the jury you were resting.

MR. DUBUC: Yes.

The defendant rests, Your Honor.

THE COURT: Very well.

MR. LEWIS: In rebuttal, Your Honor, we call as our first witness Dr. Busby.

Would you ask him to come in, please.

WHEREUPON, April 8, 1980

DOUGLAS EARL BUSBY,

was called as a witness on behalf of the plaintiff, and having been duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. LEWIS:

Q Would you state your full name, please, sir?

A Douglas Earl Busby.

Q What is your occupation or profession, sir?

A My profession is that of a physician presently engaged in the practice of environmental medicine.

Q And what is the title of your current or present position?

A I am Chairman of the Department of Environmental Health at the Cleveland Clinic in Cleveland, Ohio.

Q Would you tell us briefly what the Cleveland Clinic is?

A The Cleveland Clinic is not for profit foundation engaged in the practice of medicine in its broadest aspects, as well as conducting research in education activities.

Q Do you have a medical specialty, Doctor?

A My specialty is preventive medicine, subspecialty aerospace medicine.

Q Would you give us a resume of your education?

A My undergraduate education was obtained in Canada at London, Ontario, at the University of Western Ontario, where I received my M.D. cum laude in 1960.

Q What does "cum laude" mean?

A This placed me at the top of the class in Canada.

Q All right, sir.

A Subsequently I received graduate training in pulmonary or lung physiology at the University of Buffalo and cardiovascular psysiology at the University of Western Ontario.

I completed two years of general surgery training and in the second year completed a Master's Degree in cardiovascular biophysics.

It was at that time that I came to to the United States to join into the space program, joining the Lovelace Foundation in Albuquerque, New Mexico, where I became an information analyst under a NASA contract.

Q Now, you were then at the Lovelace Foundation

working actively in what is called aerospace medicine; is that correct?

A Full time in aerospace medicine.

Q Now, are you a diplomate of any board?

A In 1965 the late Randolph Lovelace encouraged me to complete my boards requirements for specialization and I returned to Ohio State University to take my Didatic training to complete my specialty, which I successfully passed in 1968, becoming a Diplomate of the American Board of Preventive Medicine in Aerospace Medicine.

Q Now, would you tell us where you are licensed to practice?

A I am licensed to practice in several states, including Ohio, which is my primary state, California, Oklahoma, Maryland and New Mexico.

Q Now, have you received any honors and awards in your profession?

A My principal honor is that I am a Fellow of the Aerospace Medical Association.

During my training I received a number of awards, including gold medals for my accomplishments in medical school.

Most recently I received a career award from the Federal Aviation Administration and was also made a charter member of the Senior Executive Service by the President.

Q The President of the United States?

A Yes.

Q Now, when you said you were a Fellow of the American College of Preventive Medicine, Aerospace Division, or whatever --

A Actually there are two fellowships. One is a Fellow of the Aerospace Medical Association, which is an honor, and the other is more of an academic institution. That is the American College of Preventive Medicine.

Q Now, do all aerospace physicians belong to either of these?

A All aerospace?

Q I mean is it an automatic situation or are you chosen by some group for these honors or positions?

A In terms of the college it is primarily automatic. You register as a member of the American College of Preventive Medicine. This allows you to obtain certain academic offerings that the college offers and to participate in developing the field of preventive medicine in general.

Q The special achievement award is a distinction?

A Yes, it is.

Q Now, would you give us a description of your professional memberships as they relate to your specialty?

A I am a member of the Aerospace Medical Associa-

tion. I am on its Executive Council, which is an elected position.

I am presently Chairman of the scientific program for the aerospace medical association meeting, which which be held in Anaheim in May.

I have also been a member of the American Medical Association in times past. With my change in the position I will be re-entering that institution.

I am a member of the American College of Preventive Medicine, the Cleveland Academy of Medicine, and a number of other organizations.

Q Now, have you served on any professional committees in addition to those that you have named?

A Most recently I was Chairman of the Education Committee of the Aerospace Medical Association.

In terms of my Government experience, prior to my resigning from the Federal Government, I was on the so-called SAFER Committee, which is the Special Advisory Committee For Fire and Explosion Reduction, which was a congressionally mandated committee.

Q It reports to the Congress of the United States?

A Yes. I believe so.

Q Could you give us your academic teaching appointments?

A I began my career teaching part-time at the

University of Colorado Medical School.

Subsequently I have taught at and been on the staff of the University of Southern California.

I taught at York University in Toronto; University of Toronto; Oklahoma State -- University of Oklahoma, rather, and am presently a guest lecturer to the Northeastern Ohio Faculty of Medicine.

Q And what subjects have you taught in general?

A I teach primarily aerospace medicine as applied in clinical practice, as well as another area of my interest being aerospace physiology and human factors.

Q Now, would you describe your past professional work which led up to your current position at the Department of Environmental Medicine?

You have been with the United States Government, sir?

A Five years until August past.

Q Well, give us your history after you left the Lovelace Foundation, if you would.

A I left the Lovelace Foundation in 1967 and became a life scientist. That is a researcher in industry with the Garret Air Research Corporation. At that time we were involved in designing and testing space suits for the space program. And I monitored the subjects involved in the tests, as well as participated actively in the research.

This followed with the medical directorship of the Continental Airlines, Incorporated of Los Angeles, where I developed their medical department and was the medical director for three years.

Thereafter I followed a period of consulting, in which I was involved with the B-1 bomber program of the North American Corporation.

I was actively engaged as a consultant to McCullick International Airlines, still Continental Airlines, and did a great deal of teaching during this period of time.

I was also engaged to some degree in active practice of emergency medicine.

I was invited to join the Canadian Government in 1972 and had a choice between joining the FAA, which had a job freeze on at that time, or going to Canada. I selected Canada primarily due to the job freeze. I returned to Toronto where I established -- at the Defense and Civil Institute of Environmental Medicine in Toronto -- the Civil Aviation Medicine Unit, which was a unit to be dedicated to the evaluation of pilot medical problems, related to certification, establishing a research program, and an education program.

In 1974 I had the opportunity to accept the position that had originally been offered to me at the

FAA Civil Aeromedical Institute.

Q What is the "FAA"?

A The FAA Civil Federal Aviation Administration.

Q I get some of the Government organizations mixed up. The FAA, that is the Federal Aviation Administration?

A Yes.

It is one of the components of the Department of Transportation. It is the largest component.

Q What position did you have with the FAA?

A I was invited to join the FAA as the Chief of the Aeromedical Research at the FAA Civil Aeromedical Institute in Oklahoma City. That was my initial offer. However, I was asked to be the Chief of the Aviation Physiology Lab for a period of several months due to some problems that had developed in that lab that required resolution.

Q Who was your predecessor in that lab?

A In the lab?

Q Yes.

A In the lab was Dr. Pat Iampetro.

When I was promoted to Chief of the Research Branch at CAMI, as I will refer to I --

Q That is the Civil --

A Civil Aeromedical Institute.

I was promoted to Chief of the Research Branch

in 1975, early '75, where I took over the responsibility for all of the research, some 92 scientists and technicians, about 32 research projects that were being conducted there.

Q And following that?

A In 1976, in May, the Federal Air Surgeon appointed me as Deputy and transferred me to Washington.

Q What are the responsibilities of the Deputy Federal Air Surgeon?

A The Deputy Air Surgeon is best described as the alter ego of the Federal Air Surgeon. That is, being the Federal Air Surgeon when he is away.

So, I will describe what the Federal Air Surgeon is.

The Federal Air Surgeon is responsible for the medical certification of some 760,000 pilots in the United States. He is responsible for the medical aspects of the accident investigation program, for the designation of aviation medical examiners who examine and certify pilots.

He has a very large education program for training pilots in the medical affects of flight and health for flight.

He is responsible for the air traffic controller health program, some 26,000 air traffic controllers being involved in this program.

And he is responsive to the administrator in a

number of areas, hijacking being one, medical problems occurring on an aircraft being another, and possibly even a third, more recently being the ozone problem that has surfaced again in the early winter months.

Q And how long did you perform the functions of Deputy Federal Air Surgeon and exercise those responsibilities?

A Just over three years.

Q And when did you leave that?

A August 15, 1979.

Q And since that time you have been with the Cleveland Clinic; is that right?

A Yes.

Q Now, have you had any special concentration in altitude work?

A Well, going back to my pregraduation year from medical school, I had two summers with the Royal Canadian Air Force in Toronto. At that time they were conducting some early pioneering work on the affects of rapid decompression on pilots. And, in particular, after an accident had occurred in flight, they were very interested in how long a person would stay conscious before falling unconscious after a decompression occurred.

There were some very fine films, research films, made of this that are still in use today.

During this period of time I was asked by my superior to rewrite the pilots' physiology handbook and particularly concentrate on the affects of altitude on man.

I remained actively interested in the affects of altitude, like teaching altitude physiology when I was at the University of Buffalo to the Firewell Corporation.

We had an accident in one of their chambers and it involved an episode of decompression sickness or bubbles forming in the circulatory system and causing blindness.

So, we talked to their people about aviation physiology.

My major activity -- really activities center in two areas. I was asked as part of my information analysis work with NASA to have a close look at some of the medical problems that might possibly occur in space and how we might handle them, particularly oriented toward a long term space mission. Let's say the Mars mission. You are going in that direction and you can't come back to receive medical care very quickly, in contrast to the orbiting in the Lunar missions.

And, consequently, I had a close look at what would happen if you lost cabin pressure or spacecraft pressure. And there it can be very serious, indeed.

I went around the country talking to a number of leading authorities in low oxygen affects.

Q Hypoxia?

A Hypoxia, which is really a term which defines the affects of low oxygen on the body.

In 1974 when I joined the FAA CAMI, we were very interested in the events that occurred on a DC-10 over Albuquerque. You may recall that in November of 1973 a jet engine disrupted and tore holes in the side of the aircraft. And one of the holes was a broken window and a passenger went through that window when the aircraft decompressed.

Now, some of the stewardesses were down below and lost consciousness, whereas most of the passengers got to the oxygen and had really no problems.

So, we were interested in determining whether or not the physical activities of these stewardesses was really the cause of their losing consciousness in spite of really some of them getting to oxygen.

We were also interested in the airline procedures that they published for their stewardesses as to what to do. Is a stewardess to wander around or put a mask on somebody's face and then go around and put another mask on? Or is a stewardess to sit down and remain physically inactive?

Because when you are at an altitude you have more of a demand for oxygen and yet less oxygen.

So, we conducted research in this area.

Q Did you become familiar with the literature, in addition to reviewing and interviewing the authorities on hypoxia under these circumstances? Did you become familiar with the literature in the field when you were doing this work?

A Well, I maintained an active interest in the literature ever since 1958 and consequently have collected just about everything I could find.

Particularly, in publishing now in the area of the two papers related to research in FAA CAMI, we had to go back and make sure that we hadn't missed anything. So, we looked at the Russian literature and the German literature and so on.

So, we pretty well looked at everything that was available.

Q How many scholarly publications, if you can tell me, have you made?

A I believe it is in the upper 20s, if I am not mistaken.

THE COURT: Upper 20s for what?

MR. LEWIS: I asked him how many scholarly publications that he has and he said that was in the upper 20s.

BY MR. LEWIS:

Q Now, these are in scientific journals and things like that?

A Well, I wrote the section on aerospace medicine for the Encyclopedia Britannicia.

There is also an editorship of a book called Recent Advances in Aerospace Medicine.

Then, the first authoritative text based on my work at Lovelace Foundation on the emergency situation called Base Clinical Medicine.

Q Now, your work in the field, does it include an understanding of the crash impacts, decompression and hypoxic affects on human beings?

A It has to a very great degree.

While I was at the Civil Aeromedical Institute we had an extensive crash impact program. I believe that related significantly to this case in the fact that we were testing infant restraing systems.

I was involved in overseeing that through the chief of the protection and survival laboratory.

Q This is the infant restraint for passenger airplanes?

A For passenger aircraft.

Q All right.

Go on.

A During my period of time in Washington I was required to appear on many occasions at various meetings. In fact, at congressional hearings to answer to a research

program, which always seemed to be under attack, and to explain the various things that we were doing and to justify our research and point out how it was going to be applied to passenger protection in particular.

MR. LEWIS: I tender Dr. Busby as an expert in aerospace medicine, if it please the Court.

THE COURT: Mr. Dubuc.

MR. DUBUC: May I ask a few questions, Your Honor.

THE COURT: Certainly.

VOIR DIRE EXAMINATION

BY MR. DUBUC:

Q Doctor, you mentioned you are at the Cleveland Clinic at the present time?

A That is correct, sir.

Q And as I recall what you have just told us, you are involved in a program, including occupational aviation and preventive medicine?

A Yes.

Q What portion of your time is on occupational medicine?

A At this time about 60 percent. The remainder is in aerospace medicine.

Q And when you say "occupational medicine", what are you referring to? Is that the OSHA type thing?

A Primarily concerned with the environment of the worker and prevention programs and surveillance programs.

Q You mentioned "preventive medicine" also.

Is that in the occupational field or some other field?

A We are really talking about an area that overlaps so much.

In preventive medicine and the American Board of Preventive Medicine, which is the primary specialty, there are three separate specialties: Aerospace, occupational and general preventive medicine in public health. The latter two are joint now.

The occupational medicine people say that aerospace medicine is really a specialized form of occupational medicine, which, indeed, to a great degree it is.

So, when we are talking about preventive medicine, I am the supervisor or director of the executive health program at the Cleveland Clinic. It is no different to the preventive health maintenance program that we had at Continental Airlines, or for that matter at the FAA. We are dealing with much the same type of problems, trying to keep the executive working and the pilot flying.

Q Now, in connection with this work at the Cleveland Clinic, you mentioned aviation represents 40 percent of your time.

How much of that involves actually working on or consulting on aviation accidents as opposed to research in this field?

A At this time I am not involved in any aviation accidents directly.

Q When you were Deputy Federal Air Surgeon, did you get involved in any actual accident analysis investigations or was it research and review of what someone else had done?

A While I was Deputy Federal Air Surgeon one of my major activities was to comprehensively review the entire medical accident investigation program of the FAA. And I would say that I spent at least 20 percent of my time on reviewing this program.

Our involvement in aviation accidents was not at the scene, but primarily through headquarters functions.

Q And that would involve reviewing the work of others; right?

A Reviewing primarily the work of others or giving directions from our desks.

Q You haven't been to the accident scene or been involved in any investigation in this particular accident; is that correct?

A That is correct.

Q How long have you been involved in reviewing any

facts or analysis in connection with the accident you are now going to testify about?

A It precedes the conference we attended by approximately three days.

Q You are referring to a March 8th conference?

A A March 8th conference.

Q So, you effectively have been working on this accident since March 5th or approximately one month?

A That is correct.

Q Was that the first connection you had with this proceeding or any testimony to be given in this proceeding?

A The first connection whatsoever.

Q And had you formulated any opinions as of that conference on March 8th or were you still in the process of formulating them?

A Still in the process.

Q When did you finally come to any opinions that you are going to render here today?

A Approximately two weeks ago.

Q And did you ever write any report?

A No report has been written, sir.

Q But you have conferred with counsel for the plaintiffs?

A Yes.

Q And have you conferred with any of the physicians

who examined Michael Schneider?

A Yes.

Q You conferred with them at that March 8th meeting; did you not?

A Yes. Extensively.

Q All right.

Did you confer with eyewitnesses at that March 8th meeting as well?

A The only person who I had any contact with was correspondent Murray Fromson.

Q You had not talked with any of the actual eyewitnesses or people who were at the accident scene?

A No.

Q Did you review the official accident investigation in its entirety?

A I reviewed the collateral report. I reviewed the collateral report in full detail.

Q Did you review the official accident report called the Aircraft Accident Investigation Report?

A No. I did not.

Q Did you review any of the other factual data that had been generated in connection with depositions or -- well, let's say depositions of people who were on the accident team or who were at the scene?

A I only reviewed the collateral report and the

depositions taken by individuals -- sworn statements, rather.

Q Just sworn statements?

A Just sworn statements.

Q Not the depositions?

A Not the depositions.

Q You didn't read the depositions of the flight crew or the cabin crew or anybody that was on the airplane?

A No.

Q You mentioned that you were a Diplomate. I may be confused.

Did I understand you to say that you were a Diplomate in preventive medicine with a subspecialty in aerospace medicine?

A This, again, is a matter of semantics. The Board prefers to call each of its subspecialties full specialties. However, the Board commands the right to designate, based on examination, which specialty you will be assigned to.

Q I see.

Is there just a straight specialty in aerospace medicine with no subspecialty?

A According to the Board, we call it aerospace medicine, whereas the first portion of the examination is what we call a general examination and it is given to all individuals in the three so-called "subspecialties" of

preventive medicine.

Q Now, in connection with the period of time you were with the FAA, which I think you said was five years, two years with the aeromedical branch in Oklahoma City, and three years in Washington -- is that correct?

A Yes.

Q Did you personally become involved in any actual accident investigations during that period where you were on the scene or a member of the accident investigation board or the National Transportation Safety Board?

A No. I did not.

Q Your work was in reviewing documentary evidence and discussions of findings and putting things like that together for rendering conclusions rather than the actual investigation itself; is that correct?

A That is correct.

On the other hand, I had an opportunity on many occasions to attend autopsies, to review with the accident investigators items that had been removed from the wreckage.

We were primarily involved in general aviation accidents in our program at FAA CAMI, in general aviation accidents, and consequently we had a great deal of materials accumulated from small aircraft that we looked at.

Q Now, when you say "general aviation", you are talking about aircraft below a certain weight and size; are

you not?

A In general, yes. But it is usually designated as to whether it is a commercial or non-commercial category, particularly related to air carrier. It's really the non-air carrier operations.

Q For the most part these would be smaller aircraft, many of them unpressurized; is that correct?

A That is correct, except for the fact that we are involved, as members of the human factors team, on all air carrier accidents.

During my tenure, of course, we had the Tenerife accident, we had the Eastern Airlines accident at Kennedy, and the Hope, Georgia accident, and several others in which we were participating.

But, of course, those are National Transportation Safety Board's responsibilities. So, we only played a peripheral role.

Q When you say "a peripheral role", that is only a review role; is that correct?

A A review role, supplementary fact finding. And the member of the human factors team, as of the past few years, has been a person from the FAA CAMI.

Q Now, I want to understand this clearly.

Am I correct that your work while you were in aviation CAMI was in the general aviation field for the

most part, rather than in the field of large aircraft, such as the C-5A or Boeing 747?

A No. I would disagree. We covered the whole spectrum of aviation and added to that, of course, a great deal of flight control, air traffic controller research.

Q That would be on the ground?

A Yes. It falls within the general spectrum of aviation medicine.

Q Now, how much of your time would you say was on general aviation smaller aircraft and how much on larger aircraft?

A It would depend on whether or not we are talking about my administrative functions as Chief of the Research Branch or whether or not it involved my direct research, particularly in the hypoxia area.

My research took, at least at CAMI, I would say 40 percent of my time during those two years. We were doing, for several months, daily decompressions, simulating the decompression that occurred on that DC-10.

I was very much involved in the research planning for our burn test program. That is, the assessment of the hazardous properties of aircraft interior materials when burned. And FAA CAMI discovered a large percentage of off-gas materials in a fire was cyanide and some materials, carbon monoxide and others, nitrogen flouride and others,

have toxic materials. That would apply to both general aviation and air carrier aviation.

We were involved in an assessment of pilot performance and task loading. That would apply to all types of aviation and even train operations.

So, it is very general. It depends on how you apply it.

Q Now, in your present position, you told us 60 percent of your time was on occupational programs and 40 percent on aviation programs.

Of the aviation, what portion of that 40 percent is writing or research, as opposed to actually performing testing or computation work?

A I was brought to the Cleveland Clinic to develop a totally new department. So, it has been primarily administrative in the occupational area: Selection of personnel, interviewing, and so on.

My work in aviation has been primarily confined to the age 60 issue, which has been appearing primarily as a professional witness in age 60 hearings and court cases.

I am also involved in a hearing on a bona fide occupational qualification for employment with the Canadian Government or rather Air Canada versus the Canadian Government.

I have been doing some teaching, which encompasses the area of accident investigation, cause of accidents, and so on.

I have been actively participating in the aviation medical examiner program. In fact, I just spoke two weeks ago in Boston and gave two lectures on accident investigation to aviation medical examiners.

So, it is a very general type of environment now.

Q Did I understand you to say you are primarily in the aviation field involved in this age 60 question? That takes up most of your time?

A I have also been seeing a number of pilots in consultation with medical problems.

Q And that involves, does it not, whether or not a pilot can continue to fly as captain of an airline past age 60 or not?

A Yes.

Q And whatever physiological or connected matters might be involved in that; is that correct?

A Yes.

Q But that does not specifically involve any consideration overall of the accident environment? This is the physiological question based upon time and its affect upon the body; is that correct?

A Yes.

Q You mentioned you were at Continental Airlines?

A Yes.

Q That was 1968 to 1971?

A Yes.

Q Was there any particular reason why you left Continental Airlines?

A The reason was a disagreement with the President, Mr. Robert F. Six, on returning employees to full duty.

Mr. Six and Audrey Meadow Six of the movie star fame found an employee who had been returned to duty with a cast on his foot, a mechanic, out sorting some papers and doing some filing. And it had been my policy, since joining Continental to try to get everybody back to work, if at all possible, because pay was just not adequate.

Mr. Six took difference with my decision and it was basically an issue of whether or not I would be allowed to return people on limited duty.

At that time American Airlines had gone some 1300 days without a lost time accident and that day that the man was off, just in our one base, we had 24 people off.

So, I also had other opportunities in the consulting field.

Q When you mentioned a disagreement with Mr. Six,

that wasn't only a disagreement on this one job, there had been others, had there not, on that policy of returning people to work when they had been injured?

A Yes.

This continued a matter of a few weeks thereafter.

Q And, in effect, you were let go from the job of medical director?

A No. I was not.

Q You said there was a disagreement with Mr. Six.

A I could stay on with the airlines if I wished to agree with Mr. Six.

In fact, the departure was a quite friendly departure.

I might say that one of the honors that I missed was being appointed an honorary member of the Golden Eagles, which is the retirement organization, the retired pilots' organization, and Mr. Six and I and three others are the only members of that organization as honorary members.

Q You mentioned you had other opportunities when you left Continental.

Is that the period when you were doing private consulting services?

A Yes.

Q And you did that for a period of approximately four years until you went to the Government in Canada?

A For two years.

Q Two years.

And were these consultations just private consultations to whoever was in need of an aviation consultant?

A Yes.

Q And these were the opportunities you were talking about when you left Continental?

A Yes.

MR. DUBUC: All right, Your Honor.

THE COURT: Dr. Busby is qualified.

MR. LEWIS: Thank you, Your Honor.

THE COURT: We will take our recess at this time.

[Jury leaves.]

[Recess.]

MR. DUBUC: Your Honor, I asked before the jury was brought in the last time that you ask them whether or not they read that article in The Post.

THE COURT: Oh, I forgot about that. I will do that now.

MR. DUBUC: And particularly the one this morning.

THE COURT: Yes.

MR. LEWIS: I am not familiar with it.

THE COURT: It's an article on labotomies.

MR. DUBUC: This morning's article told about a labotomy some 10, 15 or 20 years ago on a hyperactive child.

THE COURT: Why don't you take a seat over there, Doctor, until we get that done.

Bring back the jury.

(The jury enters the courtroom.)

THE COURT: Ladies and gentlemen, I meant to ask you this morning when we first convened about, first of all, whether any of you read the morning paper, this morning's Washington Post? Has anybody read the first page of The Washington Post this morning? Indicate by raising your right hand.

None did. Very well.

Have you read The Post in the last week, the morning paper?

JUROR: I glanced at it.

THE COURT: If you glanced at it, that's no problem.

You all come up, one at a time.

(Whereupon, the following took place at the bench out of hearing of the other jurors:)

THE COURT: Mr. Lake, did you see any article in there about brain surgery?

MR. LAKE: No.

THE COURT: At anytime since you have been sitting in this trial?

MR. LAKE: No.

THE COURT: You may return to your chair.

(Mr. Lake returned to the jury box.)

THE COURT: There was one other gentleman. That was Number 2.

Good morning.

MR. JACKSON: Just the sports page.

THE COURT: You haven't read the first page?

MR. JACKSON: No.

Could I ask you about Thursday evening at 4:00. I have an appointment.

THE COURT: This Thursday evening.

THE WITNESS: I have an appointment at 4:30.

THE COURT: Is it something that could be

postponed if you had to?

MR. JACKSON: I have postponed it twice.

THE COURT: Well, we can arrange for you to be out of here. How long will you need before 4:30?

MR. JACKSON: Four o'clock.

THE COURT: If we're still in session, I will remember or you remind me to adjourn at 4:00.

MR. JACKSON: Thank you.

(Whereupon, the following took place in open court:)

THE COURT: Thank you, ladies and gentlemen.

Whereupon,

DR. DOUGLAS EARL BUSBY--res.

resumed the stand and, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION--res.

BY MR. LEWIS:

Q Dr. Busby, in addition to the things Mr. DuBuc asked you about your review, what other things did you review in your study for your testimony in this case?

A I reviewed the depositions of Col. Rayman of the Air Force and Dr. Harold Gibbons.

Q Did you have an opportunity to attend the scientific conference put on by the guardians of the children?

THE COURT: Just a moment. The objection is overruled.

You will disregard counsel's characterization of the meeting as a scientific conference. It was a conference.

BY MR. LEWIS:

Q Did you attend a conference in which Dr. Copeland presented his findings and Dr. Brook also presented his findings?

A Yes, I did.

Q Let me show you what has been identified as Plaintiffs' Exhibit 55-D-1 through 55-K, and ask you were those slides -- can you tell us whether or not the information relevant to those slides was presented at the conference?

MR. DUBUC: Objection.

THE COURT: Overruled.

THE WITNESS: I observed the slides. I recall particularly the first page which summarized some skills severity -- some problems.

BY MR. LEWIS:

Q Thank you. Did you have an opportunity to consult with, among others, Dr. Brook about his findings?

A Dr. Brook and I had a very--

THE COURT: The answer to that is yes, Doctor.

THE WITNESS: Yes.

BY MR. LEWIS:

Q Did you have an opportunity to confer with any of the other physicians there about their findings?

A Yes.

Q Both in connection with what they presented at the meeting and you talked to them about?

A Yes.

Q Now, can you tell us, did you review any medical records?

A I have reviewed some general medical records, I believe submitted by Dr. Brook, Dr. Malone, Dr. Schuelein. I believe they were preliminary to final reports. This is the way I read them, as letters. I have reviewed some materials related specifically to this case.

Q What is that?

A Some medical reports.

Q Of Michael Schneider?

A Of Michael Schneider.

Q Did you have an opportunity to review the photographs of the crash scene itself?

A Yes, I did.

Q Now, Doctor, I would like you to tell us, to begin with, what is the scope of aviation medicine? Does it, as it is organized, does the discipline include children per se?

A Not to very much extent. I believe last year I attended a meeting out in California which represented one of the first scientific or professional studies of the implications or the hazards associated with transporting sick infants by air. This was sponsored by the Johnson Corporation and is yet to be published. I was one of the presenters there. And really we discussed in great detail the lack of medical information in particularly the aviation context related to infants and small children.

Q Are there any published studies, to your knowledge, of infants' tolerance to decompression or hypoxia?

A Not to my knowledge.

Q Now, I would like you to assume some facts that I am going to read to you. Before I do that, what is your task -- what do you understand that your task was in this investigation?

A My task is primarily to reconstruct the events from the moment of the explosive decompression to the evacuation of the infants and children and adults from the scene in the context of what I knew and what I had available to me in terms of expertise in aviation medicine.

Q Sir, I am going to ask you--

MR. DUBUC: Objection, Your Honor. May we approach the bench?

THE COURT: Yes.

(Whereupon, the following took plact at the bench out of hearing of the jury:)

THE COURT: Mr. Dubuc?

MR. DUBUC: Your Honor, in the proffered testimony this morning and also in the proffered testimony in the pretrial brief, there was nothing that indicated that Dr. Busby was going to reconstruct the accident events. He was going to talk about the correlation of environment as to the point of relationships of decompression and so on in surviving children. He is going to testify as to the long term effects of children and he is going to testify in the area of decompression, hypoxia and deceleration generally. There was no indication that he was going to reconstruct the accident as such.

To that effect, if counsel is proffering that I want to know if Dr. Busby has an engineering background.

MR. LEWIS: Your Honor, he is not going to do engineering. He is going to talk about hypoxia, decompression and that sort of thing.

THE COURT: He is not going to get into the business of where the parts landed? How fast they were going.

MR. LEWIS: No. I am going to ask him to assume a long hypothetical question.

THE COURT: The objection is overruled.

(Whereupon, the following took place in open court:)

BY MR. LEWIS:

Q Doctor, in your work in this case, have you consulted with any other persons in addition to the persons that you have mentioned who are members of any team that you are connected with?

A In inviting us to the conference, the guardians for the children invited Dr. -- Professor Mason of the University of Edinburgh, and Dr. Jerry Snyder, who I regard as two of the top people in my field, and who I have conferred with since the conference and who I have also corresponded with.

Q I see.

A And we are involved in approaching this accident from a scientific rationalizing factfinding, retrospective, so to speak, reconstruction. Consequently, we are putting our collective abilities and experience together.

THE COURT: Just a moment.

MR. DUBUC: May we approach the bench?

THE COURT: Yes. Hold it just a minute. Doctor, would you step down, please?

(Witness steps down)

(Whereupon, the following took place at the bench out of hearing of the jury:)

MR. DUBUC: Your Honor, I specifically asked Dr. Busby on voir dire whether there had been any reports of this. Apparently, he hasn't written a report. He mentioned correspondence with Dr. Snyder and Dr. Mason. If that is so, if he is relying on their opinions and consultations, I request that we be provided a copy of that correspondence before we have to cross-examine.

MR. PATRICK: Your Honor, first of all, we haven't seen any correspondence and I am not familiar with any correspondence. But Your Honor will recall Dr. Gibbons who was proffered as their expert and he testified at great length about having talked to or consulted with everybody.

THE COURT: He is not objecting to the consultation. All he is saying is he's making a documents request. And at the recess you ask the doctor if there is anything. We will adjourn as soon as he is off the stand, as soon as you finish your direct. And we will excuse the jury and you can ask him then out of the presence of the jury whether he has any documents, and, if he does, Mr. Dubuc is entitled to them before he has to cross-examine.

MR. DUBUC: And if he hasn't got them here with

him, we're going to have his whole testimony in before I get the documents. It puts us in a difficult position.

THE COURT: Why don't we bring the doctor up here.

MR. DUBUC: I would like to know now.

MR. PATRICK: If I may say so, Your Honor, we had no availability of any of the correspondence.

THE COURT: I am not saying that I will acquiesce in his demand, but if they're available, you'll be better off with them and they will be better off.

MR. PATRICK: If they're available, certainly. All I am saying is that we were not afforded an opportunity to cross-examine the persons Dr. Gibbons consulted.

MR. LEWIS: Or correspondence.

THE COURT: If there are letters within easy reach, it will be helpful.

MR. PATRICK: Do you wish the doctor?

THE COURT: Yes.

(The witness approached the bench.)

THE COURT: Speak up, Doctor. Speak to my reporter here, just so she can hear.

MR. LEWIS: Doctor, let me ask you, do you have any of the letters with you, either that you wrote or they wrote, the two people you mentioned and I believe a third person, I believe Cromack? Do you have any of

those with you?

THE WITNESS: I only have the letter to Dr. Mason and I may have it with me.

THE COURT: When we take a pause, we would like you to look and see if you have them.

THE WITNESS: I will see if I have it.

(Whereupon, the following took place in open court:)

THE COURT: Go ahead, Mr. Lewis.

MR. LEWIS: Thank you, Your Honor.

BY MR. LEWIS:

Q Now, what is Dr. Mason's specialty?

A He is a forensic pathologist, with orientation, primarily, to aviation medicine.

Q And who is Dr. Snyder?

A Dr. Snyder is chairman or I should say Director of the Human Impact Tolerance Laboratory at the University of Michigan.

Q And did you consult with a Mr. Cromack?

A I really had no direct conversations with him during the conference, sir.

Q Or since?

A Or since.

Q Now, Doctor, I am going to ask you to assume some facts, if you will, that I am going to ask you if you have an opinion, and I want it to be based upon the facts

that I am going to ask you to assume.

Please assume, sir, that Michael Schneider was brought to a nursery in Vietnam, called To Am, which was a facility run by a group called Friends for All Children, who were operating in Vietnam, that the time was about two days before he was scheduled to leave Vietnam on the airplane that ultimately ended up, the C-5-A, which is the one that crashed.

Assume also, if you will, that at the time that he was brought to the To Am nursery, he was examined by a registered nurse by the name of Sister Rayneld, who had had experience in examining Vietnamese children; and that she was competent and that at that time, from her examination, it was her opinion that from his appearance and from her examination that he was around one year of age. And that on the basis of her examination that she found that he could sit up firmly with his back straight; that he could be given a toy, and if she took it away from him he would ask for it back -- he would not ask for it, but he would try to reach for it back; that he was alert; that he appeared well-nourished to her; his weight and his height being proportionate; assume also that he was able to crawl. Assume, if you will, that this same child had an umbilical hernia; that he had pus in the right ear; and that his condition was -- Did you have an opportunity to

see Sister Rayneld's report of her examination?

A I cannot recall, sir.

Q Assume also that on the basis of her examination, she found the child to be in good health and that, except for the umbilical hernia and pus in the right ear, that he appeared normal and healthy to her; that the instructions that she had from her superiors was to select only the best children and that he, in fact, had met that criteria.

Assume also that the child was in a facility which was run by a Father Olivier for the time -- from the time he was born, which is not precise now, until this date in April, which was two days before he actually left from Vietnam.

Assume also, if you will, that this same child, Michael Schneider, was placed on a C-5-A aircraft, and that he was placed with other babies--

MR. LEWIS: Mr. Flicker, would you get that, please (pointing)?

Would you display that?

MR. FLICKER: This is Exhibit 2-T as in Thomas.

BY MR. LEWIS:

Q That he was placed in a seat much like this, which is a seat in a military craft which was rearward-facing; and that he was fastened with a seatbelt to the

seat, and that the pillows were placed more or less in that fashion; that those seats were located in the troop compartment of the C-5-A, which was in a position in the upward portion of the airplane.

MR. LEWIS: May I display -- Mr. Flicker, would you get the diagram of the airplane? Would you bring it over here, Mr. Flicker and put it where the jury, the witness and all can see it. What is the number of the exhibit?

MR. FLICKER: Twenty-two.

BY MR. LEWIS:

Q And assume also that Exhibit 22 is a cut-away version of the C-5-A, and I will point out the portion of the troop compartment.

MR. LEWIS: Thank you, Mr. Flicker.

BY MR. LEWIS:

Q That the troop compartment was in that location that I indicated on that exhibit.

That this aircraft took off from Saigon on the 4th of April, 1975; that it reached an ultimate altitude within less than 15 minutes, 23,400 feet approximately; and that when the plane reached that altitude that there was an explosive decompression, and that the speed of the decompression was in the range of a third of a second; that the altitudes -- have you had an opportunity to see the altitude tables?

A Yes, I have.

Q And assume that the altitude table was as you have seen it; that it descended, as you have seen, during those times; that at the time of decompression, a large door, which was on the stern of the aircraft, a pressure door blew off and that the door was wide enough so that two tractortrailers could pass, side by side, through it; that was the rough dimensions of the opening; that--

MR. DUBUC: Objection, Your Honor. There was no testimony to that.

MR. LEWIS: There was precise testimony.

THE COURT: Overruled.

BY MR. LEWIS:

Q That the air in the airplane was pressurized at or about an altitude of 5,000 feet; that the air temperature outside of the airplane was, prior to and during the time of the sudden decompression, a minus 24 degrees below zero -- Fahrenheit; that the pressure differentials between the inside and outside of the airplane before the explosive decompression was 6.4 to 6.5 pounds per square inch; that there was a common stairway and a grating between the troop compartment and the cargo compartment, which is a large space, so that air can pass freely between the two ; and that there was very little oxygen available for the children in the troop compartment; that some of the children received intermittant oxygen

and we don't know precisely whether Michael Schneider was among them; but there was only one oxygen mask per seat and there were two children per seat, and the medical personnel up there attempted to share the oxygen from the masks between the number of children for whom they had responsibility, which might vary from 10 to 20 children per person -- per adult. That during the explosive decompression, a young woman, aged 14, who was located in a lower cargo compartment, which was in the area below the troop compartment and forward to that, became unconscious in an indeterminate period, but a few minutes, more or less, after the explosive decompression and remained unconscious until after the accident; that she woke up in a muddy puddle following the accident, apparently, having been thrown out of the airplane during the crash; that she had a bump on her -- some sort of a scar on her face as a result of the accident and some fractures; that she reports that her memory is not nearly as good after the accident as it was before; and that she has trouble remembering things even on a short-term basis at school now; that a licensed practical nurse who was in the vicinity of the door of the troop compartment observed at the time of the decompression that the babies were semi-conscious or unconscious; that they looked placid and that they appeared unconscious to her; they were pale. She noted that one of them was

turning blue and she took that child and gave it oxygen; that all of the oxygen masks that were built into the airplane did not disperse and that some of them when you pulled them down disintegrated in your hand.

I want you also to assume that Michael Schneider was somewhat forward of this practical nurse in the troop compartment; but his precise location we do not know.

That the airplane maneuvered in an attempt to regain control, and it would have been a swooping motion with altitude changes as you have seen in the altitude tables.

MR. DUBUC: Excuse me, Your Honor. If he can identify the one he is testifying to.

THE COURT: All right.

BY MR. LEWIS:

Q Have you seen the one derived from the MADAR tapes?

A Yes.

THE COURT: That's what you are referring to?

MR. LEWIS: Yes, Your Honor.

THE COURT: All right.

BY MR. LEWIS:

Q I want you also to assume, if you will, sir, that the airplane first struck the ground in a field short of the runway; that parts of the landing gear broke off of the

airplane at that time; that the kinetic energy at that time -- of the airplane striking the ground -- was in the order of 1 billion 500 million foot pounds; the airplane came into the air and passed across the Saigon River, striking the ground again; that the airplane --

MR. LEWIS: What is the exhibit here?

MR. FLICKER: Twenty-seven.

BY MR. LEWIS:

Q Exhibit 27, disintegrated in this fashion at the time of the second impact, with this area being the troop compartment, and that the troop compartment was propelled through the air--

MR. LEWIS: Thank you, Mr. Flicker.

BY MR. LEWIS:

Q --for a distance of some 400 yards and then it struck the ground and slid another 150 yards or so; that the ground the airplane struck the first time was ordinary dirt, seemingly normally hard and dry; but the second time the airplane struck ground it was a boggy or marshy area, with water standing in some places, and apparently a rice field that was either partly still wet or partly drained; in other words, it was damp and muddy.

I want you also to assume that the kinetic energy of the second impact was a million five hundred thousand -- excuse me -- a billion five hundred thousand

pounds; the airplane struck a dike; the landing gear fractured and, as I say, the pieces were dispersed over the ground. Have you seen the area of dispersal in the accident report?

A Yes.

Q I want you to assume the facts that you have seen in the collateral report to be accurate.

Also, I would like you to assume the accuracy of Dr. Copeland's findings and Dr. Brook's findings.

Now, assuming those things, sir--

MR. DUBUC: Your Honor, I object. I would like to hear what he is referring to.

THE COURT: Okay, will you be a little more specific about what you mean, what portions of Dr. Brook's and Dr. Copeland's findings you are asking him to rely on?

MR. LEWIS: Yes.

BY MR. LEWIS:

Q I will ask you to assume that the child now has a condition known as MBD; that he has psychomotor or traumatic epilepsy.

I would like you to assume also the exhibits 55-D-1, E-1, F, G-1, 55-H-1, and the second page of H-1, 55-J-1, 55-K-1, 55-L-1 and 55-M-1, which are Dr. Brook's slides; I also ask you to assume 56-A-1 -- these are Dr. Copeland's -- 56-B, 56-C, 56-D, 56-E, 56-F, 56-G,

56-H and 56-I, which are Dr. Copeland's slides. I want you to assume the accuracy of the data on these reports of Dr. Brook and Dr. Copeland.

Now, assuming the data that you have reviewed is accurate, do you have an opinion, Doctor, to a reasonable medical certainty whether the condition of Michael Schneider is compatible with the environment that he was subjected to in the C-5-A decompression and accident?

MR. DUBUC: Note my objection.

THE COURT: It's overruled.

BY MR. LEWIS:

Q Do you have an opinion?

A I do have an opinion. And I assume that Michael Schneider has not been involved in that period of time in any other extremely traumatic event.

Q Assume that he has not.

A The series of events that occurred in this accident sir, that render one dismayed with the fact the child survived at all . In the combination of events that occurred with decompression, the tremendous trauma that was sustained, followed by the evacuation and, in fact, the subsequent evacuation out of Vietnam, and I would assume that the children were adequately looked after subsequently, and I feel that it is entirely compatible with a severe brain insult, as we would say in medicine.

Q You mean his injury is compatible?

A Yes, it is.

Q Would you take the blackboard and would you explain to the Court and the jury the mechanics of injury, starting with explosive decompression?

MR. LEWIS: Mr. Flicker, would you help with this?

May I approach this?

THE COURT: Certainly. If you could arrange it so that the reporter can stay where she is; if you can display that thing on this side.

MR. LEWIS: Yes, sir.

MR. DUBUC: Not my objection and I move to strike the relatively compatible opinion.

BY MR. LEWIS:

Q Do you have an opinion, Doctor, with a reasonable medical certainty, as to the cause of Michael Schneider's current medical condition, that is to say, MBD and epilepsy?

THE COURT: Just a moment, there's an objection.

MR. DUBUC: I have another objection. The exhibit he referred to referring to, referring to the injury, I cannot find any specific reference to Michael Schneider in either of them; only the number of children.

THE COURT: All right. The objection is overruled.

BY MR. LEWIS:

Q Is your opinion with reasonable medical certainty, Doctor?

A A reasonable medical certainty.

THE COURT: And what is the opinion?

MR. LEWIS: Your Honor--

THE COURT: Let him tell me.

BY MR. LEWIS:

Q What is your opinion, Doctor?

A My opinion, sir, is that Michael Schneider sustained injuries, specifically, a severe brain insult that are compatible with the trauma that occurred in this accident.

THE COURT: An objection is noted, and overruled.

MR. DUBUC: Same objection, Your Honor.

THE COURT: Same ruling.

Just a moment, Doctor, until Mr. Dubuc can get to where he can watch.

MR. LEWIS: May I move that back a little?

THE COURT: Yes, indeed.

And, Doctor, the reporter is very important and your audience is over there.

BY MR. LEWIS:

Q Would you explain your opinion, Doctor?

A With the Judge's permission, I am going to go from the moment of the decompression through some events that would have occurred on the aircraft to describe for the jury what we would reconstruct as aviation medical specialists approaching any type of incident or accident like this.

I am going to start off by telling you that the atmosphere that we breathe has both the qualities of gases in it, and the three gases that we are concerned about here are oxygen, nitrogen and carbondioxide. And their symbols are O_2, N_2, and CO_2.

Now, the amount of oxygen in the atmosphere is about the same to space, that is, about 21 percent. The amount of nitrogen is approximately 78 percent. And the rest of the atmosphere is made up of carbondioxide and what we call inert gases to about one percent.

Now, all of these gases in the atmosphere through their molecular vibrations and impacts produce a pressure, and the pressure, due to the greater number of molecules close to the ground is greater close to the ground, so, as we ascend in the atmosphere, go up in an airplane, or even in an elevator, the pressure drops. So, to review, the concentration of oxygen doesn't change

but the pressure changes with altitude.

Now, the way we in medicine, and particularly in aviation medicine, like to refer to pressure, and you may have heard pressure referred to as pounds per square inch or pounds per square foot. We like to refer to pressure in terms of the ability of the atmosphere to hold down what we call a column of mercury, and the term for this is millimeters of mercury, and the symbol for mercury is Hg.

Now, with that information, at 5,000 feet of cabin altitude, which is approximately 632 millimeters of mercury pressure, this cabin on the aircraft, decompressed from what records we have, to 303 millimeters of mercury in approximately .3 seconds. And, in fact, going back over the records, I reconstructed separately the decompression time and the decompression time from the records available to me, using mathematical calculations, are correct. In fact, two-thirds of the pressure change occurred in this case within .2 seconds. So the decompression was very rapid indeed.

Now, we would like to refer to the decompression as either being rapid or slow and, occasionally, people use the term "explosive decompression." Explosive decompression refers to a decompression in under one second.

Now, with the decompression, there is gas -- there is considerable cooling that occurs; there is a noise,

described by some as a loud boom or bang, or a whoof or a puff. In this case, particularly at .3 seconds, the decompression would have been a large bang, a very noisy one, and very similar to hearing a large cannon cracker close up.

Now, what happens when the pressure drops, as far as our concern, as far as the body is concerned?

We are concerned about gases expanding. And in all of our bodies, we have dissolved nitrogen, and we are concerned about the possibility that the drop in pressure allowed dissolved nitrogen to come out. So we talk about gas out of solution, dissolved in our bodies. And, since we need oxygen to live, and it is the pressure that drives oxygen into our bodies, we are concerned about the effect -- the effect of oxygen falling as we go up, the pressure of oxygen falls.

Now, let's start first with the gases expanding. With the fall in pressure, as I said, gas expands. And, in fact, in going from 632 to 303 millimeters of mercury, the fallen pressure, the expansion of the gas would have been over two times greater. So, if we had taken a balloon in that aircraft and had dropped the pressure, the balloon would be over twice as large.

Now, our concern would be what happens if we have got gas or air trapped in our bodies, and there are

basically three areas that we will be concerned about. The first is behind the eardrum, in the middle ear cavity. Fortunately, we are able to allow trapped gas or gas in our middle ear to get out easily when we go up. It is like a one-way flutter valve. The gas expanding easily gets out down into the back of the throat, called the eustachian tube.

Now, our problem is with descent. And you may recall that people have problems. For example, I have a cold and I am concerned in travelling by air tonight that I am not going to be able to clear my ears when I go down. And, particularly in infants who are sleeping or unconscious it's possible and entirely probable that the infant will not clear his ears or her ears, and the pressure, the low pressure inside of the ear during descent will cause suction of the drum and can cause bleeding and even break the eardrum.

Now, another concern that we have with gas is gas that may be trapped in the lungs. If I hold my breath, as one physician did many, many years ago, during a decompression, as we call the drop in pressure, in a chamber while demonstrating decompression, both lungs expanded to the degree that his lungs broke, or as we call it, disrupted, and he died.

Now, it requires a certain amount of pressure

change to do this. And what I did was, I calculated whether or not the pressure change was so rapid that the gas expanding could not get out rapidly enough, even with the infant or adult with the mouth open in this case. And I must say at this point that, based upon available medical data, that the size of the airways of a growing infant, the gas could get out of the lungs in this decompression about 10 times faster than the decompression occurred. So there was really no buildup inside the lungs of pressure if the airways were open.

Now, let us say that an infant was swallowing at the time, the airways are closed when you swallow. If the infant was at a normal breathing position, just as you and I are now, the pressure calculation would be across the chest wall of about 67 millimeters, that is from inside to outside, about 67 millimeters of mercury. This is using a special formula to calculate this.

If the infant had taken a big breath, which I very strongly doubt, at the moment of decompression; now holding the breath (demonstrating), and holding it tight during decompression -- the probability of this happening must be very close to zero -- the pressure could have built up to over 350--

MR. DUBUC: Your Honor, I object. We are dealing in improbabilities.

THE COURT: Yes. Doctor--

THE WITNESS: Yes, sir.

THE COURT: Mr. Lewis if this is -- if he's just talking about something--

MR. LEWIS: It is just to illustrate the point that happens, Your Honor.

THE COURT: Well, ladies and gentlemen, you understand the doctor telling you at the same time he is describing it to you, he's saying it probably didn't happen.

THE WITNESS: As I said, the probability of it happening would be very close to zero.

THE COURT: We're not interested--

THE WITNESS: You have to deal with them all internally.

THE COURT: We're not interested in what didn't happen, Doctor -- what is improbable.

THE WITNESS: We're talking about a child drinking, let's say a bottle of milk at this point, and taking a swallow, and the pressure of 67 millimeters of mercury across the chest wall, so blowing up the lungs a bit, is below the pressure required to produce damage in the average individual. So, we are not too concerned about expanding gas trapped in the lungs.

And I am only giving you this for the sake of completion. In any lecture you attend--

MR. LEWIS: Excuse me.

MR. DUBUC: Your Honor--

THE COURT: The objection is sustained. We are not taking a lecture, Doctor. We're getting testimony that is germane to this case.

THE WITNESS: The third concern that we have is for expanding gas in the abdomen. And we know from various studies that this gas that might be trapped in the abdomen, particularly in individuals who swallow a lot of gas or who have been concerned while travelling, who have been crying perhaps, trapped gas in the abdomen and the expanding gas can produce a fall of blood pressure and a slowing of heart rate.

Now, the second area is gas out of solution. One has to be above a certain altitude for a certain period of time to produce what we call a bubble situation, much like the coke bottle opened with bubbles coming up, and this accumulates in many, many tissues and causes problems, called decompression sickness. And it is highly unlikely that this could have occurred.

MR. LEWIS: Just tell us what did occur.

THE COURT: Doctor, I don't want to hear any more about what didn't--

MR. DUBUC: Your Honor, as long as he is pointing to something, I would like to hear the rest of that.

THE COURT: I don't care what you would like to hear. I want to hear what is relevant, and this isn't. You have already objected to something that is improbable.

THE WITNESS: It is a remote possibility, Your Honor. It has been raised as a question in this case for almost five years.

THE COURT: Let's go on to something else.

THE WITNESS: Okay.

The effects of oxygen involved are very clear in this situation. And the fact that the infants, most of whom were sleeping, and typically in infants we have a degree of carbondioxide in the lungs that displaces some of the oxygen available to us. That is, carbondioxide builds up slightly in the lungs and allows less oxygen to be there. And what will happen is--could I have another sheet?

THE COURT: Certainly.

(Counsel complied.)

THE WITNESS: This being the altitude, 24,000 feet at the time of decompression, the pressure, barometric pressure of 303 inside the cabin, the pressure that is available in the blood to the tissues calculated as being in the lung, calculates out, using a special formula of only 8 millimeters of mercury, this assumes that the infant has not had time to increase the rate and depth of

breathing at one minute, this is at zero time, and one minute at 21,202 feet, the barometric pressure is reported as 335 millimeters of mercury and, by that time, we would have had a long oxygen pressure of 14. At two minutes, we were at 16,313 feet, at 407; and the pressure calculated out at 29 millimeters of mercury. This again assumes that we did not increase the amount of breathing, that the infant was just breathing still in the same way he was before the decompression.

At three minutes, or at 16,000, the aircraft got back up again a bit, the pressure is at 404, and the lung oxygen calculates out very much the same.

And, finally, at four minutes, and I will not be going any further on the calculations, we are 459 at 40.

Now, the point that I wish to make for this is the fact that if the lung oxygen is lower, significantly below 40 millimeters of mercury, not only does unconsciousness occur but also brain damage occurs after a period of time of exposure.

This is a simple medical fact. These infants were exposed to a very, very severe oxygen lack very abruptly.

Now, you say we do have a number, in fact, thousands every year of people being decompressed in

a decompression chamber at an altitude. They are awake; they are individuals who have a chance to compensate by increasing the rate and depth of breathing and, in many cases, they are already being supplied oxygen when going to altitude.

And I might say that I would like to bring in some concerns here for the environment of the infant at the moment the decompression occurred.

I am concerned for such things as the amount of air in the abdomen pushing the diaphrams up and decreasing the ability to breathe. I am concerned for the infants being warm initially and, if you are warm, you are hot, your temperature particularly is up a little bit because you have been sitting in a confined space, let's say on a hot aircraft, as we say, with fighter pilots, your oxygen need is much greater. Then after the decompression, we get chilling. The temperature undoubtedly dropped significantly in the cabin. The outside temperature on the average at that altitude around the world was 24 degrees below Fahrenheit on that date.

The third factor that I would be concerned about would be the ability of infants to have difficulty if they have anemia, which is a decrease in the ability of the blood to carry oxygen.

Now, one final thing I should point up, and no one

has been able to give me a satisfactory answer to this, if you blow out a side door travelling at high speed in an aircraft, it is possible to raise the altitude of the aircraft by several thousand feet by a phenomenon called the Venturi effect. It is entirely possible that the altitude--

MR. DUBUC: Objection, Your Honor.

THE COURT: There's an objection.

MR. DUBUC: It's on the basis of probability.

THE WITNESS: The probability is entirely probable, sir, that the altitude was higher due to the Venturi effect, based on the rear door being blown off.

BY MR. LEWIS:

Q Would you explain that?

A The flow of air and the height with the increase in the rate of air flow over a body, such as a wing, decreases the pressure in the air relative to the air that is going straight by and not bending over the body. And this is what makes the airplane fly.

So the pressure, where the air is going the fastest, is actually lower than the pressure that is just simply going straight by. That is the best explanation that I can give.

Q Do you have an opinion as to whether there was a Venturi effect in this case with a reasonable

scientific and medical--

MR. DUBUC: Objection, Your Honor. I would like the grounds or what he looked at before we have an opinion on it. I haven't heard anything yet, either in testimony or in evidence.

THE COURT: Can you state the premise for your opinion? If you can, go ahead and state it.

THE WITNESS: My opinion is that the altitude was significantly higher, up to possibly--

BY MR. LEWIS:

Q What's probable?

A Up to probably 3 or 4,000 feet higher.

THE COURT: Why do you say that?

THE WITNESS: Based on a Saberliner door decompression a few years ago, which was flying at 42,000 feet, the door went off and the cabin altimeter registered 49,000 feet.

MR. DUBUC: I object and move to strike.

THE COURT: It's overruled.

BY MR. LEWIS:

Q So are you saying that the actual altitudes were more than the altimeter registered; is that what you're saying?

A Yes, sir.

THE COURT: The actual -- well.

BY MR. LEWIS:

Q The effect of the altitude, the pressure.

A Yes.

THE COURT: Go ahead.

BY MR. LEWIS:

Q Go on, please.

A During this period of the descent, we would be concerned with providing oxygen for the infants, children and adults, and the drop-down system that is used in aircrafts of this type is the same as that used in the commercial airlines. It is very important, as every stewardess or steward will tell you, that in order to get adequate oxygen, you have to have an adequate fit of the mask. And we found this in all of our experiments that I conducted at the Civil Aeronautics Institute and in other research that I have been involved in. To take a mask from one person to another and expect--

MR. DUBUC: Your Honor, we are done at the board. I think that instead of a lecture--

THE COURT: Yes.

BY MR. LEWIS:

Q Doctor, what is the effect--

THE COURT: Just a minute. Why can't he go back to the witness stand?

MR. LEWIS: All right, sir.

(The witness resumes the stand.)

THE COURT: And would you slide that out of the way so that I can see Mr. Dubuc? Thank you.

BY MR. LEWIS:

Q Doctor, what is the effect, in your opinion, of the masks that were used in this case as to whether or not they would be effective for babies one, two or three years of age?

THE COURT: It's overruled.

THE WITNESS: The masks would have been effective if they had been placed on the infant's face and kept there, well-sealed. These masks are certificated to over 40,000 feet.

BY MR. LEWIS:

Q What would be the effect of moving a mask from infant to infant as far as the oxygenation of the children under these circumstances?

A It would be minimally effective.

Q Now, would you go on and state your other conclusions that you reached and the basis for your opinion?

A The infants were then subjected to a number of severe jolts as the aircraft impacted. And, in this area, I am quite familiar with the effects of an aircraft striking an object on an infant due to some research that

we conducted at the FAA CAMI -- C-A-M-I -- on infant restraint systems. You may have noticed that an infant is very top-heavy. The picture that I was shown--

Q Do you mean physiologically?

A The anatomy of an infant is that their head is very large, and we are very concerned about the head being thrown up in any type of accident, whether it be an automobile or in an aircraft. And the FAA research in this area has shown that unless an infant's head is adequately restrained it can be thrown very markedly about.

Q Would that be different than an adult under the same circumstances?

A Yes, it would be.

MR. DUBUC: Objection.

THE COURT: Overruled.

BY MR. LEWIS:

Q In what way?

A The first thing is the relative size of the muscles in the upper torso and yet be able to hold the head erect during a period of jolt, being thrown forward. The other thing is that the infant is able to move and bend its trunk much easier, is more resilient. If I might say, we have a film in the FAA that we show as part of our FAA Medical Examiner Program, that shows an infant in an impact, well-restrained impact, three months old,

and another at six months old going right over the top of the belt but yet remaining attached, and the head actually goes down over top of the seat pad. That's how much stretching occurs and then rebounds.

Admittedly, in this case, the infants were rear-facing, but we are just as concerned in accidents with what we call a secondary rebound effect.

Q In your opinion, Doctor, with reasonable medical and scientific certainty, with the rearward-facing seats under the circumstances of this accident, how would the child's body behave and would there be a rebound effect and, if so, what is that?

A There would definitely be a rebound, a very severe one.

Q Would you describe that?

A The first impact probably wouldn't have been but for the infant to be thrown back into the seat effect with the first halt and project forward.

Q And how would his body be when he went forward?

A In essence, jacknifed over and the head down possibly even as far as over the pillows on the seat. Now, this would have occurred with each subsequent impact. And it has been recorded in accidents and observed in experiments that there can be in just one stopping several

whippings back and forth of the trunk in an infant.

Q In an infant?

A In an infant and in an adult.

Q Now, can you tell us, Doctor, whether you think the rearward-facing seats prevented injury in this case with a reasonable medical certainty?

A They undoubtedly did protect a great deal.

Q And did they protect the child from brain injury , the child being Michael Schneider?

THE COURT: It's overruled.

THE WITNESS: Brain injury related to the hypoxia or the impact?

BY MR. LEWIS:

Q Both.

MR. DUBUC: Objection.

THE COURT: Overruled.

MR. LEWIS: Tell us about it.

THE WITNESS: Since the primary impact, that is if the children were facing forward, it is usually much more severe than the secondary whip or motion. The children would be more protected.

MR. DUBUC: He is talking about facing forward and the evidence indicates it was rearward.

BY MR. LEWIS:

Q Do you have an opinion, Doctor, with reasonable

medical certainty as to whether--

THE COURT: The earlier questions is withdrawn?

MR. LEWIS: Yes, I will withdraw it.

BY MR. LEWIS:

Q If you have an opinion with reasonable medical certainty, whether Michael Schneider was injured as a result of the explosive decompression and hypoxia?

A Correct.

THE COURT: You can answer that yes or no. Do you have an opinion?

THE WITNESS: Yes.

BY MR. LEWIS:

Q What is your opinion?

A My opinion is that brain damage occurred to some degree as a consequence of hypoxia.

Q And what about the impact or trauma?

A My opinion is that brain damage to some degree occurred as a result of the trauma.

Q Now, Doctor, what is negative panic?

A Negative panic is a broad term to describe events that occur psychologically after an extremely traumatic and emotionally disturbing situation. Some individuals react to a very great crisis by just doing nothing.

It has been used as a term to also describe a period of amnesia of events that occurred. In other

words, the individual doesn't recognize any longer they have been through a crisis, an airplane crash. And they just sit there waiting for the announcement that we have pulled up to the gate. It is time to deplane. This happened a few years ago in a crash where they found a man still sitting on the airplane after the crash occurred waiting to be deplaned.

THE COURT: We will recess at this time, Mr. Lewis, to reconvene at 1:45.

(The jury leaves the courtroom.)

MR. DUBUC: Your Honor, may we ask that we be provided with copies of whatever correspondence he has with Dr. Snyder--

MR. LEWIS: I will ask about that.

THE COURT: And Dr. Mason.

It is so ordered.

(Whereupon, at 12:30 p.m. the hearing was recessed to reconvene at 1:45 the same afternoon.)

- - -

THE COURT: Mr. Dubuc, I notice I have another partial set of instructions.

MR. DUBUC: Those are the ones I handed in this morning.

THE COURT: What was our understanding of the filing of them?

I have another one from Mr. Patrick, too.

MR. DUBUC: I asked before, Your Honor, that we be permitted to file requests to and including rebuttal witnesses since we did not know what they were going to be saying.

THE COURT: All right.

I don't have any problem about it, except I think we have an implicit understanding that Mr. Patrick is trying to get out of town and wants to be involved in this.

Do you presently anticipate any more proposed instructions?

I don't mean to preclude you if something else develops.

MR. DUBUC: Perhaps one or two, depending on these witnesses.

THE COURT: But it all relates to what comes up in the rebuttal?

MR. DUBUC: I think so.

THE COURT: Nothing you can think of in the case

in chief?

MR. DUBUC: Not that comes immediately to mind.

I would like to look into my files.

I can think of only one or two additional.

THE COURT: What about the plaintiffs? Do you all anticipate any other instruction requests, Mr. Patrick?

MR. PATRICK: No, sir.

I have been trying to assemble some cases on this question of medical certainty.

I might mention to the Court 66 ALR 2d. There is a note at 1082, 1127 and a later case at page 277 under Section 7-B that discusses a good number of the cases. And we have some other cases.

THE COURT: This is their instruction to limit the consideration of expert testimony in the medical field to those opinions expressed with a reasonable medical certainty?

MR. PATRICK: Yes, sir.

THE COURT: And you have authority that that is not necessary?

MR. PATRICK: Yes, sir. That is right.

Apparently the Sponagle (sic) case, which was a malpractice case, specifically left that question open.

THE COURT: In this circuit?

MR. PATRICK: Yes, sir.

And it cited some cases which indicated that circumstantial evidence, lay testimony and things of that sort, would be admitted.

There are some cases that go both ways on the issue.

THE COURT: Tell me again the D. C. reference.

Is it our Court of Appeals or the D. C. Court of Appeals?

MR. PATRICK: Excuse me.

The case which Lockheed cited for its requested charge 31 is Sponagle v. PreTerm, Incorporated, which is shown as 108 Washington Law Reports, at paragraph 445, a D.C., I believe it is --

THE COURT: Court of Appeals?

MR. PATRICK: I believe so. I have that case. It is case No. 13,733. And I think that case does not hold what Lockheed suggests it does.

In fact, it expressly says that they don't need to determine what the standard is. And it was a medical malpractice case as distinguished from a personal, you know, the ordinary personal injury case.

THE COURT: Do you have some other D. C. authority?

MR. PATRICK: No, sir. I'm afraid not at the moment. We are still trying to find some more material on

it.

THE COURT: Okay.

Thank you.

MR. DUBUC: We have two authorities, Your Honor.

THE COURT: Local?

MR. DUBUC: Yes, Your Honor.

THE COURT: Well, I have everything that is cited in the papers. I thought I was getting something that wasn't cited.

MR. DUBUC: The other one is Harrington against Austin, which is also cited.

THE COURT: I have those.

Okay.

Anything else before we resume?

[No response.]

THE COURT: Bring back the jury, Mr. Marshal.

The doctor can take the stand.

[Whereupon, Douglas Earl Busby resumed the witness stand.]

[Jury enters.]

THE COURT: Mr. Lewis.

MR. LEWIS: Thank you, Your Honor.

DIRECT EXAMINATION (Cont'd)

BY MR. LEWIS:

Q Doctor, would you describe the relationship, if

any, between the injuries sustained by Michael Schneider as a result of the hypoxia and the events that occurred at the time of the explosive decompression and the events of the crash, with reasonable medical certainty?

MR. DUBUC: Objection, Your Honor.

THE COURT: Objection overruled.

You may respond.

A The events were such that, as I stated before lunch, brain injury occurred consequent to the hypoxia. The hypoxia also set up the brain for damage from the extremely severe jolt, which we refer to as "G" forces, that occurred in the accident.

These forces would have produced injury in any case in Michael Schneider or other children of this age.

As I explained, the situation was ripe: The seatbelt, a heavy head, the intense whipping, the motion of the head back and forth with the possibility of striking the childrens' heads on either side, as the case may be.

It is important to understand though that the two events in themselves produced injury, but the combination of them made the injury sustained much worse.

Q Doctor, do you have an opinion, with reasonable medical certainty, based upon your review of the accident, including the hypothetical that I gave you, as to whether or not Michael Schneider's injuries, the MBD and the

epilepsy that I have asked you to assume, are compatible with the type of events that you described?

A Positively.

MR. DUBUC: Objection, Your Honor.

THE COURT: Overruled.

BY MR. LEWIS:

Q Doctor, do pressure chamber experiments duplicate what happened to Michael Schneider on this airplane?

A The only commonality between a decompression chamber ride and the decompression that occurred is that both involved decompression.

We are not talking about babies. We are talking about adults. We are talking in most cases of individuals who are going through a training protocol who have already been provided oxygen. Let's say exposure to demonstrate hypoxia or taking the mask off to see how long it takes to lose consciousness or what we call useful consciousness because you really never allow the individual to go so far as these babies were exposed.

The other matter is decompression that occurs. We do not expose pilots in training to even a demonstration decompression of the magnitude, of the weight of decompression, the bang that occurs of this type.

You are looking at a person who has been through many, many decompressions, but I certainly don't want to

go through my decompression in .3 of a second. I have certain risks I do not want to take in this life.

Q So, in a typical pressure chamber experiment of the type that is done to acclimate military pilots and civilian pilots, the type you are familiar with and administered in the FAA, can you tell me whether or not they get oxygen before the decompression and then afterwards?

A Well, there is a number of protocols or ways of doing the training.

Q Typically.

A The typical way is to take the group -- that is, of pilots -- with an instructor up in a chamber to altitude, to take the air out of the chamber, evacuate it out, and give them an elevation in equivalent altitude.

This, for the FAA, and I believe for the United States Air Force, is to 25,000 feet. At that point everyone is breathing oxygen, using a mask. A mask is taken off an individual who volunteers to demonstrate deterioration in his ability to perform mentally as he gradually deteriorates due to oxygen lack.

Now, this is at 25,000 feet. There is wide variation between people in terms of the affect, but you can expect that on the average between three and four minutes, that individual will cease performing to the degree that he can't count backwards or write his name and

Social Security number, as we used to demonstrate. He will have turned blue. He will be smiling usually or he might actually be pretty angry, as some people do have this reaction to hypoxia. And at that point the oxygen mask goes on.

Now, one must remember that when you remove the oxygen mask he is already breathing 100 percent oxygen through a well sealed face mask.

So, there is no way that you can compare this to just suddenly sitting at 5,000 feet and .3 or a second later being at 24,000 feet or the range thereof.

Q So, your testimony, then, is that they are not comparable at all?

A Not comparable at all.

I might also add that the temperature conditions in this situation are not even comparable. We have heaters and appropriate air conditioning systems in decompression chambers that keep the temperature at a reasonable level.

In other words, there isn't that much of a cooling affect except for during the period of the decompression.

Q Now, from your experience in aircraft accidents, do you have an opinion, with reasonable scientific certainty, as to whether the average "G" forces subjected by this child would range from 1.66 to 3.6?

MR. DUBUC: Objection, Your Honor.

THE COURT: That objection is sustained.

MR. LEWIS: You may examine.

MR. DUBUC: Your Honor, may we approach the bench?

THE COURT: Yes. Certainly.

[Whereupon, the following took place at the bench, outside of the hearing of the jury:]

MR. DUBUC: Your Honor, I have two memorandums from Dr. Busby and he did indicate that he had corresponded with Dr. Snyder and Dr. Mason.

The question I want to know is whether he wrote to them or they wrote to him. We are entitled to that.

Apparently this is what he has with him, which are his summaries, which I intend to use. But he did testify there was correspondence.

THE COURT: Mr. Dubuc, I have reflected about this over lunch.

We have known for some time that this witness was going to be for rebuttal. It seems to me if you want the documents, you could have requested them.

MR. DUBUC: We asked for his curricula vitae and lab reports.

THE COURT: You did ask for them?

MR. DUBUC: We have the curricula vitae. That is

the only thing we received.

MR. LEWIS: These are not reports. What this is is this: As a result of this meeting Dr. Mason, who is a pathologist, an aviation pathologist, talked with Dr. Busby and said: Could you send me some data on it so I can do some research?

Dr. Busby wrote a cover letter -- which we don't have here -- and he sent these. We found these in Dr. Cohen's file. I didn't have them.

So, this is all we have. This is the information that this witness sent Dr. Mason so that Dr. Mason could start working on the project, looking downstream.

We have tried to get Dr. Mason over here for a long time and for scheduling reasons -- he is from Edinberg -- he couldn't come.

Counsel heard Dr. Mason speak, for example, and give this same testimony.

MR. DUBUC: I did not, Your Honor.

Dr. Mason spoke about generalized other accidents. He gave no testimony.

THE COURT: All we can do is do what we can do.

Have you had a chance to read the material?

MR. DUBUC: I have read the material.

THE COURT: You can cross-examine from that.

MR. DUBUC: I want to ask him for the corres-

pondence.

THE COURT: See if you can elicit the substance of it and then you can cross-examine.

MR. LEWIS: Your Honor, just on the question of "G" force situation --

THE COURT: What?

MR. LEWIS: The "G" forces.

This witness has had a lot of experience and is in a position to say --

THE COURT: I understood when you said that up there, when Mr. Dubuc was asking the questions on voir dire, you said you weren't going to have him do this kind of thing. You were going to have him talk about engineering.

MR. LEWIS: The only thing he is going to say is that the "G" forces can't be calculated. There are too many variables.

THE COURT: We don't need that.

[Whereupon, the following took place in open court:]

THE COURT: Mr. Dubuc.

CROSS-EXAMINATION

BY MR. DUBUC:

Q Good afternoon, Doctor.

A Good afternoon.

Q Doctor, you were just talking about some flight chamber tests, which were the tests run, as I gathered, by the FAA and the Air Force and other services for indoctrination and training of pilots; is that correct?

A That is correct, sir.

Q And you discussed the format, as I understand it, which includes only taking the pressure chamber up to, let's say, 25,000 feet and removing masks and watching affects for apparently time abuse of consciousness; is that correct?

A There are two types of the protocol, sir.

The first is the hypoxia demonstration.

The second is a decompression with mask downing.

Q So, there is actually a decompression?

A There is actually a decompression.

Q And is that usually at a higher altitude?

A It is done in different ways, depending on the service that we are dealing with.

If I recall correctly, the altitude is usually -- the difference is usually from 8,000 to 25,000 or zero to 10,000 feet. It is through a pressure differential that is enough to demonstrate satisfactorily the affects of gas expansion.

Q Are there not some tests that are done up to 35,000 feet?

A The Air Force used to conduct its tests, I believe, to 35 and has recently, at least in the past few years, come back to 25,000 feet.

Q With respect to that sort of altitude chamber decompression, are you familiar with the document entitled, A Ten Year Survey of Chamber Reaction, using the FAA training chamber flight profiles that was published in February, 1977, which I understand is the period of time you were with the FAA?

A Yes.

I, in fact, approved the paper for publication.

Q All right.

And in those decompressions, they went as high as 29,000 feet; did they not?

A That is correct.

This was in the FAA chamber. They now follow the Air Force protocol.

Q And there was a study there that included a study of evolved gases; is that correct?

A Yes,

Q Do I understand your testimony correctly to be that in your opinion because of the altitudes involved in this accident there is very little likelihood of any evolved gas or decompression sickness problem?

A I was getting into that point when I was

interrupted this morning and asked to condense my presentation.

It is highly unlikely that any decompression sickness could have occurred.

I might say the reason for dropping back the altitudes of exposure is because you are taking a group of people up to an altitude and demonstrating with a number of individuals hypoxia, taking the mask off. The risk of bends or decompression sickness increases with time and you need at least a minimum five-minute period on the average to start to produce the increase of risk.

Q That time was not present in this case; is that correct?

A Not present, sir.

Q According to your own calculations?

A No.

According to the almost overwhelming evidence and the scientific literature.

Q So, that is ruled out, as far as any precipitating cause of affect?

A As far as I can see.

Q With reasonable medical certainty?

A With reasonable medical certainty.

Q Thank you.

Now, you have also mentioned a second part of

the factors in decompression and I think I heard you say that in decompression, at the time of decompression itself, and you correct me if I am wrong, the gases in the body are exhaled, or they flow out, including the gases that may be flowing out of the ears; is that correct? The ears adjust to the decompression itself well?

A Any connection with the outside, the expanding gas will get out.

Q Okay.

In this case were you aware that Michael Schneider prior to this accident had been observed and had some pus in one ear, which would indicate an opening in the ear drum?

A If he had what we call a middle ear infection, this is a possibility, that he had an opening in his ear drum. On the other hand, it is possible to have pus in the ear from an infection in the outer ear. The probability would support, though, a middle ear infection.

Q Which would mean the ear drum would be open and the air would go out that much quicker through that particular ear drum?

A Yes. Along with pus.

Q Okay.

It would clear out the ear, wouldn't it, in fact?

A Yes.

Q Now, you have told us that you looked at the MADAR recorded altitudes of descent; is that correct?

A I understood that the MADAR recorded altitudes of descrent were reported in the collateral report, yes.

Q You didn't look at the MADAR tape itself?

A I did not look at the tape itself, sir.

Q And this is where you got the information you used here?

A That is correct, sir.

Q Now, do you recall from that report, or did you note from the MADAR information given that the descent was not direct, but, indeed, the airplane would go to one altitude and perhaps climb slightly and then again begin its descent?

A Yes.

Q Now, isn't it a fact that that is one method of relieving ear problems during a descent? Ear blocks or pain, if noticed, a pilot can arrest the descent and climb in order to relieve ear pressure?

A Where the descent profile was being changed -- that is at altitudes above 10,000 -- I doubt that the altitude changes would have been significant enough to have cleared any ear problems. We are more concerned with altitude changes fairly close to the ground. In other

words, we are bringing an individual down in the chamber before doing a demonstration of rapid decompression and he said I can't clear my ears.

So, we take them up a little bit and we call that bouncing the chamber.

Then he will come back and this will pop the drum open. And then go down a little slower.

It really, I don't believe, applies to this case.

Q Now, you had mentioned as the second event or one of the events that you based your opinion on is the hypoxia event, is that correct?

A Yes.

Q Now, isn't it a fact that the time of useful consciousness at an altitude of, say, 24,000 feet would be three to five minutes?

A Three to five minutes for an adult taking off a mask which was previously providing him 100 percent oxygen.

Q And isn't it a fact that the time of useful consciousness at 22,000 where they were within one minute is five to ten minutes?

A No. It is not.

MR. LEWIS: What number is that?

MR. DUBUC: It is an FAA document, which I assume Dr. Busby is well familiar with.

BY MR. DUBUC:

Q Are you familiar with a document entitled, Physiological Training, published by the Department of Transportation of the Federal Aviation Administration, Civil Aeromedical Institute, Physiological Operations?

That is the CAMI you worked for.

Are you familiar with this document?

A Yes, I am.

MR. LEWIS: May I see one, Mr. Dubuc?

MR. DUBUC: I don't know if I have another here, Mr. Lewis.

Perhaps you can share the Doctor's.

I don't have an extra one.

THE COURT: You are welcome to look over his shoulder.

MR. LEWIS: Thank you, Your Honor.

I haven't seen this before, sir.

MR. DUBUC: This is, I believe, a public document, which is published by the Federal Aviation Administration.

MR. LEWIS: I still hadn't seen it, however.

BY MR. DUBUC:

Q Doctor, I am particularly interested in the page, which is page 11 -- they are not all numbered -- page 11, called, "Effective Performance Time or Time of

Useful Consciousness." That is page 11.

A I am aware of this and this is actually being written at the present time.

In fact, it is being incorporated in some work I have done.

When you are talking about "useful consciousness" I --

Q Just a minute.

MR. LEWIS: May the witness finish his answer?

MR. DUBUC: I only asked if he was aware of that.

A Yes, I am aware.

THE COURT: Just a minute.

Come on. Settle down. Just a minute. Play ball.

Go ahead.

BY MR. DUBUC:

Q I only asked if you were aware of this.

A I am aware of this.

Q And this is a publication of the Federal Aviation Administration; is it not?

A Yes.

Q Does it not deal with physiological training, which is what you have been telling us about, the altitude chambers?

A Yes.

Q Does it not indicate on page 11 that the time of useful consciousness, or effective performance time at 22,000 feet is five to ten minutes?

A That is effective performance time without oxygen taken from literature in which the individual was supplied with oxygen before he removed the mask. And I would venture to say that that is an error compared to other information.

Now, this is just a training manual. It is not scientific. There are a number of errors in this and I am well aware of the errors.

Q Were you connected with the CAMI Institute or the Federal Aviation Administration during the period of time this error was recognized?

A I don't believe I can answer that.

Q In any event, you disagree with that useful consciousness, then, is that correct, five to ten minutes, at 22,000 feet?

A Yes.

Q Now, the time of useful consciousness or effective performance time, as is indicated in here, is different from being unconscious; is it not?

A The time of useful consciousness is a very, very vague term. It is really the time from the onset of

exposure to the time at which you can initiate an action to save yourself.

Now, in some cases time of useful consciousness has been measured simply by having the individual count backwards and the usual term is "count backwards in sevens, like 100, 93, 86.

In other situations, it is a reaction to an emergency light and gong.

Now, a person who is counting backwards or writing his name and Social Security number, particularly, which he does quite often -- I shouldn't say "Social Security" -- in the military it was name, rank and serial number. These were things that he wrote quite often. So, his time of useful consciousness was usually much longer than let's say, responding satisfactorily to having to down a mask, which was complex.

Again, it all has to do if you are on oxygen, you are well primed, your tissues are well oxygenated at the moment you take your mask off.

Q Well, Doctor, I would like to try it once again.

My question is: Isn't it a fact that there is a difference between the time of useful consciousness or effective performance, as indicated here, and a time of total unconsciousness, which means passing out?

A If you are referring to passing out as actually

dropping down, yes.

Q Yes.

A Yes.

Q This document so indicated, does it not, in the paragraph just above these statistics that altitudes below 30,000 feet this time may differ considerably from the time of total consciouness, the time it takes to pass out?

A Yes.

Q Do you agree with that?

A There are marked differences between people and there is a difference between the time of useful consciousness and a time of total unconsciousness.

I might say there is also a definition here which the FAA is going to be incorporating into its revised version, called the time of safe unconsciousness, a time at which you can be unconscious and not have brain damage.

Q All right.

Now, you mentioned, I believe, in direct this morning that you had published a book called, "Recent Advances in Aerospace Medicine".

A I stated I was editor of a compilation of papers in that book.

Q And in editing the book, did you review the

articles that were being published in there?

A Yes.

Q And as an editor, would you have published something that was inaccurate?

A It would all depend on whether or not I knew that it was inaccurate.

If there was a miscalculation, statistically speaking, I would identify it possibly and make a change.

I believe one paper in there was published by a French author by the name of Dr. Lavern. I picked that up.

My role in doing this editing was primarily on behalf of the Congress, the International Congress of Aviation and Space Medicine, to compile the papers into reasonable organization and make whatever changes were necessary to effect a well readable document.

MR. DUBUC: I don't have extra copies of this. Mr. Lewis is perfectly willing to look over the Doctor's shoulder.

BY MR. DUBUC:

Q I am looking at page 199 of your book, edited by you, entitled, "Recent Advances in Aerospace Medicine." I am going to read you something and ask you --

MR. LEWIS: I would like to see it, if I might have the courtesy.

THE COURT: He said that you would have it, Mr. Lewis. Don't be a martyr about it.

[Whereupon, the book was handed to Mr. Lewis.]

MR. LEWIS: Indulge me just one moment, sir.

THE COURT: Yes.

BY MR. DUBUC:

Q Doctor, did you edit and approve this article on factors influencing the time of safe consciousness, as you just mentioned, for commercial jet passengers following cabin decompression, on page 199 of your book?

It sates --

MR. LEWIS: Who wrote it?

MR. DUBUC: It is by J. G. Gaume of the Douglas Aircraft Corporation.

BY MR. DUBUC:

Q "A more accurate rule of thumb for safe exposure to decompression might be the time the cabin altitude is above a given level. Most subjects who have been exposed in altitude chambers can tolerate several minutes of hypoxia up to 25,000 feet without becoming unconscious. Below 25,000 feet is considered relatively safe without becoming unconscious."

Did you write those words?

A I did not write those words. Those are written by Dr. Gaume.

Q Did you approve those in editing that book?

A Dr. Gaume submitted the paper for publication.

This paper was also published in the Journal of Aviation, Space and Environmental Medicine and approved, I presume by a group of editors for that journal.

Dr. Gaume was presenting some of his thoughts based on what he had accumulated over the years in knowledge and statistics relating specifically to whether or not they should delete oxygen systems on passenger carrying aircraft. This was the purpose of his writing this review. It is not based on original research. He is only stating what he feels is a view based on the available literature at that time.

It is interesting, and I discussed this with Dr. Gaume. We are back to the same issue that I raised repeatedly. That is, we have been talking about chamber rides, not exposing babies to .3 of a second to 24,000 feet.

Q Do you disagree with Dr. Gaume?

A He is only stating what was available at the time.

Q You mentioned that you had written a portion of the Encyclopedia Britannicia dealing with aerospace medicine; is that correct?

A That is correct.

Q Do you recall publishing therein, in connection with stresses of aerospace flight --

MR. LEWIS: Could you tell me what it is you are going to ask the witness about?

MR. DUBUC: I am trying to tell Mr. Lewis, Your Honor.

It is on page 142, under areospace medicine, in the Encyclopedia Britannicia, referred to by Dr. Busby.

MR. LEWIS: Would you show me what part, so I don't have to read the whole thing.

MR. DUBUC: Stresses of aerospace flight, at the bottom right-hand side of the page.

MR. LEWIS: I see it.

Thank you.

BY MR. DUBUC:

Q That states: Hypoxia can limit useful function within ten to fifteen minutes of exposure to atmosphere at an elevation of 12,000 to 15,000 feet. At 20,000 to 23,000 feet unconsciousness can occur within several minutes.

Do you agree with that?

A Several minutes, it can occur, correct.

THE COURT: Just a moment.

Let Mr. Lewis furnish the witness with a copy.

MR. LEWIS: May the witness have the article?

THE COURT: Certainly.

[Whereupon, the article was handed to the witness.]

A Correct.

BY MR. DUBUC:

Q Now, isn't it a fact, Doctor, that it is the unconsciousness part of this that become a potential for brain damage?

A The unconsciousness part, in my concern, is the affect of the lowered oxygen on the brain, developing brain cell of a child, not an adult, to which these people which are mentioned in these articles.

Q Well, isn't it a fact that in the relatively fast majority of cases where you have any brain damage from hypoxia there is some period of actual unconsciousness?

A Yes.

Q And, so, if we had an atmosphere where no one is unconscious and according to the statistics and even theoretical research, as you yourself have recorded in the Encyclopedia Britannicia, no unconsciousness occurs, isn't it unlikely that you are going to have brain damage?

A If I took an individual seated in this room to 23,000 feet, it would take some time to get up there. I would go through a number of altitudes, at which I would already be building up a degree of hypoxia. When I got up

to 23,000 feet that person may still be conscious. But that doesn't mean that brain damage is not occurring.

By the same token, as we know alcohol, and this is the best analogy that I know of, alcohol does brain damage in much the same way as hypoxia does. But you don't have to be unconscious from alcohol to produce brain damage.

Q Well, isn't there a factor of time with respect to alcohol?

A That is the point that I am trying to make.

Q And within the time periods we have been looking at in this FAA document, which you indicate you don't agree with, but even in the book edited by you as to time of safe consciousness and the Encyclopedia Britannicia article which you published, isn't it a fact that you are talking about more than a minute or two at altitudes above 21,000 feet in order to have the kind of unconsciousness or partial unconsciousness that involves potential brain damage?

A Sir, it would be contradicting my understanding of aerospace medicine to agree with you on this point for we are dealing with two different situations: The adult in a decompression chamber taking off a mask, usually having been provided pure oxygen, and a child being suddenly exposed without the benefit of oxygen to 23,000 plus

feet.

Q Now, Doctor, in rendering your opinion, I know you make some assumptions, and I know you indicated that you have read the collateral report by the Air Force.

Did I understand you to say that you had not read the official Air Force accident investigation report, which is the safety report?

A There were, I believe, three volumes to the collateral report. I was provided these three volumes to read.

If I remember, the first described the accident scene and included a number of sworn statements. And I believe the others were principally statements in the engineering area and I did not read those in detail.

Q Well, my question, Doctor: Do you know the difference from your experience between the Air Force accident report or the safety report and the Air Force collateral report and the reasons for that?

A I do not, sir.

Q I show you what has been marked Exhibit D-3 for identification, which is a summary of the Air Force accident report, and ask if you have seen this document?

A I do not recall seeing this report, sir, although it contains some paragraphs that are remarkably similar to those that I viewed in Mr. Lewis' office a few weeks ago.

Q Who selected the documents you read? Did you select them from a list or index of what was available or was it selectively given to you?

A I requested any information that could be provided in creating a scene of the accident and I was asked if I would like to see the collateral report and I responded affirmatively and I was provided this to review.

There were also some documents which didn't provide very much information. I believe there were the death certificates that I also viewed, but very briefly. And I don't know whether or not those were part of the collateral report as well, but I did see those separately.

Q But did you ask whether there were any other accident report information other than the one that was given to you, the collateral report?

A No. I did not ask.

Q You mentioned some correspondence with Dr. Snyder and another physician in Scotland, I believe.

A Yes.

Dr. Mason and Dr. Snyder.

Q Did you write to both of them?

A I wrote to Dr. Mason, a very brief cover letter, saying I had been in Mr. Lewis' office and I knew Dr. Mason was very interested in determining particularly the vectors of the accident and consequently I felt that certain

excerpts I had taken for my own use might be useful to him from a scientific standpoint.

I sent a copy of this letter to Dr. Snyder.

Q Did you get a response from either of them?

A No. I have not received a response.

Q Now, you mentioned you discussed it with him on the telephone, however.

A I discussed the status of our gathering of information with Dr. Snyder on the telephone.

Q Now, I believe I heard you correctly this morning, but you correct me again if I am wrong, with you hypothesis, which was the underlying basis of your opinion, as I understood it, you gave some computations with respect to milimeters of mercury at various altitudes. And I thought I understood you to come up with a computation for milimeters of mercury at the lung in the vicinity of 8 and included within those computations, I thought I heard you say, this assumes that there is no time or attempt by one of the infants to increase the rate of breathing.

Am I accurate on that?

A You are accurate, sir. I gave the worse situation.

Q Now, that assumption assumes that none of the self-protective physiological factors of the body were operative as might be in a normal hypoxia situation; is it

not?

A In any situation there has to be a period of time for the body's mechanisms to come into play. And the initial period after decompression, there is a lag time for the oxygen to get to a low enough level in the brain to be able to stimulate an increase in the rate and depth of breathing.

And this, I feel, explains the extremely low oxygen tension to which these infants were subjected in the initial period, particularly after the decompression.

Q Well, now, from what you just said, would you agree with me that shortly after the decompression, in a matter of seconds, the oxygen content in the body, at least coming from the lungs, is not going to be changed immediately. You just said it takes some time for the brain to react and not necessarily respire or breathe more rapidly.

Is that correct?

A Well, the oxygen tension in the lungs, in the blood returning to the lungs, is actually approximately 40 milimeters in mercury. So, we are already starting at what we call the venus level, the blood returning to the lungs.

In the immediate period after the decompression -- that is within a matter of five to ten seconds -- there

would have been a loss of oxygen from the body, actually being extracted by the decompression from the body, because of the low pressure.

Now, the total amount of pressure available for oxygen and carbon dioxide in the lungs at 23,424 feet is only 56 milimeters of mercury.

Now, I said that carbon dioxide is a factor. There are 40 milimeters of carbon dioxide. And that leaves us with -- I am sorry. I used the figure of 56. It is 54. That leaves us with 14 milimeters.

We know that a sleeping infant has an elevated carbon dioxide. In fact, all of us have. So, the sleeping infants were particularly at risk in this situation because they were just releasing so much carbon monoxide that there wasn't enough room for oxygen.

Q Well, of course, sleeping infants would have a lower carbon dioxide content than an adult who is up and active at the same time; would they not?

A No.

Q They would not?

A No.

Q You disagree with that?

A I disagree.

It is a physiological fact that a sleeping individual has an elevated carbon dioxide. This is what

makes us yawn.

Q But a sleeping individual needs less oxygen; isn't that correct?

A A sleeping individual in general needs less oxygen, but the brain uses the same oxygen whether a person is sleeping or awake. So, we have to be careful of our semantics.

Q All right.

Isn't it also a fact that if the brain needs oxygen the body has a priority system which will give it to the brain?

A It is not necessarily fully effective at one time.

Q Is that called shunting oxygen to the brain?

A In a flight or flight situation, as all members of the animal kingdom have, when they are suddenly confronted with an enormous stress, a tiger has jumped in front of you, there is usually a greater amount of blood flow to the brain and to muscles at the expense of blood going through the liver and spleen and so on. But this would not apply in this case because there wasn't enough time to get the reserves mobilized.

Q Well, are you suggesting, Doctor, that the hypoxic damage in this case occurred ten or twenty seconds?

A No, I am not.

It is possible to have had the decompression and not even been awakened by it.

Q Now, within ten to twenty seconds, am I correct, that if the brain of a person, infant or adult, needed extra oxygen, this priority system would have gone into effect, sleeping or not sleeping?

A Adrenalin could have been mobilized in this period of time to be circulated. The affect on breathing due to hypoxia is not as great as generally assumed.

Q Now, isn't it also a fact that at that altitude -- let's say 23 or 22,000 feet, because you had a descent starting within a minute -- let's say 22 to 23,000 feet -- isn't it a fact that because of the altitude the blood or the cardiac output of the heart and the disassociation curve that is related to that in aerospace medicine would move more blood, and have reduced pressure?

A You are talking about an increased cardiac output, more blood moved?

Q Yes.

A Yes. There would have been some compensation in this area.

Q And isn't it also a fact that there would be an increased pulse rate?

A We are talking about the same thing, yes.

Q Okay.

And isn't it also a fact that oxygen is released easier from hemoglobin at that altitude to get into the brain?

A Oxygen is released easier, but you have to have it provided to have it released.

Q And isn't there also an involuntary reaction of the body when oxygen is needed, known as hyperventilation, which in adults or children they begin to breathe harder than needed, and, therefore, compensate within a few seconds for the hypoxic situation?

A We discussed this before and it doesn't necessarily occur within a few seconds. In fact, if you drop the partial pressure of oxygen by 65 milimeters of mercury, which is quite a drop, you only get one-third increase in the rate and depth of breathing. And interestingly enough, as soon as you increase the rate and depth of breathing, the carbon dioxide goes down and that slows down the rate and depth of breathing.

Q Now, we have been talking theoretics pretty much, I realize.

In this particular situation we have not only theoretics, we have actual people who have come in and told us about what went on in the troop compartment.

Isn't that the case?

A I do not know, sir.

Q Well, you read the collateral report; did you not?

A Yes, I did.

Q And you read a lot of statements by several people who have testified already, such as the flight crew and the flight nurses?

A I have not been privy to anyone who has attended this trial, sir.

Q Well, do you recall reading the statement of Dr. Stark, for example?

A Yes.

Q I want you to assume that Dr. Stark has provided evidence indicating that after the decompression he did not down an oxygen mask himself.

I want you to assume he is a man in his 50s.

I want you to assume that he was active following the decompression, moving back and forth and attempting to give oxygen to children in the troop compartment and that he remained active in that manner, not only in distributing oxygen, but actually going back and forth and checking the childrens' seatbelts, pillows and so on, as they were secured before the landing.

He did not have a seat on the landing. He was not injured. He assisted the children afterwards in evacuating from the airplane. He never used an oxygen

mask. And at the same time he was active, as were the crew members, in administering assistance to other passengers.

Now, isn't that a factor that is of some significance in considering what, if any, the affects of hypoxia would have been during this time?

A My first question to Dr. Stark would be: Sir, you have exhibited something which I have seen so many times and read so much about: A person that goes unconscious, regains consciousness, and doesn't know they have been unconscious.

Q Is that your assumption?

A That is my assumption, sir.

Q Did you read Dr. Stark's statement in the collateral report?

A I did. But I do not recall it in detail.

Q Well, I think you made some notes on it.

I don't see any indication in your notes to the effect that perhaps he might have been unconscious or not known it.

A Sir, my writing up of the collateral report for our fellow scientists was strictly an excerpting and I felt it would be very inappropriate for me to draw any opinions in my summary.

Q Now, I want you to assume something else.

I want you to assume that a flight nurse who was

in charge of the medical team, Captain Regine Aune, at the time of decompression did not down an oxygen mask immediately and, in fact, not for several minutes, and was actively engaged in assisting to give oxygen to and to move another crew member from the ladder into the airplane and to administer to him before she used any oxygen and she used it only for a brief period of time before they were below 16,000 feet, which you have indicated is approximately two minutes, and felt no ill effects.

Now, would that be significant to you?

THE COURT: Before you answer, Doctor, there is an objection.

MR. LEWIS: I don't think that completely describes Lt. Aune's testimony or the testimony of the other nurse.

THE COURT: You can fix that by asking another question.

MR. LEWIS: All right, sir.

BY MR. DUBUC:

Q Would that make any difference to you?

Or do you think Captain Aune also became unconscious and didn't realize it, having described the details of what she was doing during this period?

A In an emergency situation there is remarkable misinterpretation of the times that events occurred. This

has been seen so many times in aviation accidents. You ask a person how long was it before you got an oxygen mask on and I can recall people writing letters to the FAA saying I couldn't see any oxygen flow in my mask for a minute or so. And the feeling there is, we are in an anxiety producing situation, an emergency situation, something has happened.

Usually people will react very quickly and yet explain it on the basis of how long it took.

I think another good example of this, of course, is the time for an ambulance to arrive when you call the ambulance. And I did think of this situation when I read her sworn statement. I said: I wonder how long it really was between the time that she experienced the decompression and really got her oxygen mask on.

Q You wondered whether she was unconscious for a period of time, as well?

A I am not saying that, sir.

Q Now, you read some other statements and I asked you to consider these facts: Assume that not only Captain Aune and Dr. Stark, but also several other flight nurses who were using oxygen intermittently observed the orphans in the troop compartment as they descended and this included one practical nurse who noticed only one of the orphans who might have been turning blue, and the remainder

of them were checking carefully and trying to distribute oxygen and found that none other than this particular one that was given oxygen immediately exhibited any signs of blueness or hypoxia.

Is that something you would consider as a fact in rendering an opinion?

MR. LEWIS: It does not accurately describe it.

THE COURT: You can state another premise on redirect.

MR. LEWIS: Yes.

A Well, we don't discuss in very much detail in our physiological training the importance of seeing the blueness of the nails and lips in a decompression. It is extremely unreliable in a dark skinned person, including an Asian, to be able to see cyanosis. And I know that I have usually, in giving lectures, said that it is just something that you can't rely upon. You don't tell a pilot to look at his nails, particularly if he is a black, to see whether or not he is getting cyanotic, as a test for hypoxia.

So, consequently, I can't believe that this interpretation was reliable.

Q I see.

Did you disagree with the collateral report itself that you relied upon in giving the facts underlying

your opinion?

A Well, you are dealing with people who are giving reports as they see them and events as they see them and in a very, very critical situation, extreme anxiety, extreme forces involved. And you are dealing with people who are recollecting a very emotional and traumatic event. And you also are dealing with people who have not had the amount of background in training who asks the questions. And this is one point that I repeatedly have made. If you ask the questions, specifically related to certain areas, that we feel would cast some light on this, we would have a much clearer picture of what really happened.

These are very condensed versions. You can see that they are written or sworn to by these people, many of whom were injured, many of whom really, as you can see, did not even want to speak about the accident.

Q Well, Doctor, I notice I guess in your notes that were just handed to me over the noon hour today -- are these notes a summary of what you considered important from the collateral report review that you used and that you sent to Dr. Snyder and Dr. Mason?

A This is an extract of things that I considered pertinent to my interpretation of the case and have to be taken at face value based on the conditions of the witnesses at the time.

Q Is one of the things you wrote "the six medical crew and three flight crew members in the troop compartment maintaining complete composure, carefully checked the seatbelts, pillows, and blankets of each infant to insure maximum security"?

Did you write that and interpret that in reading the accident report?

A I believe that is a direct quote. That is from page 2, yes.

The first or second page of the collateral report.

Q Did you consider that significant; that they were described to have complete composure in handling the situation?

A I am only making a statement that somebody else made a statement of what somebody else did.

I have never seen a crew, whether it was military or otherwise, maintain such complete composure in a situation like this.

Q This was a trained military air evac crew.

Were you told that?

A Absolutely.

Q Did you know that?

A Yes.

Q They were trained to go into wartime conditions?

A Yes.

I have flown with them when I was in the Air Force.

Q Now, with respect to these crew members who were working, one of them was out of an oxygen mask for several minutes -- just assume that to be the case -- and assume that Dr. Stark was working without an oxygen mask all the way during the descent and assume that other crew members, including the co-pilot and certain of the crew members took their masks off at 16,000 feet and they did not suffer any signs of hypoxia and they didn't observe any, even though using oxygen, who must have been alert.

Now, isn't that a significant fact to be considered?

A I don't recall reading what altitude the captain downed his mask, sir.

Q Assume it was 16,000 feet and it was the co-pilot.

A I would have assumed it would have been a lower altitude in order to meet the necessary regulations.

Q What regulations are you referring to?

A I understand that the military is essentially the same regulations as the Federal Aviation Administration for its passenger carrying aircraft, and that is 14,000 feet.

Q Do you know that to be a fact today?

A I do not know it as a fact.

Q Was that a fact when you were in the Air Force?

A I was not involved in passenger carrying aircraft.

Q You were not a pilot?

A I was not involved in passenger carrying. I was not a pilot.

Q You were not a pilot?

A No.

Q What is your basis for your statement that the military requirements are the same as the Federal Aviation Administration requirements?

Let's say as of April 4, 1975.

A In general we shared a great many physiological facts as related to the flight environment.

The Air Force has generally been more conservative than the Federal Aviation Administration. They require their pilots to fly with oxygen at 10,000 feet and above and cabin altitudes.

The FAA has 12,500 above.

I can go into the regulations. All I am saying is that for a passenger carrying operations that in general the provision of oxygen is assumably much the same because we borrowed each other's regulations. And 16,000 feet is an area, as I believe you previously quoted me, is an area

in which significant performance decrement occurs over a matter of minutes.

Q I think the time I quoted you for 16,000 feet was 30 minutes. 15,000 to 18,000, at least in this report of the FAA we were discussing, is 30 minutes.

Would you disagree with that?

A Yes.

We have demonstrated this repeatedly; that an individual significantly loses his flight vision now as low as 5,000 feet above the ground if he is living at sea level and that at 10,000 feet over a period of ten to fifteen minutes you develop a very severe headache and that at 12,000 to 15,000 feet you can have subtle judgment, memory difficulties, and calculation and the whole works within a matter of five to ten minutes. And now we are not even up to 16,000 feet yet.

Q What do you have at 16,000 feet?

A 16,000 feet, extremely severe headache, nausea in some cases, marked judgment performance, memory performance, calculation performance, coordination.

Q But not unconsciousness?

A Not usually.

Q And not brain damage?

A In some individuals it might be possible to take them to that altitude for a prolonged period and produce

brain damage.

Q A prolonged period would be how long?

A I am talking about hours to days.

Q Hours to days?

A Yes. At 16,000 feet.

Q Not two or three minutes, however; is that correct?

I want to be sure I understand you.

You said hours to days.

A I said you are taking them up. You are not shooting them up.

THE COURT: Does that complete your examination?

MR. DUBUC: No, it doesn't, Your Honor.

BY MR. DUBUC:

Q Now, Doctor, if we assume that these flight attendants and passengers who were acting as attendants did not indeed go unconscious without knowing it and were able to recall what they had done and make statements about it shortly after the accident, would you agree with me that they in that condition of work or stress and fatigue would be more highly susceptible to hypoxia than a passenger sitting, such as one of these children, who is not working and not active at all during this descent within three or four minutes?

MR. LEWIS: Your Honor, could I have a continuing

objection to the premise? I don't want to interrupt every time.

THE COURT: Yes. You do have an objection.

It is overruled.

A People working, yes. This is an area that I have done extensive research in.

Q You did two articles on it, did you not, the affect on airline flight attendants?

A Yes.

Q Would you agree with me, based upon your articles and general information, that somebody working would be more likely to show signs of hypoxia if the content and pressure of the oxygen in the air was insufficient to sustain that activity than someone who is resting or sitting in a seat?

A Yes, sir.

A number of factors relate to increased susceptibility.

Q Did you also publish an article entitled, "The Affect of Age on the Elasticity of Major Brain Arteries"?

A Yes.

Q Was the thrust of that article that instances people younger than, say, age 30, including children, had more elasticity in the brain arteries as far as being able to resist deviations or surges of blood flowing through

them?

A This study was conducted on the major brain arteries. That is, the arteries that feed the brain around the base of the brain. It did not involve the arteries that would normally be affected in the condition that we are talking about in this case.

Q It would not?

A No.

Q Would there be any affect on the arteries and the condition you are talking about in this case?

A Can I ask for clarification, sir?

Q Sure.

A Could you restate the question?

Q You said that this wouldn't have any affect on the brain arteries and the circumstances we are considering in this case.

My question is: Isn't your article directed to the fact that with respect to elasticity of brain arteries and cells in infants and younger people that they can sustain problems in either hypoxia or decompression atmosphere better than adults?

Isn't age a factor?

A The infant brain is much more susceptible in its developing phases to hypoxia. This is an established scientific fact.

At the age at which these children were exposed to this hypoxia insult, it is the stage at which the fatty wrapping is developing around the nerves to allow the nerves to conduct effectively, much as the insulation is put around the wire. And children who are exposed to significant hypoxia show a delayed development of this so-called myelin sheet that goes around the nerves.

Q Would you agree with me that there are some other factors that relate to age that pertain to susceptibility or resistance to the affects of hypoxia, such as obesity?

A Obesity is not as much a factor as it has been reported earlier.

The major concern with obesity is the susceptibility to producing bubbles at an altitude rather than hypoxia.

But I think the major ones are fever and chilling, and, of course, smoking.

Q How about arterial changes, arterioscleriosis, as to age?

A If the areteries significantly narrowed, particularly in supplying blood to the heart and to the brain, it is conceivable that at altitude you would be more susceptible to a restriction of a supply of oxygen.

Q The same long term study we were talking about

that the FAA conducted, are you familiar with the fact that they found some differences in a response with repeated chamber exposures to persons of older age as compared with persons of a younger age?

A This has been found repeatedly, but it has not been studied in infants, which I assume you are alluding to.

Q Well, would you agree with me that age is in the normal circumstances of the usual human being without any specific problems, that the younger person, younger aviator of 20, for example, would sustain hypoxia and affects of decompression better than an aviator of 40?

A I have sat on panels in which this has been argued and we could go all afternoon on this.

Usually the argument advanced by some physiologists is the younger aviator is fitter and better able to handle the oxygen supply that he has.

So, consequently, one would have to standardize the population. I cannot answer that positively or negatively, sir.

Q Now, let's get back to your suggestion that these infants, for some reason, had some different effect upon them than did the working attendants in the troop compartment.

Would you agree with me that those infants would have involuntarily hyperventilated and would have generated the self-protecting mechanisms that we have already talked about: higher heart rate, faster blood flow, better circulation, increased release of oxygen in altitude as would an adult?

A The use of the term "hyperventilation" does not apply to this situation. Hyperventilation means a form of breathing which is an unhealthy form of breathing with excessive loss of carbon dioxide --

Q Well, what --

A What you are referring to is an hypoxic scheme of producing an increase in the rate of breathing --

Q We are talking about an hypoxic state demand.

A Normally, the demand is not very much when you consider hypoxia per se; in other words, hypoxia, or lowered oxygen, is not a potent stimulator of breathing.

Dr. John Ernsting in Britain has published extensive on it. The reaction of the child to its ability to respond quickly has not been studied, and there are people who feel that the hypoxic stimulus in an infant is not reacted to in the same way as in an adult, particularly through the early

years, before all of the nerves are fully developed.

Q Well, Doctor, you are talking in an aeronautical field, but I would like to ask you before forming your opinion, did you read anything in the pediatrics field that would apply to infants that would have given you any basis for what you are saying, as far as children, having already admitted to it that there is very little aerospace research in this field?

A I have read from in the pediatrics field and have several references. As I mentioned earlier, I was involved in a conference last year up in California specifically looking at the subject.

Q You recognize the book "Pediatrics" by Abrham Rudolph as an authority in the pediatrics field?

A Yes.

Q I am looking at his book, at an excerpt from page 1513 which states, "In both full term and premature new borns, hypoxic inspired gas, 12-15 percent oxygen produces a 10 to 20 percent increase in minute ventilation during the first minute followed by a decrease of 10-20 percent of control values by the third minute. There is a trend toward a greater hyperventilation phase with increasing gestational age. At about 10 days after birth with the full term and by 18 days in the prematurely born, gradient hypoxic gas mixtures cause sustained hyperventilation."

THE COURT: Excuse me before you answer that, Doctor

Is that the end of the question, Mr. Dubuc? Have you finished your question?

BY MR. DUBUC:

Q Would you agree with that?

THE COURT: Now there is an objection.

MR. LEWIS: That does not fit, Your Honor. Our child is much older than that by everybody --

THE COURT: Yes. Objection sustained.

MR. DUBUC: May I approach the bench, Your Honor?

THE COURT: We will take a recess.

Ladies and gentlemen, you are excused until 3:20.

(Jury leaves.)

THE COURT: Do you want the doctor in the room while you talk?

MR. DUBUC: No.

THE COURT: Just step down, Doctor, and make yourself comfortable.

MR. DUBUC: Your Honor, I am making an offer of proof on this question because perhaps it was misunderstood.

THE COURT: Mayhaps.

MR. DUBUC: What I am reading here is an excerpt from "Pediatrics" setting forth the fact that the involuntary hyperventilation instinct in newly born infants of ten days and so on is not necessarily automatic, but after 18 days they do have that.

My question to him is whether he agrees with it. I am making an offer of proof that if he agrees with it, then a child of over 18 days or 20 days of age is going to have an involuntary hyperventilation reaction in a hypoxic situation whether he is one year, two years or three years old.

THE COURT: I just have the feeling that you are bailing out the ocean here and that you will never get to the bottom of it.

MR. DUBUC: Dr. Busby was on the stand for the entire morning and the better part of this afternoon. I have only been at it about an hour. He covered an awful lot of area based on things I have not seen before until now.

THE COURT: That is a very narrow portion. Most of these things must have been collecting for several weeks, certainly not since this morning.

MR. DUBUC: He has come up with some different theories here.

THE COURT: Well, you go ahead. You are certainly privileged to cross-examine.

(Recess.)

THE COURT: We are going to stop at 5 o'clock to go to the Instructions.

(Jury enters.)

THE COURT: Mr. Dubuc.

Whereupon,

DOUGLAS EARL BUSBY

resumed the stand and testified further as follows:

CROSS-EXAMINATION (Resumed)

BY MR. DUBUC:

Q Dr. Busby, before the break I referred you to "Pediatrics" and I will ask you now would you agree with me that if pediatric authorities indicate that a child after 18 to 20 days of age develops an involuntary ability to hyperventilate, that a child of a year and a half to a year and seven months would undoubtedly have the same ability?

A I really can't put enough together in what you are saying, sir, to give you an answer. We know that there are various stages of brain development in a child that alter sensitivity to gases, be it carbon dioxide or oxygen and, consequently, just because something is happening at 18 days doesn't mean it is going to happen forever.

Even during this period of time there is a marked change, or a marked difference I should say in the quality of the chemical that transports oxygen.

Q Are you familiar or have you, in the course of reviewing pediatrics data that you said you reviewed before formulating your opinion with a publication by G. G. Haddad, Dr. Ernsting and Dr. Katz of Columbia University Babies Hospital in New York entitled "Breath Control and Ventilation

in Normal Infants during Sleep"?

A Yes, that paper was reviewed by me when I was preparing for the California conference last year.

Q Did you consider that to be a paper that was fairly factual and accurate?

A I understand that is a competent scientific group.

Q Do you recall the conclusion?

A No, I don't, sir.

Q I am going to read you the conclusion and I will ask you if you agree with it.

THE COURT: Just a moment, there is an objection.

MR. LEWIS: May I see that part?

MR. DUBUC: I showed it to him before the break, Your Honor.

THE COURT: Look at it again.

BY MR. DUBUC:

Q The conclusion, Doctor, is as follows: "Instantaneous ventilation is kept relatively constant in each age and in each sleep state by controling the mean inspiration flow and the effective respiratory timing. This control is maintained during a period of .....and in spite of why differences in the pattern of ventilation in REM and quiet sleep."

MR. LEWIS: May the doctor look at it?

THE WITNESS: I have said this many times. It is a scientist's folly to read a conclusion and agree with it

Q That is right.

A I assume a child would be ventilating normally, otherwise it wouldn't be surviving.

Q May I just see this a minute, Doctor?

A Yes.

Q Does not this article indicate that a child after four months or perhaps earlier is going to ventilate normally; and if stresses or needs or additional oxygen occur, he will ventilate from that point forward in a way that an older child or even an adult would?

A I earlier said, sir, that you cannot draw conclusions as a scientist unless one reads the entire paper and recalls it and analyzes it.

I immediately looked at the first line and the method and it says these children, seven of them, were only studied up to four months of age. I don't even know the variable, whether it was hypoxia, carbon dioxide, scratching of the feet or whatever, so I can't give you an answer based on one paragraph, number two underlined here.

Q So do I understand from your answer that it is important to read the entire documentation in order to form a conclusion and evalute it?

A That is what I said.

Q Did you do that in connection with all information available with respect to this accident in forming the

conclusion?

A I read all the documentation that was made available to me in detail.

Q Did you ask if there was anything else or did you take what was selectively given to you?

A Yes, I did ask if there was anything that was available and I was told this was what was currently available.

Q Let me understand.

You were told the only thing that was available was the collateral accident report?

A That is correct, sir.

Q You were not told the official accident report was available?

A I was not told, sir.

Q Were you told that there were depositions of the various persons whose statements you had read from the collateral report also available?

A I was not told, sir, except for Col. Rayman and Dr. Brook.

Q Were you told that Captain Aune's deposition was available?

A No.

Q Captain Wirtz, Captain Hart, and Major Traynor's depositions were available?

A I was told no depositions were available. I did

ask them if there was anything to which I could have access in this trial, and I was told because of my position as a rebuttal witness, that I would not have access to any information that would be provided the court.

Q You were told you cannot be provided with information as to what had transpired before the trial started?

A I don't recall, sir.

Q Doctor, you also said if I am correct that there are two bases for your opinion: one is the hypoxia theory and the second one is some sort of trauma in connection with the landing; is that correct?

A That is correct.

Q Those are the only two bases for causation that you have considered?

A Other factors have been considered and, in my mind, ruled out.

Q All right, sir.

With respect to the landing and the position of the children in the troop compartment, were you given the dimensions of the C-5-A such as has been indicated on Exhibit D-4 in evidence?

A I had not been given this, but I did see a diagram of the C-5-A on March the 7th.

Q All right.

Would you assume for me that the distance between

the lower deck of the troop compartment and the bottom of the aircraft is the 15 or 14 feet indicated plus the additional 5 or 6 feet for structure?

A Yes.

Q Would you assume for me that that is approximately 20 feet or approximately a two-story building in space and structure between the troop compartment and the bottom of the aircraft?

A Approximately.

Q Can you tell me whether that amount of structure would constitute a structure which would absorb a substantial amount of landing forces or G-forces before you would necessarily have damage to the troop compartment?

A The distance between could, under certain crash conditions, lead to an absorption of force to some degree.

Q You mentioned I believe in your direct testimony and in your qualifying testimony that you had participated in some testing with respect to seat restraints or restraint belts for infants; did I understand that correctly?

A Yes, it was conducted under my supervision.

Q Was that while you were at CAMI?

A Yes.

Q Civil Aero Medical Institute?

A Yes.

Q Do you recall whether the child restraint systems

that were utilized included rearward-facing seats?

A The only rearward-facing studies involved rearward-facing infant seats, since air carrier aircraft are not rearward-facing except in a few remnants of the old turboprop fleet.

Q In the course of your participation in that study, did you have an opportunity to assess the relative absorption capabilities of a rearward-facing seat as opposed to a forward-facing seat and a harness so far as an infant might be concerned?

A Only with respect to the seats that we were testing, specifically the G.M. loveseat and the MOPAR seat and a few of the other commercial models, but not the full airline seats.

Q Have you ever participated or been part of any studies or publications that dealt with the description of rearward-facing seats and the relative ability to accept and handle deceleration forces?

A I have read several papers in the area as well as seeing movies. I recall two research films comparing the direction of seats.

Q I had previously referred you to, and I think you still have it, your publication in the Encyclopedia Britanica as to aerospace medicine?

A Yes.

Q If you would, would you take a look at page 143?

A Yes.

Q In the lower right-hand corner of the page is a margin note "Effects of Acceleration."

Do you see that?

A Yes.

Q Now in the last paragraph beginning at the bottom of the page it refers to transversing G or acceleration forces applied at right angles to the body bed; does that mean right angle this way, front to back (indicating)?

A Yes.

Q Or back to front (indicating)?

A Yes, either direction.

Q Did you not state therein that such Gs are tolerated up to 20 Gs for several seconds this way (indicating) through the front?

A Yes.

Q Now, Doctor, are you familiar with the volume called "Aerospace Medicine"?

A Well, there is a journal "Aerospace Medicine" and there is also a book that was edited by Dr. Randel. Which one would you be referring to?

Q The book edited by Dr. Randel. You are familiar with that?

A Yes, sir.

Q Is that an authority --

MR. LEWIS: Would you show me the part that you wish to refer to?

MR. DUBUC: I haven't reached it yet. I will be glad to.

THE COURT: Let it come out, Mr. Lewis. Usually it will. Let it come out without asking for it.

MR. DUBUC: It would be page 124, Your Honor.

BY MR. DUBUC:

Q Is that an authoritative document in the field of aerospace medicine?

A You asked me a difficult question because I tried to memorize that textbook in studying for my boards and that was in 1968. A physician would be remiss to admit nothing has progressed. In fact, the book has been rewritten at this time to make a couple of changes.

Q Page 124 under "Deceleration Impact and Blast." There is a sentence referring to rearward-facing seats which states, "Simulation of aircrash impact with occupants seated facing backwards was also accomplished on the swing seat twenty-three hundred fifty A. G., forty-seven hundred fifty pounds, 28 to 30 G without injury."

My question is are you familiar with those tests and do you agree that it is possible in rearward-facing seats to have forces between 28 and 30 Gs without injury?

A This, by the way, is used by one of our professors as an illustration of the importance of not considering the G as much as considering the rate of onset of G, namely the jolt, as we call it, or as Col. Stapp in his famous slide work called it -- down home it is now referred to as the unit called "Stapp."

I can apply G to an individual for several seconds as I stated at 20 G, but if I apply that at an extremely rapid rate in order to reach the 20 G, the effect could be devastating on the body.

Body organs are displaced inside the body and torn from their attachments and bleeding occurs and so on. Consequently, one must assume when reading this paragraph, again back into context, that these individuals were brought up to the G-level rather slowly and then sustained there for a perio of time and then brought down to a G-level. The same thing applies to fighter aircraft. We have an aircraft that could be tolerated up to 9 Gs now for fighting for greater periods of time. I am talking about a minute or so, whereas tolerance for head-to-toe G is only 4 1/2 G, and as a most physically fit individual, you can double that.

On the other hand, if I banged him up to that G-leve or jolted him, he wouldn't tolerate it. His organs would tear apart.

Q In the hypothetical question that Mr. Lewis asked

you, he asked you to assume, I recall, that this aircraft originally impacted the first time at 270 knots and that it impacted the second time at the same altitude at 270 knots and I believe you have written in your summary report as to Captain Traynor, in your review of the collateral report, that he had reported a descent rate of 500 to 600 feet per minute with respect to the first impact.

Now considering those two factors that there was very little forward speed deceleration as to the first impact, in fact none as far as airspeed was concerned, and a descent rate reported of 500 to 600 feet a minute, in your opinion would that first impact be a very hard G landing, the first impact?

A Could you tell me which vector they are landing in? We are talking about a gliding strike or a vertical strike?

Q As you have indicated in your summary of what you read, the aircraft touched down at 16:30 local on its main landing gear in a marshy area in use as a rice paddy approximately two miles northeast of the runway. The aircraft was in a slightly left wing, low left flight attitude with an air speed of about 269 knots. It rolled and skidded along the ground for approximately a thousand feet and became airborne. The aircraft continued a flight across the river.

In another portion of your report you referred to Capt. Traynor's statement that the descent rate just prior to

that impact was 500 to 600 feet a minute, and we are talking about a marshy rice paddy with very little decrease in air speed.

A Well, a fall of 500 feet per minute would have to be converted over. You are at 880 feet per minute at 60 miles per hour, I believe, so that was a fairly substantial vertical impact or jolt.

Q All right.

Did you have an opportunity to look at the airborne photographs of the accident site which showed low skidmarks by water?

A Yes, I did.

Q Did you take into consideration the distances that those various components had traveled or skidded?

A Yes.

Q In fact your own summary indicates the second impact was on the western bank of the river at which time the aircraft skidded and began to tear and shred apart?

A Yes.

Q That was not a terminal deceleration with this skidding on?

A Well, again, it would depend upon the vector that is involved. Let us say part of the aircraft was spinning, say the crew compartment or the troop compartment was spinning as it passed along the path. It was --

Q Excuse me.

I'm going to hand you back your summary of what you reviewed. I would like you to find somewhere in there that says the troop compartment was spinning.

A I would like to find somewhere where it says it is not. All I am saying is it depends upon the vector involved. We have a vertical deceleration and a forward deceleration and I just added the three plane movements.

Q Do you recall hearing or reading anything saying that the troop compartment was spinning?

A I do not recall seeing anything to that effect.

Q Doctor, I would like you to assume that the average G-forces on the troop compartment following the second landing were 1.6 Gs during a period of travel from the point of impact to the place where it stopped, 2,012 feet from the point of impact with slide marks behind it from point of impac to point of stoppage.

I want you to assume that the Gs computed on that slide with respect to deceleration was 1.6 Gs and that the children in the troop compartment were seated in rearward-facing seats in the troop compartment with seatbelts and pillows and remained in their seats, with the exception of one child that was found under the seat, and those children were observed by attendants in the troop compartment before and after the accident as remaining in their seats as before.

I will ask you, Doctor, in your opinion, considering the distance and time that would be involved in the deceleration and the Gs of 1.6, average Gs during the course of deceleration whether that amount of force could precipitate any serious injury?

THE COURT: Before you answer that, Doctor, I have an objection.

MR. LEWIS: Your Honor, it doesn't take into consideration the casualties in the troop compartment.

THE COURT: You just state your own hypothesis when you have him back in this kind of situation. I have suggested it before. That is a standing order.

MR. LEWIS: I understand.

THE WITNESS: You are asking for a simple answer to a very complex question.

This is analogous to an individual hitting a concrete abutment with a car and then gradually skidding along the pavement and gradually slowing down.

You said over the period of time from impact to the eventual stopping of the troop compartment, we had an average of 1.6 Gs; yet the critical component was not given, that is the peak sustained and rate of onset of that peak G, and I can't give you an answer to that effect.

We know that the airplane tore horribly apart and there must have been some jolt sustained by the occupants.

BY MR. DUBUC:

Q Doctor, would you assume in your answer then also that the average G load on the cargo compartment which was under the troop compartment and which you previously told us would be a structure which could absorb a substantial amount of energy, that G load was approximately 3.67?

A Well, the Gs that were sustained were enough to tear people's limbs apart and tear their heads off.

Q In the cargo compartment?

A In the cargo compartment. I don't know of any Gs at 3.6 that --

When going through the airport tonight, if we struck another cab, we would certainly be above 3.6. The emergency landing indicators on aircraft peak out to give the warning system that an aircraft has crashed at 5 1/2 to 7 Gs, so-called ELT. 3.6 is a very, very soft G. Again it depends how we apply it, how rapidly it comes on and how much is involved in the peak.

Q Are you an aeronautical engineer, sir?

A I'm not an aeronautical engineer by profession.

Q You have told me you were in the Air Force. Did you participate in flight operations in the Air Force?

A Yes, both the Canadian Air Force and the United States Air Force -- not as a pilot.

Q Not as a pilot. As what?

A Flight observer or additional crew member as the term is.

Q Now, if I told you to assume that the pilots of this airplane, the pilot and copilot, had both described the first landing -- as had one or two of the air nurses in the troop compartment -- as no harder than some of the other landings they had made on runways; would that have any effect on your opinion as to the force of the first landing?

A It could have effected it, but in reading over the transcript not too many described the impact forces involved in this and, consequently, I would have to go back and ask for further opinions.

MR. DUBUC: Excuse me just a minute, Your Honor?

THE COURT: Surely.

BY MR. DUBUC:

Q Did you not report in your notes from your own review of the collateral investigation that Captain Traynor stated that the first impact did not seem severe and the aircraft became airborne again?

A This is correct, but the first impactwas not the impact that was involved in tearing the airplane apart.

Q I was just asking you about the first impact.

A Yes.

Q I thought you told us previously that would have been a pretty severe jolt even though he described the rate

of descent as 500 to 600 feet a minute?

A 500 to 600 feet a minute is a fairly severe jolt.

Q Would 500 to 600 feet a minute related to the 60 miles per hour be 5,280 feet per minute --

A I gathered somebody would do that calculation. I may not have been correct in that.

Q Would that amount to approximately 6.8 miles per hour?

I will show you the calculation.

A I would prefer to go to seconds which is the standard we use. 6.8 miles per hour and that should be converted over to seconds to work out the G load. We could determine what equivalent it would be to jumping off a table or let us say a high ladder.

Q Okay.

Did you also report as one of the things you noticed in reviewing the collateral report that the troop compartment in its entirety came to rest in its upright position reasonably well intact, both inside and out, after skidding over a thousand feet and there was no fire? Was that one of your observations?

A It was a "out of the report."

Q You were quoting what you thought was significant?

A I was excerpting with minor grammatical changes for readability.

Q Did you also note in reviewing that report, and did you not state in your summary, did you not make a statement to the effect that Captain Traynor had received an award for his performance of duty in connection with this accident?

MR. LEWIS: Objection.

THE COURT: I ruled on that sometime ago, Mr. Dubuc.

MR. DUBUC: May I approach the bench, Your Honor?

THE COURT: No. Go ahead with something else. We will take care of it later.

BY MR. DUBUC:

Q With respect to the copilot, did you not review his statement which was taken shortly after the accident?

A Yes.

Q Did you record in your notes that he "describes a relatively smooth initial impact"?

A I would have to see it. If you are reading it to me, I accept it.

Q You don't recall it?

A I believe that is a 14-15 page report. That was dictated.

Q You don't have a copy of it?

A I have a copy in the witness room, sir.

Q Oh, I see.

Okay.

Doctor, if there had been some kind of hypoxic or traumatic brain injury with respect to Michael Schneider in this case, would you have expected a neurological examination to reveal some evidence of that?

A Yes.

Q And are you aware that a neurological examination was made as to Michael Schneider two days after the accident?

In other words, he was back on another airplane the next day after this accident and he was in San Francisco on April 6 where a neurological examination was performed; are you aware of that?

A I don't recall specifically. I assume performed by a neurologist.

Q Do you recall whether among the selected documents you looked at, you looked at Exhibit D-24, the hospital record from the Presidio?

A I believe that there were materials like this in the package, but I do not recall the specific pages. Again, it is very diffcult for me when I go through hospital records day after day to recall specific pages.

Q Well, take a look at the page which is physically page 7, and it starts at the top with an entry of "4-6-75; April 6, 1975," where it says "Generally active boy" and so on? Have you seen that page before?

A I don't recall, sir.

Q There is an entry on that page toward the bottom. This is Exhibit 24 in evidence which reads, "Neuro C. N. XII, N. L." -- within normal limits.

"Sensory reaction: normal limits" indicating a neurological examination.

In your opinion if there had been some --

MR. LEWIS: Counsel is testifying.

MR. DUBUC: No. I am reading from an exhibit, Your Honor.

THE COURT: Objection overruled.

BY MR. DUBUC:

Q In connection with such a neurological examination, would you have expected that there would have been something abnormal, something which would have indicated some result of brain damage as you suggested it, either in connection with hypoxia or the landing incident as to Michael Schneider in that neurological examination?

A I can only speak from a general practitioner, family physician standpoint, and that is when you conduct in the way of a general physical examination, a neurological examination, it is usually quite superficial.

I cannot answer that question.

Q You don't know one way or another whether this one was?

A I can't say so.

Q Have you ever been shown Exhibit DD-47 for identification which is also a Presidio document and a discharge release form for Michael Schneider who was then known as Hguyen Phi Khan?

A I don't recall seeing this, sir.

Q That indicates that there was a discharge of physical examination given by Doctor --

THE COURT: He said he hadn't seen it.

MR. DUBUC: Okay.

BY MR. DUBUC:

Q I had thought I heard when you were giving your preliminary remarks that you had reviewed the medical records of Michael Schneider; is that correct?

A I have, but I can't say whether or not I have viewed specific pages. The materials that were provided to me were almost two inches thick. Since they were provided to me, I have reviewed thousands of pages of hospital documents as part of a study. So, consequently, I only had to draw certain conclusions from viewing, particularly the later on studies, the ones that have been provided by neurologists in the past months in terms of studying Michael Schneider.

Q You mentioned--

A The records you are showing me are medically very superficial. They are really just screening records.

Q This record is a record two days after the accident.

In your experience as an accident investigator, aren't records shortly after an accident significant in determining causation, medical problems, and so on?

A Yes, but that is not an accident-oriented record. In other words, I looked at that record to see if there was any record of head trauma. I expected any physician who was writing there to say: No evidence of hematoma, ecchymosis or contusions or abrasions.

THE COURT: I interdicted your showing this document. He has apparently seen enough of it so you can give it back to him and he can examine it.

MR. DUBUC: I was just going to try it again, Your Honor.

BY MR. DUBUC:

Q Looking at DD 47 for identification, this is the discharge summary. Apparently you hadn't looked at it enough to know whether there had been an examination by a physician; is that correct?

A That is correct.

Q And the examining physician did note certain things on his examination, did he not, such a boils on his skin?

A Yes.

Q And he noted that he smiles?

A Yes.

Q And he noted that he had conjunctivitis with respect to his eyes?

A Yes.

Q And he noted as to the ears, the left ear had puss in it?

A Yes.

Q And he noted that the lungs were clear and he circled the "N" for the lungs, for "Normal"?

A Yes.

Q He noted the heart was normal and he circled the "N" for heart, "Normal"?

A Yes.

Q He examined the head with no entry and he circled the "N" for "Normal," did he not?

A Yes.

Q So he did look at his head and didn't find anything in the head that would have been reported by a physician making such an examination; is that a fair conclusion?

A I have seen things like this missed after an accident, and I have missed them myself.

Q He is very specific about a lot of rather detailed physican observations; is he not?

A I considered this form only a screening form, sir. It is not a very well put together form.

Q What is the basis for your opinion that this is only a screening form.

Do you have any particular experience with this particular medical facility?

A No, I have not..

MR. LEWIS: What was the number of the last exhibit for identification that you referred to?

MR. DUBUC: DD 47, Your Honor.

MR. LEWIS: Thank you.

BY MR. DUBUC:

Q Doctor, I am going to show you some other medical records. I am wondering if you looked at these, any of these, in the course of formulating your opinion: Denver Hospital record, DD 102; Lutheran Medical records, DD 113, DD 118, DD 116, DD 119, DD 122, the Lakewood Otolaryngological Clinic, DD 126, and the John F. Kennedy Child Development Center, DD 58?

Can you tell me if you looked at these? I know you said you looked at the later ones. Most of these are within a month or two after the accident and hospitalizations.

[Exhibits handed to witness.]

THE WITNESS: I definitely recall DD 102, and DD 118 Also DD 122, DD 126 and DD 58.

BY MR. DUBUC:

Q All right.

These were within the last couple of weeks; is that correct?

A Approximately three weeks ago.

Q Then I think vou mentioned that you had relied to a great extent on some recent neurological reports by examining physicians; is that correct?

A Yes.

Q Was one of those Dr. Schuelein's report?

A I believe so, sir.

Q Did vou look at her report as to Michael Schneider dated December 27, 1978?

[Document handed to witness.]

THE WITNESS: Yes, I did.

BY MR. DUBUC:

Q Is that the one you referred to, or did you look at another neurological report?

A I cannot recall whether there were other reports written by Dr. Schuelein, but I recall in the third line her statement, "Occasional temper tantrum."

Q That was a report by the parent?

A This is signed by Dr. Schuelein.

Q All right.

A And the words "Overactive," and "abnormal," under-

lined.

Q I see that.

Isn't it a fact that in this report, Dr. Schuelein stated, "Neurological examination today was unremarkable with the exception of his activity"? Doesn't that mean that there were no abnormal neurological signs except for over-activity?

A But Dr. Schuelein also qualified her statement by saying, "However, it was late in the afternoon. He had been through a lot of tests," et cetera, et cetera, et cetera.

Q Maybe that is why he was over-active?

A An over-active child, as I understand, neurologically, although I am not a neurologist, can be considered abnormal.

Q Over-active or is there some other name for it?

A Well, there is hyperactive, the hyperactive child. There is "over" and "hyper." Whatever terms are appropriate.

Q Do you understand that "overactive" is a specific neurological or psychological diagnosis of anything?

A I am not too qualified to answer that.

Q I thought in your answer you were suggesting that over-activity was within your particular expertise as far as this report was concerned.

A When I see the term how "he did indeed seem quite over-active written by a person of reputable qualifications as Dr. Marian Schuelein, particularly in the condensed style

that she is writing this brief letter, I would consider her as indicating that there is a problem. This is the way we write at the Cleveland Clinic and the way we were asked to write.

Q Would you agree with me that by stating other than his physical activity, she stated her neurological examination was unremarkable and normal?

A Only if we take it in the light of the fact that she was making that statement with qualification.

Q Have you had any occasion to find, in connection with your activities and duties prior to this case, have you ever run into a specific case where you had over-activity as the diagnosis, the resulting cause from hypoxia?

A Yes.

Q Who was that?

A My own child, sir.

Q I beg your pardon?

A My own child, sir.

Q I see.

In connection with airplane hypoxia, or otherwise?

A Respiratory arrest after birth.

Q This is in connection with delivery; is that right?

A Yes.

Q That would have been anoxia, would it not?

A No, it wasn't, sir.

that she can't read it in essence because of the fact that he is moving about and there is no sleep tracing on Michael Schneider.

Q She indicates that what there is, is normal, does she not?

A No. It is like trying to take blood pressure without a stephoscope.

Q Did she say that the electroencephalogram is extremely brief, but what there is is normal?

A Yes, but that is another qualification statement.

Q Did you discuss that with Dr. Schuelein?

A No. I haven't.

Q What is the basis for your reading in that qualification?

A Well, in medicine, when we write reports like this, we will throw in qualifications to indicate to the reader that we have taken things and attempted to interpret them under less than ideal conditions so there is room, significant room, for error. And this is just the way that physicians talk to each other in providing reports.

Q Had you reviewed any of the other of Dr. Schuelein's report, other than these two?

A I can't recall, sir. I would have to see the reports.

Q All right, sir.

Q Other than that, have you had in the case of your aerospace duties come up with a single diagnosis of over-activity as describing a substantial neurological sign resulting from hypoxia?

A In the aviation world, we have not had the exposure of children to hypoxia. This is a very strange situation.

Q How about adults?

A In adults one would not normally see the period of over-activity except in those individuals and I have seen three of these people who have suffered profound hypoxia consequent to exposure to drowning in one case and carbon monoxide in the other two cases, which would be somewhat analogous to the hypoxic situation.

Q Drowning is a period of time under water with no oxygen?

A No oxygen, although to a degree in both these cases, there was body cooling, which saved the body from some of the ragged effects of lack of oxygen.

Q Did you also see Dr. Schuelein's report as to a readout of an electroencephalogram as being normal?

A I don't recall seeing that report.

Q You didn't see that report?

A I may have seen it, sir.

Oh, yes, I recall now.

This is interesting, because she is really saying

Doctor, this morning or this afternoon,--I thought it was this morning--I thought I heard you say something about the Venturi effect with respect to the opening of this airplane and in some way the Venturi effect increased the cabin altitude of the airplane.

I thought I heard you say it was two or three thousand feet.

Am I mistaken?

A I said it could be as much as 2,000 or 3,000 feet.

Q I understand you base that upon some report you read of a Sabre line airplane that had a side window come out?

A Side door.

Q On the Sabre airplane, was there any other damage, such as windshield damage or any other opening other than the side door?

A To my knowledge, no.

Q Is that the only basis for your opinion as to Venturi?

A Since 1958, I have been teaching altitude physiology and I have heard many, many reports and reports, and I believe one was in the Toyal Canadian Air Force Bulletin in 1959, and I kept that for some period and someone else has it now. I believe I loaned it as an incident in which blowing off the canopy in a jet aircraft can markedly reduce the altitudes; in other words, we warn our

pilots to watch out. If you are at altitude, you better make sure that your emergency oxygen supply is on before you blow the canopy.

Q When you blow the canopy of a jet aircraft, that is the window above the pilot where the pilot is sitting; if the canopy goes, nothing is left in front of him?

A Yes, there is.

Q The windshield?

A Yes, and up over him to a degree. We are talking about the reduced side pressure associated with air flow.

Q In connection with the canopy you have great pressure directly on the windshield in front and along the side?

A Great pressure?

Q You have ram air pressure?

A Depends on the configuration of the windshield. This is the reason we slope windshields, let us say, on the B-1 bomber. It is very sloped so that the air can flow over it and not ram pressure it.

Q I thought you described the canopy as rounded; I thought I saw your hands move in that direction.

A Well, the ram air pressure would be occurring on the tip of the nose, way out, 14, 20 feet ahead of the pilot.

Q In determining air flows on not only wings, but fuselages of the airplanes, isn't it a fact that there are

certain aerodynamic coefficients which are measured, and they differ from airplane-to-airplane design?

A Yes.

Q Would you agree with me that without knowing the aerodynamic coefficients of pressure flowing around the fuselage of a Sabre liner as opposed to a C5A, without knowing the specific pressure coefficients and comparing the loss of a side door on a Sabre liner compared to the loss of a rear door on the side of the C5A airplane is perhaps making an unacceptable direct, scientific comparison?

A No; it is not. It is not because, as you recall, it was more of a speculative nature that I made the statement. We have blown one door off the side of the Sabre liner, which is a relatively small aircraft with a relatively small door. But we are talking about a relatively large aircraft plus two relatively large doors, I understand. So space versus volume would have to enter into the calculations. We are comparing two aircraft with different configurations; I agree with you.

But the fact is, whether you are at the rear of a truck or at the rear of an aircraft of this size going at some 270 knots, there is an area of negative pressure.

Q You mentioned calculations.

Did you make any as to the C5A as to the coefficients of pressure flows in the area of the rear cargo

door?

A No, sir. The calculations I made were related to time over the period, over which the decompression occurred.

Q You made none as to the Venturi effect?

A I did not.

Q Did you read any reports as to the C5A relevent to testing of the airborne delivery system wherein the rear door is open in flight at altitudes up to 20,000 feet?

A I attempted to obtain that information, but I understand it is not available.

Q Have you ever been through a C5A?

A I have walked through one.

Q Have you ever been through one in flight?

A No, sir.

Q Have you ever been given any information that in fact men stand on the rear door in open flight at 20,000 feet in connection with unloading the cargo by parachute?

A I would assume so under the mode it is operated under.

Q Did you review any specific information as to the pressure coefficients as to the C5A air flow?

A No, sir.

Q From a scientific standpoint, wouldn't it be necessary to have that kind of information to make other than your speculation as you said your suggestion was this morning?

A Yes. I would like to run a model in a wind tunnel in altitude with both doors off.

Q Rear?

A Some attempt has been made to see if this is possible.

Q What would you expect the wind-tunnel test to show?

A The wind tunnel test, as I said, I would expect to show that there is reduced pressure in the cabin versus the static air pressure outside the aircraft.

Q Now, are you familiar enough with the C5A to know that there are not only altimeters in it, but altitude differential pressure gauges which measure altitude inside and outside?

A Most aircraft have altitude pressure differential gauges; that is correct.

Q Did you notice in the collateral accident report any suggestion that the recorded altitudes and reports as to instrumentation readings indicated any difference between cabin altitude and differential pressure outside the airplane?

A I don't recall. Unless I missed it. I was certainly looking for it.

Q But you did not read the official accident report?

A I did not read the official accident report.

Q now, with respect to decompression time, which I think you mentioned this morning, you were talking about a time between, I thought I heard 0.2 and 0.3 seconds?

A Yes.

Q The accident record says 0.3 seconds, does it not?

A That is the total time of the decompression, sir.

Q I think you told us you were familiar enough with C5A's, as far as compartmentalization was concerned, and you pointed to that picture?

A Yes.

Q To your knowledge, in connection with your past experience, have there beendecompressions where there might be a rapid decompression in one area, where there was perhaps a slower or less rapid decompression in another area?

A. This occurred on the DC-10 aircraft on three occasions, sir, and unfortunately, in one of the occasions, it resulted in one of the world's greatest air disasters. Consequently all the aircraft, including the C5A's, are well ventilated through the upper and lower decks, and i believe that one of the counsel mentioned it this morning.

Q You mentioned the DC-10, and I guess you were referring to the Paris accident?

A Yes.

Q Wasn't there also a DC-10 incident which did not

result in an accident involving a National Airlines flight between Houston and San Francisco, in which you were involved in some form of investigation?

A Yes. This is one of the DC-10's I was familiar with. There you had the lower galley, elevators, and there was also the one where a coffin went out over Windsor, Ontario.

Q Was that the one where rapid decompression and severe decompression was at one rate of speed in the lower compartment, and it was at a slower and lesser speed in the upper flight compartment's cabin?

A Which airline?

Q National Airlines.

A There was a small pressure differential between the upper and lower, but it was extremely small. It was enough to bend a thin tin wall.

Q Wasn't it described as a smaller and less severe decompression in the passenger cabin and flight compartment than the experience in the lower galley and cargo compartment?

A This was speculated, but there were no pressure measurements taken inside the cabin, so there is no way of knowing. It is pure speculation.

Q I may be misreading this. I am referring to oxygen equipment, and rapid decompression studies by the

Federal Civil Aeromedical institute in Oklahoma City in March of 1979. At that time you were the Assistant to the Surgeon General for Aeromedicine?

A Deputy.

Q Would these kinds of reports come across your desk and be reviewed?

A Yes.

Q Do you recall reviewing this one?

A This -- first of all, I recall definitely receiving this section, because it is an extract from the National Transportation Safety Board report of this accident. It says, "the slower and less severe decompression occurred in the passenger cabin and flight compartment."

It doesn't say how much slower. It certainly was a slow decompression to begin with, the total time of the decompression was 26 seconds.

Q They describe it on the page before as a rapid and severe decompression in the cargo compartment.

A They said, "a rapid and severe decompression occurred in the galley."

Q Does it also say for the cargo compartment?

A There was differential loading to a degree.

Q So that can happen, can't it, Doctor?

A Yes, it can,but --

Q All right, thank you, bctor.

MR. DUBUC: I have no further questions, Your Honor.

THE COURT: Redirect.

MR. LEWIS: I just have two questions.

REDIRECT EXAMINATION

BY MR. LEWIS:

Q Doctor, can you tell me whether or not the DC-10 was notorious for not having an equalizing break between the two sections?

A It was quite notorious for this problem, and both situations, the forewarning situation over Windsor, Ontario, with the rear cargo falling open, and the one over in Paris, of course, were indicators that there was a serious problem where the floor would crash downward due to difference in pressure.

Q Is there anything comparable between the DC-10 situation and this airplane?

A Well, you will recall the DC-10 has elevators that go up and down in some of the models, and the ventilation in this aircraft between upper and lower decks is really ideal for stairways, front and rear, and grating and so on. It is just really a compartment up there that is well connected to the lower compartment.

Q So is the C5A comparable to the DC-10 in that respect?

A It now is to a degree because all DC-10's had to be reconfigured, every DC-10, up to a certain point -- millions of dollars were spent in putting additional holes in the floors, and so on.

Q Were those holes present in the three incidents that you mentioned?

A No, they weren't.

Q Counsel asked you about Exhibit DD-47 for identification, which was the Presidio document. Did you see anything in the Presidio document that indicated that the examining physician knew the circumstances that this child had gone through, that is to say, the description of the airplane accident?

MR. DUBUC: Objection, Your Honor. He said he hadn't seen it at all.

THE COURT: Well, he has seen it now.

Overruled.

BY MR. LEWIS:

Q Before I ask you that, would an examining physician want to have, or need to have a history of this kind of accident before he could make an adequate examination?

A The history in any medical examination is the most important part of the examination.

You asked me if I saw anything in there. Could I see it again, sir?

Q Yes.

(Document handed to the witness.)

MR. LEWIS: Counsel showed you 47.

MR. DUBUC: Which one?

MR. LEWIS: What was the other one?

MR. DUBUC: 47 and 24.

MR. LEWIS: Thank you.

BY MR. LEWIS:

Q Here is Exhibit 24. I believe you looked through that, too?

(Document handed to the witness.)

THE WITNESS: Again, of course, this is very superficial. I say that again. I was asked why I didn't pay very much attention to this, and why I didn't think it was anything more than a screening exam.

When I see a form at the top that describes a child in terms of good, fair and terrible, it immediately turns me off.

BY MR. LEWIS:

Q Is that good medical terminology?

A It is not good medical terminology at all. It looks as if it was put together by a medical student for the purpose of processing these children through.

Q Do those documents, from your review of them, and I realize it is brief, on the stand, showing the complete

history, or any history of this airplane accident was known to the examining doctor?

A No, I have not seen anything.

MR. LEWIS: Thank you, Your Honor.

Those are all the questions I have.

THE COURT: Mr. Dubuc?

FURTHER CROSS EXAMINATION

BY MR. DUBUC:

Q Doctor, you had not seen that Presidio document before today, is that correct?

A I mentioned to you, sir, that I do not recall seeing it.

Q You mentioned you reviewed, I think you said, thousands of other documents, between the time you started working on this case, and today?

A I reviewed thousands of pages.

THE COURT: There is an objection.

MR. LEWIS: This exceeds redirect.

THE COURT: Overruled.

BY MR. DUBUC:

Q Thousands of pages on this case, or other cases?

A Not in this case, other cases not involved in this case. I am involved in some other matters that take me out of this case.

Q Can you tell us how much time you spent on this

case in the months that you have been on it?

THE COURT: That is objectionable. That is outside the scope of redirect.

MR. DUBUC: Thank you.

MR. LEWIS: May the witness be excused?

THE COURT: I would like to excuse the jury briefly.

(Jury leaves.)

THE COURT: Doctor, at the end of Mr. Lewis' direct examination, he asked you some questions about the G forces, and I sustained Mr. Dubuc's objection to that, and then Mr. Dubuc opened that up again.

Just for my own information about it, can you explain this to me? I gather it is difficult to calculate the G forces into the circumstances of this accident. Can you tell me why?

THE WITNESS: If you take an instrument called a G-meter, they only measure the direction in which they are aligned. Let us say we had a G-meter pointed in the fore-aft direction in which this aircraft was coming in and impacted, and so on. It would record a number of jiggles on the graph, and the jiggles going up and down indicate the level of G being sustained.

The top of each jiggle, or each spike, is the peak G sustained and the curve upwards is the G as it onsets

over a period of time, so we are really doing something like accelerated G, and this is called a jolt. This is considered vital to determining how much effect there is on body structures.

Now, what we do in aircraft accidents all too often is say, well, there is an average G sustained, and what they do is take all the jiggles over a period of time from the start to the stop, and they measure the area under the curve and bring it down to an average level of G, so this explains why you have to consider G not only in the direction, the magnitude, the rate of onset, and the area of the body that is actually being subjected to G, it is a classic Board examination question.

THE COURT: Well, one version of this incident contemplates that the first impact was inconsequential insofar as the effect on the G was concerned. And at the second impact the plane with the wheels gone, hit on the cargo part, skidded some 800-odd feet, and then in the course of that, the underpart sort of shredded, it was sort of an explosive shredding, but it shredded, and then they have got a picture of the troop compartment going straight ahead, being launched, so to speak, off the cargo compartment, which is slowing down, decelerating more rapidly than the troop compartment is decelerating.

Have you speculated, or thought about that, or

tried to make a calculation of that?

THE WITNESS: We are presently, as I mentioned, the three scientists who are involved, aside from me -- are closely looking at the dynamics involved in this, and they feel that by looking at certain bolts sheared on seats, the seats are stressed to 19 G, andthe dynamic mode, FAA tests, and what we call the static mode; consequently if we see sheared seat attachments, it is probable that the peak G loading on those seats exceeded 19 G. This would give us some idea -- in the fore-aft direction -- this should give us some idea as to just what the dynamics involved were.

THE COURT: Thank you, Doctor.

MR. PATRICK: We would like to begin Doctor Connors, who has been waiting here patiently for about three days to go on the witness stand.

THE COURT: Fine.

(Witness excused.)

THE COURT: Bring back the jury.

(Jury enters.)

Whereupon,

CARMEN KEITH CONNERS

was called for examination by counsel for the Plaintiffs, and having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. LEWIS:

Q Would you state your full name, please, sir?

A Carmen, C-A-R-M-E-N, Keith Conners.

Q What is your occupation or profession, sir?

A I am a Clinical Psychologist.

Q What are your current positions?

A I am Professor of Child Health and Human Development at George Washington University. I am also a Professor in the Departments of Neurology and Psychology at Children's Hospital. I am Director of Research in the Department of Psychiatry at Children's Hospital.

Q Can you tell me whether or not you are involved in grant reviews from the National Institute of Mental Health, and other institutions?

A Yes, I have been involved for many years as a consultant to those parties, especially the National Institute of Mental Health, as a grant reviewer on the various committees.

Q We have heard something about the Conners' Test. Are you the Conners of the Conners' Test?

A I am afraid so, yes.

Q Would you describe your involvement with that test?

A Well, it is basically a checklist of symptoms