed instantly.

7 One man on this junction, in sort of parallel to
8 Ferris Dewan's difficulties, I think it was -- was it
9 Romeo Short, I forget now. I'll have to look back to my
10 crib sheet. Yes, Doyle, did I say "Doyle"?

11 Q. No, you said "Short."

12 A. Doyle, back here, he didn't die of CO poisoning. He
13 died of spasm, by being burned around the head. So we've
14 got one man at the outbye here who has gone down on his
15 hands and knees with the flames, and there's a man here
16 who's been hit in the face so badly by it that he's been
17 unable to breathe, but everybody else expired from carbon
18 monoxide poisoning.

19 I must apologize to the members of the family for
20 going into all this detail, but it's pretty impossible
21 not to.

22 COMMISSIONER Just one point of clarification. Up here,
23 you say Doyle was -- had the spasm?

24 A. Yes.

25 COMMISSIONER But there was a man outbye of Doyle?

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1 A. Yes.

2 COMMISSIONER Who was, I think, 82 percent --

3 A. Well, he was 80 percent.

4 COMMISSIONER 80 percent carbon monoxide.

5 A. Yeah.

6 COMMISSIONER And Doyle was only 22 percent.

7 A. Well, it just depends exactly how the flame hit them
8 when they reached that turbulent zone, you know. One,
9 it's almost like bullets being fired at you. One might
10 have just slipped and slid worse than the other. I
11 mean, I'm locating the area that I consider to be the
12 impassable zone where they would have begun -- I'm not
13 saying walking under this flame or running under this
14 flame would have been anything at all other than
15 agonizing, but I think it would have been physically
16 capable -- I think when the layer started to get dipping
17 down into the heading and expanding products and, you
18 know, coming down to this sort of height, the heat, and
19 your inability to move at high speed when forced down to
20 that sort of height, this is what I'm saying. This is
21 what I'm describing is occurring there.

22 I think an explosion then occurred of this gas. And
23 I think it would have probably shot out of C-1 and B Road
24 simultaneously.

25 We're now developing a shock wave, but the shock

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1 wave and the flame would be at the point of initiation
2 together. And the shock wave would have to lead the
3 flame by a certain distance, something in the order of
4 one to two seconds as a minimum, in order for any coal
5 dust to be raised. I'm sort of jumping the gun there
6 because I'm telling you it was a gas explosion all the
7 way down to here.

8 And I don't think it would have been possible to
9 initiate a coal dust explosion in the time available for
10 the explosion to have travelled from No. 3 Crosscut back
11 down to No. 1 main. That's just purely a fact, that the
12 speed that the flame was travelling and the length of
13 road it had did not give it enough time to have raised
14 the coal dust before the flame hits it. It doesn't mean
15 it might not have consumed a little bit of coal dust,
16 because coal dust would have been raised, but you
17 wouldn't have had the intimate high density mixing
18 necessary for a chain reaction to occur in the coal dust.

19 So if you can imagine, the flame might have burned a bit
20 of coal dust. It wouldn't have been much because it
21 would have been a relatively transient opportunity. But
22 we're not talking a coal dust explosion at that stage.

23 It's clear from all evidence -- this then, in my
24 opinion, probably simultaneously entered the intake at C-
25 1 Road and blew out the overcast at No. 9 Crosscut, which

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1 doesn't appear to have been a very well built overcast.
2 I have no difficulty believing that the gas explosion
3 would have been capable of blowing it out.

4 The gas that I've described coming off here was a
5 fuel-rich mixture, so though an explosion was taking
6 place, there would have been quite a body of the gas that
7 was being ejected with all this activity, which would
8 have been fuel-rich consumption, even though an explosion
9 had taken place, if that makes sense to you.

10 Q. So you get up in the mains --

11 A. And I think the sooty products of that went up this
12 intake, and although there's no evidence, no pictorial
13 evidence of it, would have gone down No. 1 main.

14 The shock wave would, theoretically, have divided
15 the junction. But there was in fact a wall in its way at
16 C-1 road. And although it might sound amazing, even in
17 highly powered explosives, the shock wave from an
18 explosion does still seek the easy way out, even if only
19 marginally. There has been cases when an explosion has
20 met two roads of equal size. They're both exits, but it
21 has preferentially chosen the larger of the two roads,
22 rather than gone down the smaller of the two roads,
23 purely on the basis of, you know, a resistance factor. I
24 mean, if one of them was open to the surface and the
25 other one was closed to the surface, it would almost

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1 always seek the open road.

2 On the evidence of the -- so far we've talked about
3 relatively little violence in this area. But on the
4 evidence of witnesses, even though there's no pictures,
5 the violence was considerably greater in here. And
6 there's no way that the gas from here transferred to this
7 point and re-ignited in a larger volume.

8 So in my opinion, the only rational explanation for
9 the continuation of the explosion at an enhanced rate,
10 this gas explosion would have sent the products in here,
11 make no mistake, and done a bit of damage, but it would
12 have been on an ever-decreasing basis, not an ever-
13 increasing basis.

14 So it refuelled itself somewhere inbye of No. 10
15 Crosscut, in an area which I understand from witness
16 reports most people commented on as being one of the
17 worst pieces of coal dust in the mine. And I think maybe
18 a coal dust explosion -- well, for definite a coal-dust
19 explosion started there.

20 We're now far enough away from the source of
21 ignition to readily believe that the shock wave was
22 leading the flame by enough to ignite the coal dust.

23 I think the explosion then went down the North
24 Mains. I'm not convinced that it continued to fuel down
25 the North Mains. I think it may have already run out of

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1 fuel before it reached the inbye end. But there was now
2 a large body of flaming particles which would have
3 reached the top end of the North Mains, and for sure
4 large volumes of carbon monoxide and a substantial shock
5 wave.

6 And clearly the men who perished here perished from
7 combinations of blunt trauma, in other words, being hit
8 by a shock wave, just the violence of the shock wave
9 predominantly, rather than actual physical objects
10 hitting them. They just had been hit by the flat force
11 of the shock wave. Others died of carbon monoxide
12 poisoning or virtually in one spot in this area in here.

13 The shock wave would then have carried on down 2
14 East. There's evidence that it was pushing outwards on 2
15 East. John Bates, as it's proved to be, was found very
16 much on the east side rib of 1 East. And then it came
17 back out No. 2 mains, still a very substantial shock
18 wave. Still maybe consuming coal dust at this point. I
19 don't believe it was consuming coal dust right outbye.
20 It was still a substantial shock wave, at which point it
21 blew out all the stoppings between No. 2 main and No. 1
22 main into No. 1 main.

23 Clearly, at this point in time it was no longer fuel
24 rich because very little soot was being made because the
25 debris from these seals is considerably cleaner than

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1 anything else. So when it landed in No. 1 main, it
2 landed in a sooty road, but it deposited clean concrete
3 blocks in that road, so in fact any soot found in this
4 road, in my opinion, pre-existed the coal dust explosion
5 by a fraction of a second.

6 It then shot out of the mine, ran out of fuel. In
7 my personal opinion, it wasn't consuming fuel all the way
8 to the surface. That doesn't mean to say that consumed
9 fuel didn't get that far because clearly, in a coal dust
10 explosion, the consumed coal dust and some more coal dust
11 is blown considerable distances, so the whole thing is
12 taking its fuel with it, to some extent, and depositing
13 consumed fuel.

14 The reason I'm saying it didn't burn all the way to
15 the surface is because the violence at the surface was
16 relatively negligible, whereas the violence inbye was
17 extremely considerable. And if a shock wave of this
18 violence, and if it carried on burning, it would have got
19 worse rather than better. It can only get worse while
20 it's finding fuel, and then it can only get better when
21 it's dissipating, due to resistance to the shock wave as
22 it travels down a relatively confined roadway. So, in my
23 opinion, it was already dissipating long before it hit
24 the surface at No. 1 and No. 2.

25 In time frame, I already said this flame had gone

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1 down here. It would have likely been doing 35 to 50
2 meters a second down Southwest 2-B Road, which would have
3 taken it about five seconds to reach its source of main
4 gas energy.

5 Q. At that point it's still just a flame?

6 A. It's just a flame.

7 Q. Burning on the layer of methane?

8 A. It comes down here in about one second, at about
9 something in the order of 200 meters a second.

10 Q. Because that's now more along the lines of a gas
11 explosion?

12 A. It's very much a gas explosion. And then it goes
13 around the piece here at maybe to 200 to 300 meters a
14 second, I would doubt any more, which is relatively slow
15 for a coal dust explosion. But I don't think it was fuel
16 rich. If you've got a coal dust explosion, it just gets
17 worse and worse and worse the more fuel you pile in up to
18 virtually no realistic ceiling. So in other words, it
19 was certainly above the lean minimum, but it might not
20 have been heavily into getting plenty of fuel --

21 Q. What support do you get for the distances and the
22 speeds that it was travelling and the sequence that it
23 was travelling and the shutdown times of the main
24 monitoring system?

25 A. I should say that that supports as well, really, the

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1 direction supports. The theory ties in with the support
2 movement because a gas explosion travelled outbye on this
3 road because this jib end here was pushed outbye and into
4 that rib. So in fact there was violence coming outbye on
5 that roadway, not inbye, outbye. So the initiation of
6 that was an explosion that took place at or inbye the
7 third crosscut. No explosion here or here could
8 conceivably have driven that equipment outbye.

9 All these arches down here fall outbye. The arches
10 just there and arches just there are inbye, so in fact
11 this slight disturbance taken here and the way they set
12 arches as an umbrella rather than a means of direct
13 roadway support, they would not have taken a lot of
14 violence to knock them over. I mean, these things were
15 just arches set in fresh air, connected together by
16 struts. I've seen them go down as badly as that just by
17 having been hit by a mobile [plant?] So I mean, they're
18 not tied to the struts or in any way that would be an
19 immediate support, but they are an umbrella to stop the
20 very largest of lumps closing the roadway. I assume
21 that's why they were built. So there's evidence that the
22 violence when inbye that point. There's evidence that
23 the violence came out here and came out here.

24 There is dual evidence here of some movement in both
25 directions which tends to support slightly dissipating

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1 energy coming out, but the majority of the energy going
2 in. All the evidence down here is out. Maybe I can list
3 them individually. I've got them all marked in my plan,
4 but basically there are about five sites down here that
5 show out. All the evidence on here is out and obviously
6 all the stoppings show the situation I've described.

7 As far as the timing, I based my initial timing, and
8 this isn't the benefits of hindsight, I based my initial
9 timing, in fact I produced a report for the Crown
10 Prosecution Service with these times in before I was
11 given the evidence that you gave me on Saturday morning.
12 And the evidence that you gave me on Saturday morning
13 contained -- I'm pointing to Ena there, if that needs to
14 be said for the tape, but the evidence that Ena gave me
15 on Saturday morning included references to a senior Davis
16 Derby report which stood at the times that outstations
17 were wiped out. And the outstations, which are the
18 electronic governing points for the data from conveyors
19 and from the environmental monitoring stations that they
20 had, the outstations went out in the order of one here,
21 one here, simultaneously. And then one out here and then
22 one out here. So in fact -- and these out here were
23 after this one here. So something happened here, and
24 then it happened here, and then it happened here. So
25 there's a sequence of events that show it coming out and

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1 going in and coming out.

2 Q. "Here and here," the two that happened
3 simultaneously are the ones that are just in the vicinity
4 of 10 Crosscut inbye and outbye?

5 A. Yes, there's an environmental monitoring station
6 here somewhere, and there's a --

7 Q. When you say "here," just identify for the record.

8 A. It's in No. 1 mains. I'd have to dig the report up
9 to give it its correct status.

10 Q. In any event, those times that we've got --

11 A. And the other one is the No. 11 Crosscut on No. 3
12 conveyer.

13 Q. You say --

14 A. No. 3 conveyer outstation, that one.

15 Q. You say corroborate this theory and the speeds that
16 you've calculated?

17 A. Well, they -- to the extent the corroboration can be
18 accepted. I don't think they could refine it down to
19 less than a second. So, I mean, it's obviously unlikely
20 to have been in exact seconds either. So we're only
21 talking about something resolved to the accuracy of a
22 second within a speed that itself is only a second, if
23 that makes sense to you. So we would need to know if it
24 was .8, say, or 1.2, say, really, but that's not
25 available to us. So in fact we're talking about one

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1 second between that time and then one second to the next
2 event and then two seconds to the next event. So the
3 whole thing had gone round there and back out to there in
4 three seconds, which does tell me about 300 meters a
5 second.

6 Q. I'm going to take you back and go over each step of
7 this, but if we're going to take a break, this may be an
8 appropriate break point.

9 COMMISSIONER Yeah, we'll take ten minutes.

10 INQUIRY RECESSED (TIME 3:23 p.m.)

11 INQUIRY RESUMED (TIME: 3:39 p.m.)

12 MR. MERRICK Now, Mr. Liney, I just want to back up and
13 flesh out a few points on this that I think will be of
14 assistance to us.

15 COMMISSIONER "Flesh" out or flush out?

16 MR. MERRICK Flesh out. To begin with, the layer that
17 was ignited and everybody agrees that a layer up in that
18 heading was ignited, what kind of a layer was it? Was it
19 a thick layer, a thin layer?

20 A. Well, the only guidance we've got as to the
21 thickness of the layer really is the fact that it burned
22 it out.

23 Q. Yes?

24 A. There was not a lot of flame, therefore it was
25 within radiant heat burning of the duct distance which

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1 would probably mean it was within a few feet of the duct.
2 The fact that I see no mechanism for the layer not
3 filling the whole of the triangular portion at the roof
4 of the heading until such time as it reached the duct
5 mouth. So there's just a physical mechanism there that
6 it effectively would fill up the heading till it reached
7 the drain because otherwise the velocities in those
8 headings were so microscopic as to be undetectable in
9 terms of interfering with the mechanism, plus the fact
10 that my calculations suggest that the ever-thickening
11 aspect of the layer would, by the time it got to the
12 heading, have got it up to at least a meter thick at
13 about 20 percent methane, starting from probably 40
14 percent methane when it came over the top of the wall.
15 So everything says to me a meter around the area
16 throughout most of the piece but getting somewhat thicker
17 in the headings.

18 Q. All right. Now let me come back a moment to the
19 very start of that scenario because this ultimately, at
20 least the strict direct cause of this explosion appears
21 to be basically a ventilation problem. Let me start with
22 that. You talked about the fact that the ventilation in
23 the Southwest district and whether or not there was the
24 proper mixing of gas coming out of the Southwest 1
25 district would to some extent be dependent on what they

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1 were doing with the ventilation circuit by the opening
2 and closing of doors and regulators. Let me begin,
3 first, with the regulator that you placed in the No. 2
4 return just inbye 10 Crosscut. I think it's --

5 A. 9 --

6 Q. -- inbye or is it just outbye 10 Crosscut?

7 A. Outbye 10, inbye 9.

8 Q. Outbye 10 Crosscut. Tell me why the placement of a
9 regulator there or more properly why the opening or
10 closing of a regulator there would affect the air flow
11 into the Southwest district?

12 A. Well, first, I should say that the place of the
13 regulators in a mine is a normal ventilation procedure
14 for distributing air around the mine which, if left to
15 its own devices, would just travel around the various
16 parallel splits or circuits entirely according to the
17 resistance inbuilt into those circuits and not related to
18 the air flow they actually needed in the circuit. So I
19 find no fault in them using regulators for the purpose of
20 distributing air around the mine.

21 It wasn't a well-designed regulator. It was only a
22 single wall, so when people passed through it, even when
23 it was in use, it would have affected its ability to
24 regulate.

25 And, furthermore, it had a small hole around the

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1 conveyor, so it was obviously a place to encourage coal
2 dust to blow off the conveyor. But leaving all those
3 things aside, when it was placed there, the purpose was
4 to reduce the amount of air coming out of the North
5 returns by physically putting resistance into the North
6 return system. I mean, like, say the road had fallen in,
7 you would have no difficulty thinking that that's an
8 obstruction or you built a wall across the road or
9 something. You know, anything that tends to make the
10 resistance of the road higher will tend to reduce the air
11 flow. So the regulator there reduces air flow on the
12 North Mains and, therefore, it favours the Southwest, so
13 more air goes around the Southwest.

14 So, undoubtedly, there is no explanation for its
15 original placement other than that. They didn't really
16 need as much air in the North Mains as they would
17 otherwise have got, and they clearly needed more air in
18 the Southwest than they would have got without the
19 regulator. So it was probably a sensible thing to do at
20 the time to give more air to what was probably at the
21 time the high output side of the mine.

22 Q. So if I've got it, to close the regulator on the
23 return -- No. 2 return outbye No. 10 would create
24 resistance to air being -- coming back out of that
25 district so that intake air coming down the No. 1 intake

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1 when it reached this point at No. 10 Crosscut would tend
2 to be driven into the Southwest district because of the
3 increased resistance into the North Mains?

4 A. That's exactly it.

5 Q. All right. And when they opened that on April --
6 what date?

7 A. 23rd.

8 Q. When they opened that, that would have reduced the
9 split of air into the Southwest district?

10 A. Yes, very much so. I assume, although it's not said
11 in the document, the April the 23rd document, the purpose
12 of doing it was to increase the air flow in the North
13 Mains where the requirement for air had now swung back in
14 favour of the them needing it because they've established
15 this extra Southeast area which we knew to be in serious
16 trouble throughout its entire life, for a totally
17 separate set of complicated ventilation problems that
18 they didn't build into it. But at the same time I accept
19 that it was in trouble, and they may have rationalized
20 that the way to deal with it was to increase the air flow
21 around the piece. And --

22 Q. We've heard a lot of evidence --

23 A. -- clearly they took air off the Southwest.

24 Q. We've heard a lot of evidence about ventilation
25 problems in the North Mains. In effect, and I don't want

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1 to be oversimplistic about this, but in effect what
2 you're saying is that on the April date when they opened
3 that regulator, they in effect robbed the Southwest in
4 order to try to solve their problem in the North Mains?

5 A. Exactly.

6 Q. All right.

7 COMMISSIONER Just further on that, Mr. Liney, was there
8 another regulator that would have put more air into the
9 Southwest section? I mean, if you -- if this was running
10 normally, this regulator here, if that was shut or,
11 pardon me, if that was open and there was no -- wouldn't
12 that have a tendency then to take the air straight down
13 No. 1 all the way and sort of bypass these --

14 A. That's right. It would have reduced -- it's
15 actually quite technical and you would have to go back to
16 the idea of running a network analysis to find the exact
17 distribution.

18 COMMISSIONER Yeah.

19 A. Because if you reduce the resistance in your mine,
20 you actually increase the total amount of air available.
21 But, ignoring that, because it's a very, very tiny
22 concept in terms of the size of what we're talking about,
23 you're almost down to the situation because all the
24 resistance at this mine was outbye that point.

25 COMMISSIONER Yes.

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1 A. The resistance of these splits was virtually
2 negligible, so I could, in fact, have had virtually all
3 the air going round there or all the air going around
4 there. So you're nearly down to a simply algebraic
5 assessment. If there's 100 cubic meters available, like
6 on a 50/50, 60/40 or any combination. And they just
7 played tunes on that regulator in order to send it to the
8 place that was in the most trouble.

9 COMMISSIONER Okay, I see that.

10 A. I would also have to say, given the general
11 background, as I understand it at the mine, it may be
12 something they did on more than that one occasion. I
13 only say it happened on the 23rd of April because it was
14 noted by the ventilation officer to have happened on that
15 occasion. The ventilation officer only made infrequent
16 ventilation surveys. It's quite feasible that it
17 happened two or three times a week. So if they're in
18 trouble here, they gave them more air; and if they're in
19 trouble there, they gave them more air. Not a very good
20 way of running a mine, but it's not an unlikely scenario.
21 But we only have one day's evidence that it got
22 deregulated.

23 COMMISSIONER Okay. I see that, yeah.

24 MR. MERRICK Who should dictate when that regulator is
25 open or closed?

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1 A. Solely the ventilation officer. Only the
2 ventilation officer, assuming he knew his job, would have
3 sufficient knowledge to understand what the implications
4 of that act were and, moreso, where there was an
5 alternative way of dealing with the problem. In other
6 words, the robbery of one place to help another is not
7 necessarily the best way out of this problem. It clearly
8 wasn't the best way out of this problem because it, for
9 various reasons which I can go into, it wasn't destined
10 to cure the North problems which arose from an entirely
11 separate series of circumstances that they'd created up
12 there, and, therefore, it unfortunately robbed the
13 Southwest for nobody's benefit at all.

14 Now if the ventilation officer had been asked if it
15 could be done or would it be all right or whatever,
16 therefore he would have said no.

17 Q. I'm assuming that, to a lesser extent, the opening
18 or closing of other blockages, we've got stoppings here
19 and there, stoppings in the crosscuts all the way down
20 the mains, et cetera, some of them with passageways, they
21 would be opened or closed as people tried to get access
22 into and out of. Each of those in their own way, great
23 or small, would also affect the circulation in the
24 Southwest?

25 A. Well, very much so. I mean, in the United Kingdom,

MR. LINEY, EXAM. BY MR. MERRICK

1 I can only speak for that, but it's not legal to do what
2 they were doing, which is to only have one door on each
3 air lock. This mine had a series of single doors at 5
4 Crosscut, 6 Crosscut, the overcast itself at No. 9
5 Crosscut and various other locations which, when opened,
6 would short circuit the mine entirely at the expense of
7 both the Southwest and the North Mains. In fact, because
8 of the effective regulation created by the overcast,
9 every time anybody leaked air outbye, the Southwest mains
10 would suffer more than the North Mains, but in general
11 terms, both places would suffer together, so both would
12 go down at that point.

13 A very, very serious fact which is reflected in, for
14 example, Samantha Phillips on several occasions when she
15 was the ventilation officer, if I can call her that. She
16 was doing the ventilation surveys anyway. She reported
17 such things as if when a door is open, it's open. You
18 know, as if that was the status of it, which tends to
19 suggest to me that some of time these doors were left
20 open and left open for long periods of time.

21 I mean, obviously, a ventilation officer, if you
22 went to a door that was open, the first thing you would
23 do, if it wasn't him that had opened it for some reason,
24 you would shut it.

25 Now in the United Kingdom, all doors have to close

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1 themselves. So the only way to have them open is to hold
2 them open. No door could stay open on its own because
3 the law says they have to be self-closing. They're
4 usually self-closing by fairly rudimentary means. What
5 they do, they put the door post leaning in favour of
6 shutting the door or you have a sequence of wires and
7 ropes, but normal practice is you just lean the whole
8 door frame over so that when the door opens, it opens up
9 hill, if you can follow that, and then it just slams
10 shut. So that in the absence, you know, if anybody could
11 accidentally have left it open, it will shut itself.

12 So, I mean, for her to say in her report "door
13 open," not "Found door open then closed it; we must do
14 something about this unauthorized abuse," but "door open"
15 as if it was a feature. "Door open, cable through it"
16 just as if it was sort of a ventilation feature. So I
17 have a nasty suspicion that the doors could have been
18 left open for prolonged periods.

19 Q. But that would also lead us then to expect and maybe
20 understand why there might be fluctuations hour to hour
21 perhaps as to the adequacy of general body air flow into
22 either of the two working districts?

23 A. Well, any of the doors that were big enough to have
24 allowed one of the large diesel plant through so,
25 therefore, they must have been in the order of six feet

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1 high and nine feet wide, something in that order. They
2 would have been quite large doors. Any door left open
3 then would have savaged the Southwest air flow down to
4 not 50 percent. You know, it would have been less than
5 50 percent of its normal air flow, without a shadow of a
6 doubt. It would have been a horrendous short circuit.

7 Q. So even if under design conditions, if you will,
8 there is a certain air flow that may likely to be in
9 there, that may not be what is happening on a particular
10 day or at particular times during a day or a shift?

11 A. Oh, absolutely not. I mean --

12 Q. All right.

13 A. -- given that we know they also turned the fan off,
14 not only illegally but unauthorizedly and for no good
15 reason, just due to a design defect in the construction
16 of the fan, if people are prepared to turn the surface
17 fan to the mine off at a time when men are underground,
18 moreso that men are working underground and, moreso, on
19 one occasion when they were doing a burning operation
20 underground with a naked flame, that that could happen at
21 a mine presupposes that any lesser offence would come
22 easily, if that makes sense to you. I mean, they have
23 done something so gross and so amazing on that occasion
24 that you have to say that anything like leaving a door
25 open would just be a mere trifle in comparison to turning

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1 the surface fan off altogether.

2 Q. All right.

3 A. Apart from the fact that turning the surface fan off
4 contravenes your Provincial regulations anyway.

5 Q. Let me now come to a bit of a difficult topic, but
6 it's one that I want to tie down a little bit because at
7 some point it may be relevant to know what the true
8 situation was, and that is the existence of a layer
9 coming out of Southwest 1 and going up Southwest 2-B
10 Road. It's your view that that was possible --

11 A. Probable.

12 Q. -- but I take -- probable. But I take it from your
13 evidence that not necessarily at all times, it would
14 depend on whether it was a good ventilation day or a bad
15 ventilation day --

16 A. Yes.

17 Q. -- and by that you would mean whether everybody had
18 doors closed and they were -- had the main fan on and all
19 of that sort of thing?

20 A. But the frequency with which it was a problem would
21 have increased once they took the overall background best
22 day down by sending more air over to the North Mains. I
23 rather think at that point in time, as evidenced by the
24 35 cubic meters reported by Eagles on May the 8th, that
25 they had a background level of layering by that time. In

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1 other words, they'd permanently reduced their ventilation
2 to a potential layering situation. Even having read some
3 of what Eagles did which is, to say the least,
4 unimpressive, I can't believe that he would have gone
5 round the mine and taken such a relatively poor
6 ventilation quantity and not addressed himself to things
7 like the surface fan not running or the doors being
8 opened or closed. In other words, as he travelled the
9 mine, presumably, the mine was in a good day.

10 So on the peaks and troughs that were now running at
11 a later ebb than they used run at, that was probably as
12 good as got over that last few days.

13 Q. Now tell me briefly, and more for the record maybe
14 than for my comprehension as you go through it, your
15 calculations that lead you to the opinion that there was
16 the possibility -- or probability that at times a layer
17 did survive out of the Southwest 1 and up that road.

18 A. Right. Let me first say that I'm assuming 200
19 liters per second coming out of here.

20 Q. Yes.

21 A. I should also say lest anybody say, well, how is it
22 exactly 200 liters, that its relationship -- it's effect
23 on the layering number index is the cubed root of the
24 flow and, therefore, it's permissible, effectively, to
25 have a reasonably good guess at the gas level. If it was

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1 50 liters wrong either way, it would make virtually no
2 difference to the calculation. So I'm using 200 liters,
3 but if I substituted 150 or 250, it would not make a huge
4 difference to the formula. I'll --

5 COMMISSIONER That's per minute?

6 A. Per second.

7 COMMISSIONER Per second.

8 A. I'll just -- I'll put the formulas down if you want.
9 The layering number is $6U$ over the cube root of V
10 divided by W . And " V " is the volume of CH_4 in liters per
11 second and " U " is the velocity in meters per second. And
12 " W " is the width of the roadway in meters and is also
13 within the cube relationship and therefore if it was five
14 and a half meters which is the -- I use the figure 5.2
15 meters, which I got off the plans, but if it was five and
16 a half meters it wouldn't make that much difference.
17 This is clearly directly linked to layering number --
18 velocity. So, you know, the important factor in that
19 equation is clearly the velocity.

20 You'll have seen these formulas quoted elsewhere;
21 the only difference between this formula and the one that
22 Dr. McPherson was using is that his was configured for
23 cubic feet a minute in all -- you know, imperial-type
24 data, and this is a metric version of the same formula.
25 But, in fact, all those appear in exactly those

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1 relationships. You won't have seen the "6" before.

2 Q. Yes, okay.

3 A. But -- so you've seen that formula before -- that's
4 what I'm saying, I'm not assuming -- trying to put a
5 third formula. I know you were using a formula this
6 morning which came from Noah's Ark or somewhere, but this
7 is the sort of a -- this is what you might call the state
8 of art version, the formula that Dr. McPherson was also
9 using.

10 Q. All right.

11 A. So let me -- can I make one further point? I should
12 make this point at this time. Even the layering index
13 formula can only be used as a design parameter, and it
14 might be used in a forum such as this where we have no
15 other evidence, but there is only one way of preventing
16 layers causing problems in your mine and that is looking
17 for layers. And without the religious, endless, constant
18 vigil of attending to measuring layers, probing for
19 layers, putting instrumentation up looking for layers,
20 the possibility of a layer can never be ignored. So no
21 layering number would convince me that layering was
22 impossible. That layering number gives you a fairly
23 accurate indication of when a layer number -- when
24 layering is inevitable, if that makes sense to you. So I
25 wouldn't use this in the negative. I would say you could

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1 have found a place that I said layering wouldn't occur
2 where you could tell me it did. But I would tell you
3 that I could find a place where I'm saying it will occur
4 and it will. So I'm confident that it can indicate where
5 it will occur, but I'm not confident it was foolproof,
6 and you should, therefore, forget layering. I think
7 somebody said that this morning while I was in the body
8 of the thing that if it's above 2, you don't even bother
9 looking for layers, which to me is -- well -- anyway.

10 Q. All right.

11 A. The layering number -- if I draw in that piece, is
12 that big enough for people to see or do you want me to
13 turn the paper around?

14 Q. No --

15 COMMISSIONER No, that's okay.

16 MR. MERRICK Give it a try.

17 A. If that's the layering number, say, going from a
18 position of 2 to a position of about 8, and that's the
19 length of the layer, I won't call it "L" again because
20 we're getting confused with Ls, the layering index forms
21 a curve, something like that. [Witness drawing on board]
22 And that means that, say this is a level roadway -- I'll
23 come back to the effective gradient which is another
24 complication to the whole scheme. So if we're ignoring
25 gradient at the moment, in a level roadway, if we had a

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1 layering index number of 2 -- you'll appreciate that
2 knowing the parameters of the roadway, we could derive
3 what the layering index number might be now. And we
4 derive the methane make just by looking at the general
5 body somewhere outbye, like on the drift, working back to
6 what we think must have been coming out of Southwest 1,
7 using the data when somebody actually measured what was
8 coming out of Southwest 1 -- they actually said it was 10
9 cubic meters at two percent at one time. So they
10 actually went there and said there's 200 liters coming
11 out of here, except they never put the equal sign at the
12 end of the calculation, but they have the data there to
13 make 200 liters, so contrary to what might be thought,
14 the figure "V" is entirely derivable; the figure "W" is a
15 fact; the figure "U" is a fundamental implication of the
16 air flow in the mine. So, undoubtedly, you'd have to
17 accept that we could derive a layering number for any
18 particular site.

19 If we get a layering number 2, we're talking here of
20 something like 60 meters. So, in other words, what this
21 layering number index is telling us is that a layering
22 number of 2 will just about be able to start biting in to
23 the ability of the gas to layer.

24 And how it does that is that as the layer gets
25 slightly thicker, due to diffusion from its edge and

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1 diffusion of oxygen into the layer, and slightly less
2 dense, somewhere down the road about 60 meters from the
3 source of the gas we're breaking it up.

4 And if you imagined it like a stream of smoke, I
5 suppose, we released at roof level, you'd see a nice
6 continuous stream and then eventually it's doing this
7 feathering business that you see with -- with, you know,
8 demonstrations of layering by smoke. If you've ever seen
9 that demonstration, it's quite effective. It sort of
10 gives you a -- sort of a picture of what's happening.

11 As the layering number increases, in other words,
12 this is directly proportional to the increasing velocity,
13 I could have scrubbed that layering number index out and
14 just written "velocity" and drawn you the same graph, if
15 V and W remain constant.

16 As that layering number increases, we get more and
17 more ability to foreshorten the layer -- to foreshorten
18 the layer until eventually a layering number of something
19 like 5, we're getting down to a situation where the layer
20 is destroyed within a few meters of its source.

21 On that particular place, where the junction is so
22 untidy, it's somewhat difficult to allocate anything to
23 length. I've said between 20 and 25 meters between the
24 third crosscut and Southwest 2-B. Depends where you
25 measure in the junction or whatever because, you know,

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1 looking at the junction, you wouldn't exactly say this
2 point here is the edge of the junction. But you're
3 looking at about 20 to 25 meters.

4 So in other words, we've got 20 or 25 meters of
5 layer coming down there. That's our chance to bite into
6 and destroy it. If we don't do it, I suppose,
7 analogizing it's like an airplane flying, right, if we
8 don't shoot it down in that 25 meters, we've missed it.
9 And that comes out at a layering number of about 3.4.

10 So at 3.4 we've got this thing, so we're just about
11 on the junction at a time when the layer's peaking out,
12 and I would say if we've got 3.4, we'd have a layer but
13 it wouldn't be capable of --

14 Q. Turning the corner.

15 A. -- pouring into Southwest 2-B. The normal figure
16 that's supplied, the golden rule throughout the industry,
17 despite something I've heard during the Inquiry --
18 figures of 2 and 2.3 and other such things, which I can
19 only assume to be a misunderstanding of the commencement
20 of the layering number hypothecation. But the golden
21 rule the industry is 5, as an absolute minimum, in a
22 level roadway. So 3.4 would only just be beginning to do
23 the job for us, but we'd need 5 to, you know, bite it at
24 the outset.

25 Now we can forget 5. It never was 5, not on good

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1 days, not on any day in the mine. There were days when
2 they were approaching the 3.4s and there were days when
3 they were in the 2s. So on the very, very best day they
4 ever had, you could persuade me that they got layer under
5 control by the time I got down to Southwest 2-B. That's
6 on the red letter day.

7 Q. This is assuming the velocities that we think were
8 going by there?

9 A. Well, I'll have to come back to that but, yes. I
10 mean, I'm inputting their data rather than taking off the
11 correction factor, let's say.

12 On all other days, they fell short of that area, so
13 I can clearly see an implication here -- if you'd had
14 been designing -- if I'd have been designing this for
15 you, I'd have said don't design it like that at all. I
16 don't want that gas and all that. So, you know, we'll
17 have to come back to all that. But let's say we've got
18 an unavoidable source of methane. I would have said that
19 we might have had a chance at 3.4; we'd have had a better
20 chance at 5, and anything above 5 we should have been on
21 a winner.

22 So, in my opinion, on a very, very good day, they
23 might have got it into the general body by the time they
24 got around to the Southwest 2-B, and on every other day
25 it layered at Southwest 2-B.

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1 If you repeat this calculation for every other place
2 between Southwest 2-B junction with C-1 Road, and all the
3 way into the second crosscut in Southwest 2, you always
4 get a worse layering index. Quite a lot worse. So in
5 other words, if it didn't win then, it isn't going to win
6 -- I mean, you're getting into the 1s, you know, sub-2s.

7 Q. So that if it survives to get around the junction up
8 Southwest 2-B Road, even on good ventilation days,
9 that --

10 A. Exactly.

11 Q. -- layer wasn't going to be distributed?

12 A. Well, yes. And the main reason which I just alluded
13 to previously was that that is an uphill grade -- quite
14 significant uphill gradient to about 13 degrees and the
15 layering index number, the 5, this is a level roadway,
16 the layering index number becomes 6.4 at 13 degrees. So
17 you've really put your arm up your back to 6.4 out of
18 what, in fact, is a diminishing layering number, so the
19 requirement is getting higher and the actual layering
20 number is getting lower. So you've got a rapidly
21 departing likelihood of ever succeeding with the layering
22 index number.

23 Q. And these layering index numbers, the 6.4, that's --
24 you've read McPherson's report?

25 A. Yes.

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1 Q. Those are the layering numbers I think he was using
2 as well, was he not?

3 A. Well, they are the layering numbers.

4 Q. Yes.

5 A. I mean, you buy the formula; you buy the layering
6 index numbers that go with it. You can't have the
7 formula and then say I fancy 2 as an answer.

8 Q. All right.

9 A. So these come with the formula. I didn't devise the
10 formula, and I didn't devise the number "5" so -- but,
11 you know, you've got to accept that they are intimately
12 tied into together.

13 I understand the Crown Prosecution Service have the
14 United Kingdom Colliery Ventilation Officer's Handbook in
15 their possession. Is that true? Am --

16 Q. Well --

17 A. -- I allowed to ask somebody -- oh --

18 Q. We'll just keep rolling.

19 A. But what I'm saying is all this is very well and
20 clearly laid out in that, and if it's something you want
21 to absorb into the Inquiry, the Colliery Ventilation
22 Officer's Handbook has a very good discussion as to the
23 implication of all this and effective layering and one
24 thing and another. So, you know, I think, it might be
25 something that's worth introducing into the --

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1 Q. Well, you're corroborating Dr. McPherson's use of
2 it?

3 A. Yes.

4 Q. And his calculation. And I guess in a sense he
5 corroborates yours then? Contrary to Mr. Mitchell's
6 testimony of this morning.

7 A. [No audible response]

8 Q. All right.

9 A. Do you want me to discuss Mr. Mitchell's testimony?

10 Q. In just a sec -- or let me ask you this, I take it
11 that that, in a nutshell, is your assessment as to
12 whether a layer could survive coming out of Southwest 1
13 and around into Southwest 2-B Road?

14 A. Yes.

15 Q. All right.

16 A. That's the first one-word answer I've --

17 Q. And it's your opinion that on good -- on bad
18 ventilation days there was going to be a layer coming up
19 that road?

20 A. Absolutely.

21 Q. I would assume that that would also be corroborated
22 by the fact that when this explosion occurred, to the
23 extent that methane had to burn to where coal dust was
24 involved, Mr. Mitchell testified that the layer he was
25 talking about that first ignited was formed in the

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1 heading and came around and outbye Southwest 2-B Road
2 only as far as the Stamler. Now if that's so --

3 A. Can you just -- I haven't heard the whole of his
4 testimony. Does he think that simultaneously there was
5 an identical layer forming in Southwest 2-B and Southwest
6 2-1?

7 Q. I believe so. In fact, I think his report suggests
8 that in all headings with those ventilation --

9 A. Okay.

10 Q. -- characteristics, layers are forming.

11 A. Okay.

12 Q. But if that were so, I assume that for that
13 explosion to propagate, once you get the layer burning,
14 wherever you've got it, either up at the heading or at
15 the junction, once you've got the layer burning that if
16 it only extends down to the Stamler and it has not
17 developed at that point into a coal dust explosion, then
18 I guess you don't get an explosion?

19 A. No, well, I've never heard anybody suggest that a
20 layer from here could have got down the Stamler. If you
21 do the layering index calculations for gas going
22 downhill, there was excessive velocity to prevent it
23 going that way; it's much easier to prevent gas going
24 downhill than coming uphill. So there's no question at
25 all, and I can't believe that the gentleman concerned who

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1 didn't think it was very likely that it was layering that
2 way could then say it was layering downhill. Because if
3 it couldn't layer uphill, it clearly couldn't have
4 layered downhill. That would be an absolute
5 impossibility. He can layer downhill against the
6 ventilation in some circumstances, but you need a very
7 low layering number. Instead of going up to 6.4 you come
8 down well below 5.

9 Q. So if there is -- if the only --

10 A. So there's no question of gas getting from there to
11 there; that really is ridiculous.

12 Q. If the only source of gas is in your heading,
13 fissure off the ribs, whatever, it's not going to go down
14 Southwest 2-B Road. At best it may be exhausted --

15 Q. It will pass through the fans at which point it has
16 to be disturbed. A layer a meter thick wouldn't have
17 been an explosive mixture in the headings. So if you
18 ignited a layer that by some amazing coincidence was
19 present in both headings from two different sources, it
20 would just burn. It would burn until it burnt all the
21 gas, and then when it had finished burning the gas, it
22 would probably leave some coal burning or it might leave
23 some fissures of gas just burning in the roof like a
24 small hanging flame, but that would be the end of it. It
25 could not possibly convert into an explosion because

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1 there wasn't enough gas in all that lot -- in roadways of
2 those dimensions, to have created an explosion. Not even
3 in static air. And it couldn't have existed past here
4 because it had to pass through those fans, on either side
5 of the fans. I mean, it's still going downhill, if you
6 try to suggest it came out bypassed the ventilation
7 altogether and sneaked down the hill. But it's not going
8 to go downhill. But the fans are an extremely efficient
9 air mover, so even if hasn't gone through them and got
10 mixed up, it's going to go get mixed up when it passes
11 them because there's quite a decent velocity effect
12 coming out of the back side of the fans, and these fans
13 are plug straight up against the roof.

14 So no layer made in here could have passed that
15 junction up the intake or could have passed those fans in
16 the return. Although, I would suggest to you they
17 couldn't even pass the junction in the return either.
18 But we have a very defined area of gas that would have to
19 have been lower than the heads of men working in the
20 headings, virtually, to have ignited --

21 Q. So the only possible --

22 A. -- exploded.

23 Q. -- way that we could have a methane ignition coal
24 dust explosion, with coal dust being initiated anywhere
25 from the Stamler outbye, would have had to have been a

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1 layer that took it there, and the only source of that
2 layer is Southwest 1?

3 A. Yes, but I should point out to you that 200 liters a
4 second, I mean, I doubt if anybody is going to say it was
5 more than 200 liters a second.

6 And I'm quite convinced that 200 liters a second is
7 a good figure, but 200 liters a second streaming up there
8 is not going to produce an explosive mixture in Southwest
9 2-B Road either. Not by a long, long way. So if a layer
10 burns down here, it can't raise coal dust. It can only
11 raise coal dust when it turns into an explosion. Unless
12 there's a shock wave, there's no coal dust up, so it
13 would have burnt down here all day and just gone straight
14 past the coal dust. No question of the coal -- no
15 question of a coal dust explosion being raised in
16 Southwest 2-B Road. There is no possible way that that
17 could have happened with the amount of gas that we
18 believe to be present.

19 You would have to persuade me, not that there was a
20 layer a meter thick at 20 per cent, but that there was a
21 layer two meters thick at 100 per cent. I could
22 calculate it for you, but it would have to be a
23 considerably larger amount of methane.

24 Q. And the mere fact that this burning layer of methane
25 may have started to turn into swirls and vorals [sic] et

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1 cetera because of turbulence or restrictions in the
2 passageway, like the Stamler -- my understanding of what
3 has been explained to us so far is that that may start to
4 create enough turbulence --

5 A. No, no, no, no, no, no. No, no. Not at all.
6 Absolutely not. It wouldn't even be dominant turbulence
7 at ground level in relation to the velocity created by
8 the ventilation. You'd have no more chance of picking up
9 a -- an intimate mixture of coal dust at lean level than
10 say, driving past with a vehicle quite quickly or kicking
11 the dust around with your feet or increasing the
12 ventilation a little bit. You're talking a heck of a
13 different kettle of fish to get that amount of coal dust
14 off the floor. You need a good shock wave.

15 The only two times, and I've looked through the
16 records for the purposes of coming to this Inquiry, that
17 such levels of coal dust have clearly been distributed
18 without a prior coal dust, gas explosion, one occasion
19 when it was clear and one occasion when there were two
20 options. You know, it was one of these where was it one
21 source or was it the other, were when tubs full of coal
22 dust, full of very, very fine coal dust, 20 tonnes, were
23 let go down extremely steep drifts and turned over, and
24 the huge mechanical violence associated with that
25 distributed the coal dust into the air. And on one

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1 occasion it hit a cable and the electrical spark was
2 reputed to have ignited the coal dust, although that's
3 not proven, but that's one of the theories.

4 All I'm saying is normally, you cannot raise coal
5 dust off the floor in those types of proportions. And
6 all the other hundreds and hundreds of instants of coal
7 dust explosions are allocated to prior gas explosions;
8 not to gas burning quiescently in a roof layer.

9 Q. All right.

10 A. This would have been like the sea rolling along.

11 That type of effect in the roof. Just like this.

12 [Witness makes a wave-like motion with arms] You know,
13 bobbling around. It would have made it much more
14 difficult for people to pass under it. It would have
15 brought the radiant heat level down, you know, much
16 nearer to people's heads and that type of thing, but it
17 wouldn't have lifted -- I know nobody got that far, but,
18 I mean, that's the problem they were suffering at this
19 junction. But that's its implication -- not anything
20 else.

21 Q. All right. Let me just deal with the mechanics of
22 your -- what I take to be your preferred theory of the
23 ignition source and that was the boom truck pulling down
24 the ducting. Can you take a look at the two exhibit
25 booklets that should be on your desk. One is Exhibit

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1 73 --

2 MS. MACDONALD Tab 10.

3 MR. MERRICK -- tab 10, pages 66-A and 67 and -- well,
4 66-A primarily.

5 A. Yes.

6 Q. And the second --

7 A. By the way, talking about that turbulence. It would
8 have been very significant if there had been sufficient
9 gas there to be an explosive mixture.

10 Q. Pardon me?

11 A. You know the turbulence you're referring to --

12 Q. Yes.

13 A. -- the other significance would be if that was then
14 an explosive mixture of gas. So, in other words, the
15 conversion of the question layering to turbulent layering
16 may have an implication if there had been enough gas in
17 that roadway to explode per se. I think I probably
18 called that on a previous -- I should just make that
19 point for completion.

20 I'm ignoring the turbulence because there wasn't
21 enough gas in the roadway to cause an explosion. Does
22 that make sense to you?

23 Q. That's if there was enough gas to have brought the
24 general body air percentage up to an explosive mixture?

25 A. Yes. Then the turbulence would be significant

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1 because the turbulence would be the mechanism by which
2 the gas got mixed up, but it's not the level of
3 turbulence that we're talking about for mixing coal dust
4 up. So there are occasions when a layer turns into an
5 explosion because of turbulence, but it's because of gas
6 turbulence, not --

7 Q. Would it not be possible for enough turbulence on
8 the under -- on this layer of gas, and you're only
9 burning where the percentage is such that it's flammable,
10 that the turbulence would be such that it could mix up
11 enough that it would become explosive?

12 A. No, it doesn't disturb a layer like that. These
13 layers can burn for a considerable periods of time if
14 they want. The only burning, you know, some millimeter
15 of gas at the surface of the layer; you're not burning a
16 lot of gas, not by any stretch of imagination. So
17 although you see turbulence, like I say, it's like the
18 waves in the sea if you ever see a film of -- these
19 things have been lit on many occasions for demonstration
20 purposes. You're not talking about, you know, the sort
21 of thing that's going to readily turn it into an
22 explosive mixture unless it's an extremely thick layer
23 and it's close to the lower -- upper explosive limits in
24 the first place. Don't forget, as it goes back to the
25 head end as well, it's a sticky layer because it's

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1 getting purer and purer back towards where it's coming
2 from, so it decreases the likelihood of disturbing it,
3 not increases.

4 Q. Under your theory then if the Southwest district had
5 not been there, Southwest 1 district had not been there -
6 - of course, if it had not been there you wouldn't have
7 had the layer in the first place.

8 A. It's a bit of a chicken and egg, that, because if
9 between the time the layer came out and you got the
10 opportunity to build an explosion-proof stopping in front
11 of it, and then the layer burnt back, you would have
12 stopped the explosion. But, of course, the explosion-
13 proof stopping would have stopped the gas coming out in
14 the first place. So it's -- it's the sort of --

15 Q. But in your opinion, as I understand it, Mitchell
16 attributes the ventilation problem to gas make in the
17 headings; you attribute it to Southwest 1?

18 A. I don't believe, on the evidence I've read, that the
19 headings could have made that amount of gas.

20 Q. Well, in any event, in your opinion it's Southwest 1
21 that is the ventilation -- the cause of the gas, the
22 cause of the ventilation problem, the cause of the
23 explosion?

24 A. Yes.

25 Q. Let me take you to those photographs, the second

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1 booklet that I want you to look at because we've got
2 pictures of that truck in two separate books now as a
3 result of your bringing this theory up. Exhibit number
4 122, tab 9, are the additional photographs that we have
5 just pulled out of the RCMP --

6 COMMISSIONER Exhibit 73, isn't it, Mr. Merrick?

7 MR. MERRICK One is 73, page -- tab 10, page 66-A.
8 That's one photograph of the boom truck. But in
9 addition, we've now added on Exhibit 122, tab 9, a couple
10 of additional photographs taken by the RCMP of the boom
11 truck which you consider to be particularly relevant, Mr.
12 Liney. Taking those two books in front of us and showing
13 those pictures, just tell me the mechanism of how that
14 tubing you think got pulled down over the truck and laid
15 over the truck? And I will let you pick which
16 photographs you would prefer to --

17 A. Are the remains in this big blue book, you say?

18 I've got 66-A which is relevant. What's the other one?

19 Q. And there should be an Exhibit 122, a black ring
20 binder.

21 A. That's right.

22 Q. Tab 9. Those are the additional photographs which
23 over the noon hour you identified for us and suggested we
24 add to the exhibit --

25 COMMISSIONER Is it tab 9 in both or just in the --

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1 MR. MERRICK No, in Exhibit --

2 COMMISSIONER 122 is tab 9.

3 MR. MERRICK -- 73 it's under tab 10, page 66-A.

4 A. There is still another photograph there that I
5 wanted --

6 COMMISSIONER Oh. Oh, okay, I'm sorry.

7 A. -- included though. To give you the complete
8 picture, I also --

9 MS. MACDONALD I think it's this one.

10 COMMISSIONER Well, these have already been in, haven't
11 they?

12 MR. MERRICK I don't believe all of them.

13 COMMISSIONER Because my writing is on these.

14 MS. MACDONALD Is it this one?

15 A. 196, yeah.

16 MR. MERRICK Okay.

17 A. So they're in three books.

18 Q. So you want -- we're going to have to take all three
19 books out. The other one is Volume 59 --

20 MS. MACDONALD Photograph 27.

21 MR. MERRICK -- Photograph 27.

22 A. Yeah.

23 Q. All right. Flipping back and forth between these
24 three booklets, you tell me from each of those
25 photographs basically what they show as to how this

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1 tubing came down over that truck?

2 A. Right. If we take Photograph number 27 in one of
3 the books --

4 Q. Yeah, that's in Exhibit 59.

5 A. Yeah. -- although without further evidence you
6 can't necessarily make anything of it, I would just point
7 out to you that the duct which has at some time been
8 towards one of the fans which is about -- the fans are
9 about where the photograph was took from, that duct is in
10 -- apparently laid over the top of the boom truck in that
11 photograph. Front corner to back towards the passenger
12 side of the boom truck.

13 Q. So that those coils that you see coming down over
14 the left-hand side of that truck --

15 A. Appear to be going over the boom truck.

16 Q. And that's what you're referring to?

17 A. Yes.

18 Q. Yes, all right.

19 A. I say up here but that apparently -- the duct which
20 had previously been about where you stood from as the
21 taker of that photograph.

22 Q. All right.

23 A. And which sometime later, you know, in its travels,
24 went up the heading which is on your left on there which
25 is where the boom truck is pointing?

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1 Q. Yes, got it.

2 COMMISSIONER We're looking here, are we?

3 A. Yes.

4 COMMISSIONER Yeah, okay. Thank you.

5 A. Right. If we now look at 197 -- I mean, you can
6 really take -- but if you look at 197 --

7 Q. Yeah, that's in Exhibit 122.

8 A. -- you can see some more of that duct --

9 Q. We're now in 197. We're now looking at the front of
10 that truck --

11 A. Yes.

12 Q. -- with our back to where the bolter would be?

13 A. Yes.

14 Q. All right.

15 A. And although you can't see that duct I've just
16 described to you, it must be there in the dim and distant
17 on your right-hand side over towards where that ladder
18 is.

19 Q. Yeah.

20 A. Okay? So we've now got the duct on the left-hand
21 side of the boom truck, presumably in some vertical
22 relationship to where it was originally hung.

23 Q. Yes?

24 A. Now in 198 you see a coil of ducting, let's say
25 that, where the Royal Canadian Mounted Police

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1 investigation team found it. That's as they found it and
2 they later on moved it, but that's how they found it.

3 And it's clearly heavily wrapped round the wheel exhaust,
4 whatever you -- whatever, that part of the boom truck
5 which is on the left-hand side as you're looking at 197.

6 Q. Just a second now while I get --

7 A. That's the passenger's seat of the boom truck and
8 the passenger's seat --

9 Q. I follow you.

10 A. Is in 197 is the one that hasn't got --

11 COMMISSIONER That's down here and there? [Indicating
12 photograph].

13 A. Yes. But the passenger seat is the one without the
14 steering wheel, obviously, but --

15 MR. MERRICK So, for example, in Photograph 198, if we
16 look down at the bottom left-hand corner, we see the
17 wheel of the vehicle?

18 A. Yes. And that --

19 Q. And just above the wheel, we see what appears to be
20 the remains of the passenger seat?

21 A. Yes.

22 Q. So what you're saying is that we see this all
23 wrapped around that wheel as well?

24 A. Well, it's just wrapped around that wheel. That's
25 the only wheel that it's wrapped around.

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1 Q. Okay.

2 A. So we've got a duct that appears to go over the top
3 of the boom truck --

4 Q. Oh, yes.

5 A. -- and somehow magically get to the boom truck's
6 left-hand side, looking inbye --

7 Q. Yes.

8 A. -- wrapped round its wheel and then carry on up the
9 heading.

10 Q. Oh, I see. So this ducting that in Photograph 197
11 is to the left-hand side of the photograph, coming out of
12 the heading behind us?

13 A. Yes.

14 Q. Going over to the left-hand side of the vehicle, we
15 see it in Photograph 198 as being wrapped around the
16 wheel of that vehicle?

17 A. Yes.

18 Q. You say also then must pass over the vehicle and
19 continue out --

20 A. Well, you would think, but then you go to 202 and
21 you see that it clearly passes through the articulation
22 of the vehicle behind the driver. It crosses the
23 vehicle, but it does so in the articulation point of the
24 vehicle.

25 Q. Oh, yes. And that's just behind that driver's seat?

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1 A. Right. Then you go to 200, which is the 66-A one --

2 Q. Yeah?

3 A. -- where they've forcibly moved this stuff back away
4 because they wanted to get a shot of the wheel and the
5 exhaust, et cetera, which they intuitively must have
6 thought was involved, I suppose, but, anyway, they wanted
7 to get a shot of exhaust, okay?

8 Q. Yeah.

9 A. And you can see parts of the wire that were hitherto
10 in that duct, not only going over the wheel -- under the
11 -- over the wheel in about three coils. There's a No. 1
12 coil goes right over the tire. No. 2 coil goes a bit
13 further over the tire. No. 1 disappears behind the mud
14 guard. And then you see various bits of wire reappearing
15 on the -- behind wheel and underneath the boom truck,
16 fully underneath the boom truck on the wrong side of the
17 wheel from where we're looking. And then, although you
18 can't tell from that photograph, but you can tell from
19 202, going up through the articulation of the vehicle.
20 So the only place it's under the vehicle is in its front-
21 end engine end. Does that make sense to you?

22 A. Yes. All right, I understand.

23 Q. So this duct that dropped across the vehicle
24 couldn't have dropped across the vehicle under gravity,
25 (a) because it's doing a zig zag through the articulation

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1 points of the vehicle but, more primarily, because some
2 of it ended up under the vehicle.

3 Q. I suppose that that would also be consistent with it
4 having been caught by the high part of the boom? For
5 example, in exhibit 122, Photograph 202 --

6 A. This is 202. Oh, yeah.

7 Q. We see the high part of the boom in the back part of
8 the right-hand side of the photograph behind the driver's
9 seat?

10 A. Yeah. Well, that's what I think.

11 Q. So what --

12 A. I think the vehicle came around the corner, hit what
13 clearly, if I'm right, must have been a duct that was at
14 or about the height of the top of the boom. That's
15 behind the driver's head, so it's so high that he sees
16 this duct above him. His boom captures it and the whole
17 duct just comes down. The next thing he sees is a piece
18 of ducting dropping down in front of him which he is then
19 effectively towing from behind him because he's caught in
20 the articulation of his vehicle. And he's chewing it up
21 in front of him because it's coming around his wheel, and
22 he's run over it as it's come down in front of him, laid
23 on the floor in front of him. The only thing you can do
24 is run over it. He's going to gather it, run over it,
25 and eventually, of course, when he has the ability to

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1 stop, which is distance related from when first reacts
2 and puts his brake on, he stops, parked on it. With a
3 fair amount of duct, and I can assure you that if this
4 duct was the six-inch pitch duct which is also called
5 150, 150 millimeters in some of the testimony, there is
6 quite a lot of duct there in Photograph 200. It's quite
7 a length of duct there that's gathered back.

8 Q. And if I can just take you --

9 A. There's only one spiral every six inches, so if you
10 count the number of those that you consider to be remains
11 of spirals and multiply it by six inches, that's how many
12 feet of duct there is gathered on one spot, if that makes
13 sense. That's how much he pulled round his wheel.

14 COMMISSIONER Just can I get that clear, that as he
15 struck -- as it fell and got under the wheel, then he
16 just bunched a whole bunch of it up --

17 A. Yeah --

18 COMMISSIONER -- in behind, yeah.

19 A. If I can draw it, and I'm going to pretend this is
20 exactly according to the photograph, but he's -- this
21 duct appears to me to have gone over that side of the
22 heading. The reason I say that is twofold because it's
23 on that side of the heading that it branches into the --
24 to the inbye heading where they had the T-piece, and it
25 looks at the inbye very much as if it was on that side of

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1 the heading.

2 Sooner or later he'd have to cross the heading and
3 there's no reason to believe that he didn't cross it
4 there. Although if it crossed it here, it's just a
5 little bit harder to explain the photograph. That, you
6 know, fits the thing better, lived up to the theory,
7 whichever.

8 But it's come up here somehow, you know, as this is
9 gone cross the junction, as he has driven under it, he's
10 caught it. He's then -- this piece here has dropped down
11 in front of him. He's run over it. This piece here is
12 gone through the articulation of his cab, so he's towed
13 this duct a little bit because it's dropped down the
14 articulation of his vehicle. And then he's run over this
15 piece here which is -- he just caught it, so it's gone
16 round his right-hand wheel and his right-hand wheel has
17 acted as a bit of a winch and winched in several feet of
18 duct. Of course, and he's parked on it, so it's gone
19 down his articulation under his cab and comes back out
20 the side.

21 I can see no explanation from that other than he
22 knocked it down and then he run over it because they
23 didn't run over this bit.

24 And if it was on the floor in the first place, he
25 would have run over the lot, but half of it is on top of

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1 him, so, you know, it was up in the air when he hit it.
2 I can see no other feasible explanation. Not that I
3 could comprehend there being duct on the floor for the
4 purpose of it just being laid there for storage purposes,
5 because if it was there for storage purpose, it would
6 have been bunched up. It would have fitted under this
7 table. That amount of duct would have fitted under this
8 table, as you can see in other photographs.

9 Q. If you can look at Exhibit 73, which is Photograph
10 200, we see there the passenger's side of the vehicle.
11 It's pointing up the heading in which the bolter is to
12 the right. That's the heading going off to the right.

13 A. That's right.

14 Q. And this is where you say the RCMP pulled all this
15 mass of wiring away so they could get a picture of the
16 exhaust. And we see the exhaust which is that opening
17 just ahead of the wheel?

18 A. Yeah, if you look at the description of that
19 photograph in the RCMP Index, it's described as, and I'm
20 paraphrasing, duct pulled off exhaust to get better shot
21 of exhaust or words to that effect.

22 Q. All right. Now --

23 A. The previous photograph shows it in its original
24 position which is much more intimately onto the wheel.

25 Q. And that was the point I was going to make. If we

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1 then compare that Photograph 198 which is in Exhibit 122,
2 we see there how that ducting must have been very close
3 to and in proximity of that exhaust opening.

4 A. That's right.

5 Q. All right. Okay.

6 A. The exhaust is the -- you see the flame arrester on
7 the end of the exhaust, what appears to be a flame
8 arrester on the end of the exhaust, and then it comes
9 into an exhaust box. I take that to be a flame arrester.
10 But the whole of that piece will be red hot and the bit
11 that comes out the bottom end of that box is the
12 unconditioned diesel exhaust. So you've got sort of hot
13 metal and hot particles and, to me, it's sort of
14 intimately related to both of them. You know, so I
15 wouldn't speculate which of them might have done the
16 damage, but in a new conditioned exhaust, of course, you
17 would get incendive particles coming out the exhaust.

18 Q. Okay.

19 A. Which is why I'm not allowed in the mines but --
20 among other reasons. So I believe then that the two
21 gentlemen that I understand to be on here which was Bell
22 and Doyle, rightly so, would have been concerned as to
23 what had just occurred. I mean, the understanding of
24 ventilation varied between people, but I think everybody
25 recognized that if you just rode -- ridden over the

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1 ducting, obviously, that's serious for the implication of
2 these people who were about to be drilling or in fact
3 bolting, probably putting the actual plate up. I think
4 they would have set off up that heading in order to alert
5 their colleagues as to what had happened.

6 And at that point in time the duct and/or the
7 methane ignited. I'm prepared to believe either because
8 the -- although this duct is fire resistant, this in fact
9 was United Kingdom product, so I'm fairly conversant with
10 what the duct was made of. It's what's called "supported
11 fabric PVC" which is just like a scrim, a cotton scrim
12 with PVC suffused through it, effectively, so it just
13 makes it a little bit more stronger than ordinary PVC.

14 And it has to pass a test where a Bartell burner
15 played on it for 10 seconds which ignites it. It must go
16 out within the following 10 seconds. That is the
17 definition for this type of ducting of "flame-resistant."
18 In other words, it is not of its own volition, going to
19 go raging down the heading forever. It's only going to
20 burn as far as it can burn in 10 seconds. It would be
21 impossible to make a PVC type product that you couldn't
22 set on fire. And the Bartell burner test is the lowest
23 test in the whole range of tests that are applied for
24 flame proof.

25 For example, the conveyor belt, to pass its flame

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1 resistance, has to be exposed to a 2-megawatt fire which
2 would destroy the duct the minute the fire was turned on,
3 so it would be a, you know, pointless test.

4 The Bartell burner, you can actually put your hand
5 in it. It's -- the nearest I can describe it to you,
6 it's a gas flame, as most people would have seen at
7 school with a Bunsen burner when they had the Bunsen
8 burner airing light turned off, so it's just the yellow
9 smoky flame of gas alone burning.

10 Q. All right.

11 A. So that test has to be played against a stretched
12 piece of fabric which is stretched in a frame. It's not
13 allowed to have a biting edge which is easy to ignite.
14 If you light this duct from the bottom, it would burn
15 quite merrily. So you play this flame on the duct at a
16 specified angle, and then you leave it there for 10
17 seconds. The flame starts right here. You don't take it
18 right up to the thing, but you leave -- you point the
19 thing at it. You take it away and then you start the
20 stop watch, and there's a big hole in the duct now and
21 it's getting bigger and bigger and bigger quite rapidly,
22 but in 10 seconds it's not the amount of duct that's
23 burnt, it's the fact that it's gone out of its accord, so
24 it's not a self-sustaining flame for very long.

25 But, I mean, it would have been self-sustaining long

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1 enough to do some damage to a methane mine.
2 Alternatively, of course, it could have ignited the
3 methane directly, because if you just pull the duct out
4 of the roof, this layer that's just quietly accumulated
5 everywhere else, of course, is going to be immediately
6 disturbed, you know. So I'm prepared to believe it
7 ignited the gas, but I believe it ignited the duct. And
8 I would say that because I think these people got off and
9 walked into the heading. Or I think if they had ignited
10 the gas there, it would have been a more quick feature,
11 you know, so they would have had a problem straightaway.
12 Q. All right. That's a break point, Mr. Commissioner,
13 if you want to break for the day?

14 COMMISSIONER Yeah, we will adjourn until 9:30. Thank
15 you.

16 INQUIRY ADJOURNED (TIME: 4:30 p.m.)

REPORTER'S CERTIFICATE

I, Margaret E. Graham, Court Reporter, certify that the foregoing is a true and accurate transcript of the evidence taken by way of recording and reduced to typewritten copy.

Margaret E. Graham

DATED this 15th day of January, 1996, at Stellarton, Nova Scotia.