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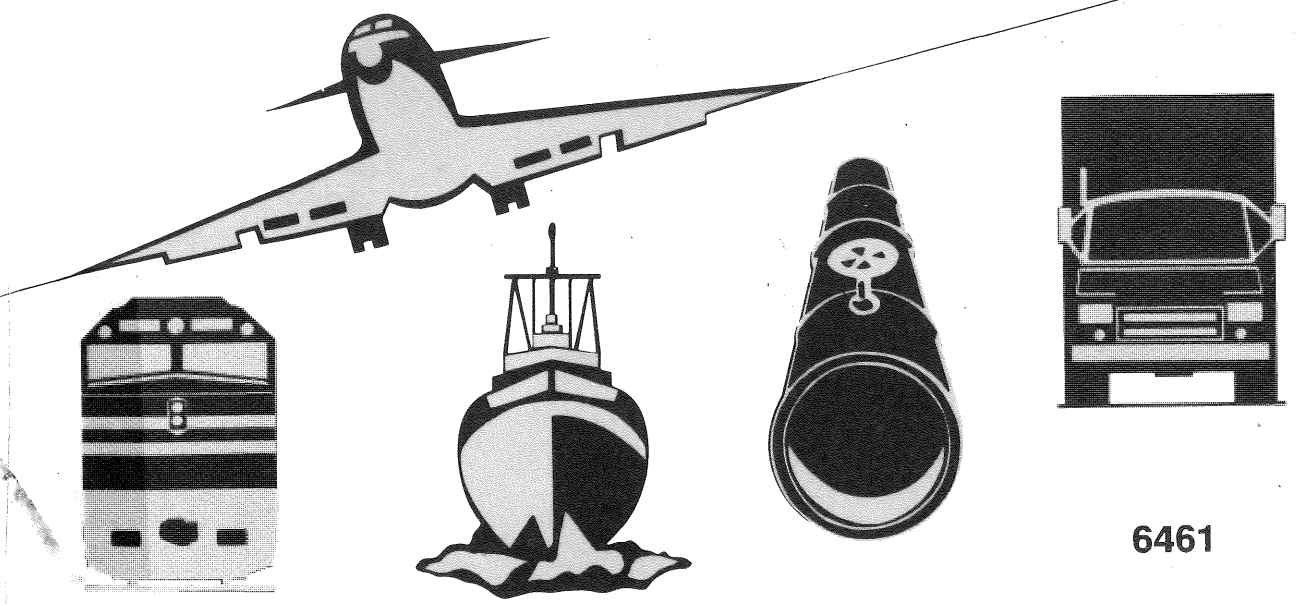
# NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

# REPORT ON PROCEEDINGS

## AVIATION ACCIDENT INVESTIGATION SYMPOSIUM, MARCH 29 - 31, 1994 TYSONS CORNER, VIRGINIA

## VOLUME II: PARTICIPANT PRESENTATIONS



The National Transportation Safety Board is an independent Federal agency dedicated to promoting aviation, railroad, highway, marine, pipeline, and hazardous materials safety. Established in 1967, the agency is mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The Safety Board makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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## AVIATION ACCIDENT INVESTIGATION SYMPOSIUM

## VOLUME II: PARTICIPANT PRESENTATIONS

**MARCH 29 - 31, 1994**
**TYSONS CORNER, VIRGINIA**

**Adopted: October 17, 1994**
**Notation 6461**

**Abstract:** Volume II contains presentations made by participants in the Safety Board's Aviation Accident Investigation Symposium held at Tysons Corner, Virginia, from March 29 through 31, 1994. Volume I contains the Safety Board's responses to a number of recommendations made by the aviation industry during the symposium. The symposium provided a forum for the aviation industry to discuss and critique Safety Board programs and practices, as well as procedures used during aviation accident investigations. Participants included representatives from U.S. air carriers, airframe and engine manufacturers, aviation associations and unions, government officials and interested parties, as well as foreign investigative authorities and manufacturers.

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**TIMOTHY P. FORTÉ**
**DIRECTOR, OFFICE OF AVIATION SAFETY**
**NATIONAL TRANSPORTATION SAFETY BOARD**

# WELCOMING STATEMENT AND SETTING OF AGENDA

Welcome to the National Transportation Safety Board's Aviation Accident Investigation Symposium. The next 3 days promise to be an interesting and educational forum for ideas and discussions among those of us here with a vested interest in aviation safety. Given the expertise and makeup of the participants in this symposium, I foresee a lot of interesting discussion along with positive feedback from this exchange. I'm sure it will also foster a better understanding of the Safety Board's role and responsibilities to the aviation community and the public in terms of its aviation accident investigation process.

This year's symposium is the Safety Board's third--the first having been held at Downingtown, Pennsylvania, in 1975, where roughly 170 industry and government participants discussed aviation accident investigation issues; and the second having been held in Springfield, Virginia, in 1983, with over 280 industry and government representatives attending. This symposium has over 350 registered participants from around the world, including the former Soviet Union, China, Japan, Australia, the Netherlands, France, and Switzerland, to name a few. The past symposia allowed the parties to our investigations to better understand the Safety Board's procedures and the reasons we conduct investigations the way we do. This understanding has helped foster smoother working relations on those unfortunate occasions when we have had to work together professionally. The parties to the investigations have also been more active in submitting their ideas as to the probable causes of accidents, which has facilitated the accident investigation process. The benefits derived from those symposia will hopefully be replicated at this year's event.

Over the next 3 days you're going to be exposed to many facets of the aviation accident investigation process. You will get a chance to hear the Safety Board explain its programs and the aviation industry and other investigative authorities offer constructive criticism and recommendations to improve the quality and effectiveness of the Safety Board's aviation accident investigation procedures.

Since becoming Director of Aviation Safety, I've received numerous letters and calls commenting on our investigations, some positive, but, as we all know, those with complaints are the most vocal! Formally and informally, I've heard industry's complaints and suggestions. This symposium is an opportunity to air those criticisms and to generate formal discussions of areas to improve our accident investigations.

The Safety Board has been generally proactive in responding to suggestions and criticisms about its investigative processes, and this symposium is yet another outgrowth of our desire to refine and improve our procedures.

The topics scheduled to be presented this morning by Safety Board staff include overviews of regional aviation accident investigations, Washington "Go-Team" major aircraft investigations, international investigations, and Regional Office "major" investigations. Our staff will also discuss technical services support, public hearings, and accident report preparation, crew and witness interviews, the safety recommendations process, party and non-party rights in accident investigations, as well as the new Occupational Safety and Health Administration's requirements, news media relations, and intergovernmental relations. After lunch, there will be panel discussions on Regional Office Delegated and Washington Go-Team Major Investigations. Tomorrow, we'll continue by dedicating the entire day to panel discussions on General Aviation Accident Investigations, News Media in Accident Investigations, and International Accident Investigations. The panels will be composed of spokespersons from industry, associations, manufacturers, government, and foreign investigative authorities. Tomorrow evening will be the dinner and reception, with our keynote speaker, Donald Engen, a former Executive Director of the AOPA Air Safety Foundation, a former FAA Administrator, and a former Safety Board Member. Finally, we'll conclude on the third day with committees composed of government and industry representatives who will analyze the inputs from the preceding days' discussions and develop comments, suggestions, and recommendations to the Safety Board concerning procedures used in aircraft accident investigations for presentation at the afternoon session.

There will be many breaks throughout the symposium, and these breaks can be as valuable as the formal allotted time in making contacts. Tonight there will be a reception in the main lounge, located on this floor, where we can get to know each other better and share ideas. One last bit of housekeeping, the hotel has provided us with a stamp to validate parking - you can go to the NTSB registration desk to get a validation.

With great pleasure, I would like to introduce Carl Vogt, the Chairman of the National Transportation Safety Board, who will be delivering his opening remarks. Many of you have met Carl but may not be familiar with his background. He is a native of Houston, Texas, and was a senior partner, and managing partner of the Washington office, of Fulbright & Jaworski, before coming to the Safety Board in 1992. He was also a member of the board of Amtrak and served on the Federal Aviation Administration's Aviation System Capacity Advisory Committee. After graduating from Williams College where he was a member of the senior honor society, Carl served in the U.S. Marine Corps as a fighter pilot, flying F-8 Crusaders. His flying service included a tour of duty aboard the aircraft carrier USS Lexington in the Western Pacific.

Active in professional and community affairs, Carl has held positions with the American Bar Association, the National Association of College and University Attorneys, the U.S. Chamber of Commerce, the Greater Washington Board of Trade, the Greater Washington United Way Campaign, and he is a Fellow of the American Bar Foundation. He is included in "The Best Lawyers in America" and "Who's Who in American Law." He also was a founding trustee of the Chinquapin School for underprivileged boys in Highlands, Texas.

By way of introduction, I'd like to acknowledge Carl for his leadership and professionalism, and the genuineness that he brings along with these qualities. Few people combine this kind of quality and background. I'm able to consistently count on him for his support and guidance in effecting change in aviation safety and making my job a lot easier!

**CARL W. VOGT**
**CHAIRMAN**
**NATIONAL TRANSPORTATION SAFETY BOARD**

Welcome to the National Transportation Safety Board's Aviation Accident Investigation Symposium. Personally and professionally I look forward to some very rewarding discussions during the next three days. As you can see by the list of attendees, some of the most knowledgeable people in the aviation industry are here. I believe that this symposium will provide a unique opportunity for many of us involved in accident investigations to share ideas and, in some cases, to meet face-to-face for the first time.

The primary mission of the Board is to investigate certain aviation, highway, railroad, pipeline, and marine accidents; to report publicly on the facts, conditions, and circumstances; and to determine the cause or probable causes of these accidents. Safety Board accident investigation teams are composed of technical experts from the parties who support our investigators-in-charge (IICs) and group chairmen. The support of industry and government has provided immediate and invaluable assistance to accident investigations that would otherwise not be available because of our limited resources. Working together, the Safety Board, other government agencies, and industry have operated the most comprehensive and successful aviation accident investigation program in the world.

The aviation industry has an outstanding safety record of which it can be justifiably proud. Although there are occasional accidents that attract considerable attention from the news media, the overall accident rate is quite low and continues to improve. However, the purpose of this symposium is not to proclaim what is working well but rather to discuss how things can be improved. Specifically, I wish to emphasize that this symposium should serve as a forum for the aviation industry to tell us what you perceive we are doing wrong. If you do not take this opportunity to speak out, the Safety Board can only assume that you have no current problems with how we investigate accidents.

I recognize that by speaking out, some of you may be concerned about creating hard feelings or otherwise damaging working relationships. We are, however, all professionals, and, as such, we recognize that among us there may be differences of opinion. We each have our own motivations--be it getting an airplane back into service, reducing negative publicity, informing the public, changing a design, or writing an accident report. The common thread that ties us together is our

commitment to determine what causes accidents and what can be done to prevent recurrences. We may have different visions about how to get there, but we all share the same goal. It would be unprofessional for differences of opinion to reduce our effectiveness, and we will not allow that to happen.

This symposium is not designed to be a "band-aid" fix, where we spend three days listening to your concerns and then go back to business as usual. You will notice that all of the senior staff of the Office of Aviation Safety are in attendance, as well as many of the Board Members. In short, the appropriate people are in place to hear your concerns and to make change happen.

As many of you are aware, there are very few review bodies anywhere that function like our five-member Board. If you have been to our meetings, you know that they are the culmination of a very time-consuming and sometimes painful review and rewrite process by the staff. When the Board adopts a report, the findings and conclusions have been picked apart, to the best of our ability, from every angle. Board Members may consider everything that pertains to the investigation--group chairmen factual reports, submissions by the parties, occasional non-party submissions, and, of course, the staff's draft analysis, findings, conclusions, and probable cause recommendations. I continue to be impressed with the thoroughness of the process and the general quality of information available to us. We welcome your thoughts about how the process can be improved.

At the conclusion of the symposium, we will most likely discover that we disagree about some recommendations for change. There may also be areas where the Safety Board is constrained by regulation from accomplishing the changes that you believe are necessary. I am sure that not all of the Board Members or the staff will be in complete agreement on where change is needed. However, when the symposium proceedings are published, we will respond to each recommendation. If we agree with a proposed change to our investigative procedures, we will take the necessary steps to implement that change. If we disagree, we will provide you with our reasons. We believe that you deserve to know why and how we arrive at each decision.

There is one aspect of the Safety Board's practices that warrants comment now because we believe it is the keystone to our major investigations--that is the system by which persons are officially designated by the Board to participate in investigation as parties. This procedure has drawn considerable and varied comments through the years. Many other countries do not permit such participation

by airlines, unions, or manufacturers. Our regulations allow government agencies, companies, and associations to participate as parties when their employees, functions, or activities were involved in the accident and when they can provide qualified technical personnel to actively assist in the investigation. Excluded from party status are those persons who represent claimants or insurers.

This system has evolved as a way to inject the most relevant and specific expertise available into our investigations. The only alternative would be to fully staff the Safety Board with specialists who have expertise in all types of aircraft and components. This would be neither cost effective nor politically possible. Therefore, although we recognize certain inherent limitations in the current party system, experience shows that it is the most effective method available to obtain the expertise necessary to complement the capacities of our staff.

We have also been criticized by some who claim that the party system confers special rights on certain groups and fosters their immediate access to information. Access to information uncovered in an investigation that allows an involved organization to take immediate remedial action may, however, be critically important from a safety perspective.

Some parties may also have a protective attitude toward their products or personnel. We do everything we can to keep such attitudes from affecting the conduct of our investigations. A party's litigious or protective attitude cannot contribute to a successful investigation. Our investigators-in-charge are directed to remove those party representatives whose interests are focused on determining the rights or liabilities of their employers rather than on contributing to the investigation of the accident.

Essentially, the party system is a combination of people who have diverse interests working together to investigate accidents. We believe that this kind of "team effort" is the most efficient method available to us. As I mentioned earlier, no system is perfect, and, we are here to explore ways to improve and make it work better for aviation safety.

I would like to acknowledge the significant turnout of government and industry representatives from overseas. When the Safety Board convened two previous industry meetings in 1975 and 1983, the discussions focused primarily on United States domestic problems and issues. As we all know, aviation safety has truly become an international concern. Any major accident involving a large

transport airliner today raises worldwide public concern for the safety of the industry. We welcome the international aviation community and we solicit your comments to assist us in improving our procedures and practices. We appreciate the fact that you bring considerable expertise and experience that we hope you will share with us.

As I have said before, the purpose of the symposium is for the Safety Board to listen to you. With that in mind I will stop talking. Thank you for being with us.

**ROBERT JOHNSON**
**CHIEF, REGIONAL OPERATIONS**
**AND GENERAL AVIATION DIVISION**
**NATIONAL TRANSPORTATION SAFETY BOARD**

As the chief of the Regional Operations and General Aviation Division in headquarters, I work very closely with all of our regional personnel to improve the efficiency and effectiveness of our efforts. My division coordinates the regional office administrative activities, strives to standardize the regional procedures, and processes the factual reports issued by the regions and the probable cause reports issued by the Safety Board.

Regional operations involve 74 people, 66 located in the 6 regional offices and 8 assigned to my division here in headquarters. That is slightly over half of the total authorized manning for the Office of Aviation Safety , which right now stands at 126 positions. Four of our regions have field offices and the offices are situated in 10 different locations across the United States from Anchorage to Miami and from New York to Los Angeles.

Since these offices are quite small, as few as 3 employees in the Denver office and as many as 11 in the Los Angeles and Chicago offices, they do not have the luxury of administrative specialists support. Therefore, they often need assistance in getting things done. Where those of us in headquarters simply seek out a specialist to solve our problems, the regional people often need to make several calls just to get to the right person. My division tries to make life easier for them by coordinating their support needs.

One of the most important administrative functions that we help to coordinate is training for our regional personnel. We spend a great deal of money on training in the Office of Aviation Safety each year, and making sure that those training funds are spent in the proper areas is very important to all of us.

Another major function is the standardization of regional operations procedures. This is an area where we can always improve and an area where we have heard and will hear more suggestions for improvement from you. I have heard it said that there are too many differences in the way our regional offices do business. We realize this causes problems for you and we are striving to minimize those differences.

In order to standardize our operations, we begin by having every new investigator attend a two and one-half week school here in Washington within a few months of their coming on board. This school is not a basic accident investigation training course. It is primarily to train our new investigators on how we at the Safety Board do business. Our hiring process emphasizes technical aviation background and training and experience in accident investigation. For those that we think need further basic accident investigation training, there are several courses that are available to new hires to augment their skills. While the accident investigation course is not basic investigation, it does have several presentations that involve investigation procedures and techniques but it is more to help our investigators understand Board procedures.

In a further effort to standardize our activities we have published a revised investigation manual. The manual serves as a ready reference for our investigators on how we implement the basic laws, rules, and regulations that govern our activities. It spells out step-by-step procedures and attempts to answer the many questions that face each of our investigators during their day-to-day work. You would be surprised at how often the question "Is this occurrence an accident?" comes up. The definition of an accident is contained in our basic regulation, CFR Part 830; however, interpretation is often necessary. The following is quoted from the Board's regulation: "Aircraft accident means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked..." That sounds like a fairly simple, straightforward statement, but in day-to-day situations questions often arise as to the meaning of such things as "occurrence associated with the operation of an aircraft..." Does a passenger's injury associated with spilled hot coffee qualify as an "occurrence" within that definition? Does the case of a plane becoming airborne during a high speed taxi test fall in the category of "intention of flight?" We have tried to anticipate these kinds of questions and have presented some of the situations in the investigation manual to make the calls in these cases more uniform.

Another action directed toward standardization is our quarterly regional directors meetings. Each quarter, the six regional directors and I meet to discuss our activities. In December 1991, we began inviting participation in these meetings with some of the organizations represented here today.

One of the problems that was addressed to us by your representatives was the differences in the type of response that is given to mishaps. I'm sure this subject is going to come up in your breakout sessions, and I only mention it here in an effort to help you understand some of the constraints within which we operate.

I mentioned that there are 66 people in the regional offices. Of that number, 49 are investigators. During 1993, those 49 investigators were in charge of investigating approximately 2200 accidents and incidents. Those mishaps were investigated in several different ways.

We have limited investigations in which the investigation is conducted from the investigator's desk. The investigator gathers information by mail and telephone. Only rarely does the investigator travel on this type of investigation, and if they do travel, it is usually to conduct an examination of failed parts.

"Limited investigation" is a somewhat misleading title. A limited investigation often includes the support of specialists from our headquarters and on-scene support from FAA personnel. Many of the limited investigations are fairly straightforward, but if an investigator uncovers a safety issue, we encourage the pursuit of corrective action for that issue, and in those cases, the investigation can become quite complicated. Of the 2200 total investigations in 1993, approximately 1800 were conducted as limiteds.

The next level is the field investigation. In this case the investigator nearly always travels to the scene of the accident. This type of investigation is more comprehensive in the collection of facts, circumstances, and conditions. A field investigation usually includes the on-scene participation of an FAA representative. I should mention here that the FAA has authority, by law, to participate in our investigations. The participants may also include representatives from the operator, the airframe and powerplant manufacturer, and less frequently, the manufacturer of other on-board equipment. The investigation includes examination and documentation of the wreckage to determine any failures but also to try to determine the causes of injuries and what changes can be made to mitigate the results of the accident. We did about 400 field investigations in 1993 and about 12 of those investigations were considered major field investigations.

The major field is a more in-depth investigation than a field investigation and is run very similar to a headquarters go-team investigation. Where the field investigation may involve only the Board's investigator-in-charge and a

representative of the FAA, the major field investigation typically includes representatives from several interested parties and specialists from our headquarters staff. It may include the reading of cockpit voice recordings or flight data recordings or both. It often includes an aircraft performance study by our staff engineers. The participation of the additional specialists provides both the manpower and expertise to look into areas such as human performance where applicable and a more detailed examination of survival factors issues.

I also want to mention the accident investigations that we delegate to the FAA. Ten years ago we delegated nearly 80 percent of all investigations to the FAA. At that time we did most of the fatal accidents and those involving commercial operations and called on the FAA to do the rest.

Our current agreement with the FAA says that we may call on FAA personnel to investigate and provide a factual report to the Safety Board on selected accidents, generally those accidents which involve serious or fatal injuries and which occur in agricultural operations or in homebuilt or other experimental aircraft. Because of changes in our computer systems it has become less efficient for us to delegate accident investigations to the FAA. As a result, in the past twelve months, we have delegated only 27 investigations. Although we delegated only 27 investigations, I want to emphasize that the FAA makes a very important contribution to our efforts because in many cases they travel to the scene of accidents when we just do not have people available. In those cases they often provide us with facts and conditions that we would otherwise not have available to include in the factual report. We identify those cases as limited investigations but again a lot of information is available only through the eyes and ears of the FAA representatives on-scene.

Each field investigator does 8 or 9 field investigations and another 35 to 40 limited investigations each year. I mention this to help you understand why we sometimes do not respond to mishaps at the level that you would like to see. Our managers constantly face decisions about allocation of scarce resources. We have 49 field investigators and 30 specialists dedicated to accident investigation in the Office of Aviation Safety in headquarters. The specialists are the people who make up the go-teams that are headed by the investigators-in-charge from our Major Investigations Division, but they are also available to support our field investigators. In addition, there are 22 specialists in the Office of Research and Engineering that are available to assist our field investigators. However, these same specialists also

support the highway, railroad, marine, pipeline, and hazardous materials investigations conducted by Board investigators.

As you can imagine, we are sometimes spread rather thin. If we had additional resources, our decisions would undoubtedly result in more on-scene investigations and in more in-depth investigations. Several investigations that are now handled as limited investigations would be upgraded to fields and several of our field investigations would be upgraded to major fields with help from specialists. Discussions at our quarterly regional directors meetings often center around the challenges of making the best use of our limited resources.

Another subject often discussed at the RD meetings has to do with the standardization of our reports. One of the most significant changes made at the Safety Board in recent years has to do with the placing of responsibility for the quality of our product, the accident reports and safety proposals, at the level in the organization which has the most knowledge of the mishap. In the past, the investigator and his supervisor in the field, prepared the reports but much of the responsibility for quality control was held in headquarters. The philosophy now is that we build quality from the very beginning. That means that the investigators and their first-line supervisor are responsible for the finished product. It also means that there is a much greater need to train employees and a greater need for standardization of the product.

Before I close, I want to take a few moments to explain a new concept for our reports that you may not have heard about. We are now producing a paperless report. A recent report in the Washington Post described how the government spends millions of dollars each year to store documents. The report told of a newly opened warehouse that was supposed to solve the storage problem for the next ten years, but 18 months after opening it is nearly full. Our agency, for instance, is required to store the hard copy of accident reports for seven years. To facilitate the distribution of our reports, we also made microfiche copies of the reports. We have just recently changed our way of storing reports.

We are now producing and storing all of our reports on computers. We enter the investigator's report on a personal computer, which is networked to our mainframe in headquarters. The supporting documentation, including photographs, is scanned into a personal computer at the regional office and both the investigator's report and the supporting documentation is transferred electronically to headquarters. When we are satisfied that the information has reached the

mainframe, the supporting documents are returned to their owners or are destroyed. There will no longer be a paper copy of a report stored anywhere. The advantages of this are that the quality of the product provided to the public is an improvement over the currently available microfiche copy, the cost of producing a report is reduced, and the cost of storing a paper copy of the report is eliminated. It may also mean that you will be able to receive a copy of our report by electronic transfer or by computer disk in the future. It has taken about a year and a substantial expenditure of funds to develop this program but we believe the effort will pay for itself many times over in the years to come.

I hope this helps you to understand how our regional accident investigation system works. It takes the coordination of many individuals to make the system work effectively and we know you have many suggestions for improvements. We in regional operations believe in satisfied customers and you are certainly one of our most important customers. We welcome your suggestions and I assure you we will make every effort to improve our processes and products.

**RONALD L. SCHLEEDE**
**CHIEF, MAJOR INVESTIGATIONS DIVISION**
**OFFICE OF AVIATION SAFETY**
**NATIONAL TRANSPORTATION SAFETY BOARD**

# MAJOR INVESTIGATIONS AND INTERNATIONAL INVESTIGATIONS

## INTRODUCTION

The excellent safety record of the international airline industry is not often mentioned by the international news media following an airline accident. Unfortunately, any aircraft accident involving a transport category airliner, especially an accident involving serious injuries and death, regardless of where it occurs, creates intense worldwide interest and concern. The real-time coverage by the electronic media initiates and propagates the intensity of this interest. The concerns range from personal factors related to the families and friends of the victims involved in the accident, to the institutional factors pertaining to the aviation industries and governments involved. The concerns also extend to the airline operators and regulators of the same or similar model aircraft in other countries, as well as to the traveling public worldwide.

It is well established that the continued growth of airline traffic volume worldwide increases the exposure and the probability of accidents, even if the currently low accident rate continues its slight downward trend. This situation places a tremendous burden on the officials charged with preventing accidents and those officials charged with investigating accidents and incidents and developing accident prevention measures. The only means to cope with this burden is to develop and ensure cooperation on the part of all facets of the international aviation community.

For several reasons, the United States (U.S.) has a deep vested interest in preventing aircraft accidents worldwide. First, it has an enormous domestic airline industry that is an integral part of its transportation and economic system. Secondly, it has a significant international airline system and a significant number of U.S.-manufactured aircraft and engines operating all over the world. Additionally, the U.S. aviation industry is deeply involved in the programs of the International

Civil Aviation Organization (ICAO), which specify the responsibilities and obligations of States regarding aviation safety.

This paper contains a brief overview of the policies, practices, and procedures of the National Transportation Safety Board (NTSB) for the investigation of major aircraft accidents that occur in the United States (U.S.). The paper is intended primarily for the benefit of U.S. aviation industry officials and foreign government, airline, and manufacturing officials, who may become involved in an accident investigation in the U.S. The paper also explains the role of the NTSB in providing objective/impartial assistance to investigations led by other States through its Accredited Representative and technical advisors.

Because the NTSB is totally independent from the Federal Aviation Administration (FAA), which is charged with the regulation of the U.S. aviation industry, the NTSB acts as an independent "oversight" agency that has no vested interests in the results of its investigations, other than accident prevention, regardless of where the accident occurs.

**Domestic Accidents--The NTSB Go-Team**

An NTSB "go-team," led by an investigator-in-charge (IIC), is dispatched from Washington, D.C. to the accident site within 2 to 3 hours of notification of a major accident in the U.S. These 2 or 3 hours involve considerable interaction between NTSB staff, FAA and aviation industry officials, including foreign government, foreign manufacturers, and foreign airlines, as appropriate. Timely and accurate communications are essential to accomplish a rapid and proper response to a major airline accident. The first NTSB investigator to arrive on scene is often from one of the NTSB Regional Offices. He/she will begin the investigation and coordinate site security and other matters while awaiting the arrival of the go-team.

The IIC is a senior air safety investigator supported by several NTSB Group Chairmen. The Group Chairmen are specialists in powerplants, systems, structures, operations, air traffic control, weather, survival factors, and human performance. Cockpit voice recorder (CVR) and flight data recorder (FDR) groups are formed at the NTSB laboratory in Washington, D.C. An aircraft performance specialist is assigned to most investigations. An NTSB specialist is often assigned to cover witnesses and maintenance records. All NTSB staff are under the direction of the IIC.

One of the five NTSB Board Members and a public affairs specialist usually accompany the go-team. The Board Member is appointed to the NTSB by the President of the U.S. and is confirmed by the Congress. The Board Member's role is to represent the U.S. people and to ensure that the NTSB fulfills its mandate to investigate civil aviation accidents to determine the probable causes of such accidents and to make recommendations to prevent future accidents.

In accordance with NTSB regulations, only the NTSB is authorized to release information regarding the investigation findings. Persons or organizations that fail to abide by these regulations will be removed from the investigation. The Board Member or public affairs personnel release appropriate factual information about the investigation to the news media. In the absence of a Board Member or public affairs personnel, the IIC deals with the news media.

The NTSB policy for news media briefings is one of factual and responsible reporting about accidents to the public as information is obtained during the course of an investigation. This policy varies considerably from many other States' policies about dealing with the news media. In general, the NTSB will release factual information in context as it becomes available. The aim of providing such information is to reduce and eliminate, if possible, speculation and suspicions on the part of the general public. Also, the intent is to assure the public that a responsible investigation is in progress and the findings of the investigation will be reported openly and objectively.

**Organization of the Investigation**

The NTSB maintains the "team concept" throughout its investigations to ensure the proper utilization of the expertise of the parties and the international officials and experts, both to determine the facts, conditions, and circumstances of an accident, and to develop timely corrective actions. The "team concept" requires a high degree of organization before a proper investigation can begin. Shortly after arrival at the accident site, the IIC convenes an organizational meeting, usually at a large hotel where the NTSB command post is established.

All personnel approved to participate in an NTSB investigation should report to the NTSB command post. Although the IIC and key NTSB personnel will usually take a short tour of the accident site and obtain an initial briefing from local officials, all other persons are restricted from the scene, until the team is organized.

At the organizational meeting, each party to the investigation, such as the FAA, airline, airframe manufacturer, engine manufacturer, pilots' union, local law enforcement, the airport authority, etc., must designate a spokesman or coordinator, who will supervise its specialists assigned to the NTSB team. Each party coordinator is expected to report to and respond to the IIC's directions, and he or she must ensure that all personnel from his or her organization comply with the rules and procedures of the NTSB.

It should be noted that, except for the FAA, party status to an NTSB investigation is a "privilege" and not a "right." No news media, lawyers, or insurance personnel are permitted to participate in any phase of the investigation, including meetings. The IIC will work with selected insurance representatives, only in conjunction with the aircraft owner, for the purpose of retrieval, movement, and release of the wreckage. Occasional press conferences will be held to report the status of the investigation to the media.

In accordance with the provisions of Annex 13 to ICAO, if the accident aircraft involves a non-U.S. airline, or is a non-U.S. registered or manufactured aircraft, the respective government accident investigation authority(ies) would be notified and invited to appoint an Accredited Representative and advisors to participate in the NTSB investigation. The NTSB attempts to comply with all provisions of Annex 13, whether stated as Standards or Recommended Practices. If the government(s) involved has an independent accident investigation authority, the respective certification (regulatory) authority from that country could participate as an advisor to the Accredited Representative. The airline operator or aircraft and engine manufacturers' representatives would be granted party status. However, they would also be under the jurisdiction and control of the Accredited Representatives. Any problems that might occur with non-U.S. representatives would be resolved between the IIC and the respective Accredited Representatives.

The specialists assigned by any party to an NTSB investigation must be employees of the party and must possess expertise to assist the NTSB in its investigation. The NTSB regulations state, in part, that "parties to the field phase shall be limited to those persons, government agencies, companies, and associations whose employees, functions, activities, or products were involved in the accident or incident, and who can provide suitable qualified technical personnel to actively assist in the field investigation. Further, specialists assigned to groups must work under the direction of the appropriate NTSB Group Chairman at all times. Failure

to abide by NTSB rules and procedures can result in dismissal of individuals, or even the party, from the investigation team.

As each group is formed during the organization meeting, each party, or Accredited Representative, is permitted to assign experts from their organization to the respective groups to assist in the investigation. For example, the airline operator generally would assign a training pilot to the Operations Group that is type-rated in the accident airplane. Maintenance or engineering staff familiar with the aircraft would be assigned to the airworthiness groups. Similarly, the airframe manufacturer would normally assign a flight test pilot to the Operations Group and systems or structural engineers to the Structures, Systems and/or Powerplants Groups. A more detailed description of the various investigative groups is included as an attachment to this paper as part of a hypothetical investigation team.

If the aircraft is equipped with a CVR and FDR, separate groups led by NTSB specialists are formed in Washington, D.C. for readouts. Parties with expertise required by the NTSB are offered status on these two groups. For example, the airline would be requested to assign an accident airplane type-rated pilot, who knows the airline procedures and is familiar with the pilots' voices. The airframe manufacturer would be asked to assign a pilot or flight test engineer who is familiar with the aircraft's operational characteristics, cockpit aural warnings, and other systems. Membership on the FDR and CVR groups is strictly limited and highly controlled because of the sensitive nature of the data obtained. Party status to an NTSB investigation does not automatically allow the assignment of personnel to all of the groups. Accredited Representatives and/or their advisors, as defined under ICAO Annex 13, would be assigned to selected groups, as appropriate.

In most major airline accidents, the NTSB forms an Aircraft Performance Group to correlate FDR, CVR, ATC radar data, weather data, and crash dynamics data, with aircraft design and operational data, to develop a profile of the flight. In many cases, simulation studies are performed by this group.

A Human Performance Group may be formed to document medical, behavioral, and human engineering information concerning the accident. If such a group is not formed, the NTSB human performance specialist works with a key group, such as the Operations Group.

The on-scene phase of the investigation may last from 7 to 21 days. Each person assigned to the NTSB team must be prepared for extended work schedules,

often under extreme environmental, physical, and mental stress. Each party coordinator must consider these factors when assigning personnel to a group. Substitutions of individuals on a particular group are highly discouraged in order to maintain continuity and the team concept. If personnel cannot fulfill their obligations, or if they do not comply with the NTSB regulations or procedures, the individual or the party may be removed from the investigation team.

Each group member assigned to the team is directly responsible to his or her NTSB Group Chairman and the IIC, or the Accredited Representatives. No "independent" investigations by parties or group members are permitted. Any problems should be brought to the attention of the IIC immediately for resolution in consultation with the respective party coordinators or Accredited Representatives.

The NTSB is currently developing policies and procedures for compliance with Occupational Safety and Health Administration (OSHA) rules regarding potential exposure to blood-borne pathogens in the work place. The OSHA requirements have direct application to NTSB activities during on scene and off scene wreckage examinations. The OSHA rules will require strict procedures for protection of investigators involved in wreckage examination. As a result, access to the accident site will be dependent upon special training and equipment requirements for all investigators, including the party participants. These requirements will lead to limited access to investigators to the accident sites.

As the "field phase" of the investigation comes to a close, each Group Chairman will prepare "field notes" that contain the factual findings and other data collected by the group. Each member of the group will have an opportunity to review and comment on the notes and will receive a copy before the group disbands. Each Coordinator/Spokesman also receives a copy of all of the field notes before the team leaves the site. If further investigation is necessary, the needs and plans will be discussed by NTSB staff and party representatives.

The parties' group members and Coordinators have an obligation to remain with the team until the close of the field phase of the investigation. Persons assigned to participate must be prepared to remain with the team until released by the NTSB Group Chairmen and/or the IIC. The IIC is responsible for the release of any particular group in consultation with the party Coordinators.

Follow-on off site investigation activities continue to involve the parties in the group structure and additional notes are made for each phase of the investigation.

Once the entire field phase is complete, the NTSB Group Chairmen each complete a final factual report of their area of responsibility. All factual material is sent to each Coordinator and is placed in the public docket. At that point, a Technical Review Meeting is convened at which the parties have one final chance to comment on the quality and scope of the factual record. Subsequent to that meeting, the parties are urged to make submissions to the NTSB of findings, conclusions, probable cause, and recommendations that they believe should be drawn from the factual record. The submissions are also placed in the public record.

The final narrative accident report is usually written by the IIC and goes through several levels of internal NTSB review before it is adopted by the 5-Member Board. The goal for completion of the final report is 6 months from the date of the accident until it reaches the Board. This is merely a goal and can be modified according to the safety issues, other workload, and complexity of the investigation and analysis.

The NTSB conducts many accident investigations on a much less major scale than the full go-team as described above. For example, there are "partial team" launches led by NTSB headquarters IIC's that are supported by both headquarters and Regional investigators in limited technical areas. Further, there are "field majors" led by Regional IIC's and supported by headquarters and other Regional investigators. In all of these cases, the NTSB goal is to operate in a consistent manner regarding the organization, management, and conduct of the investigation and final report. In those cases, the procedures, regulations, and guidelines for the investigations are similar; they are just conducted on a lesser scale.

**NTSB Involvement in Accident Investigations Outside the U.S.**

During investigations led by other States, the NTSB has a different role. The NTSB is the government agency charged with the responsibilities for assuring compliance with the U.S. obligations under Annex 13 to ICAO during accident investigations led by other States.

The NTSB appoints the U.S. Accredited Representatives to international investigations and oversees the advisors from the U.S. aviation industry, including the advisors from the FAA. Therefore, the NTSB provides an objective and impartial representative to assist the authorities charged with the management of accident investigations outside of the U.S.

The U.S. interests and needs for involvement in investigations conducted by authorities of States other than the U.S. stem from the obligations contained in Annex 13 to ICAO, as well as its obligations under other requirements of ICAO. The interests and needs are obvious for accidents involving U.S. registered aircraft and U.S. airlines. That is, to provide assistance to States' authorities investigating such accidents from the U.S. government and industry, and to enable the U.S. authorities to take accident prevention measures based on the findings of the investigations. However, the U.S. interests and needs for involvement are not so clear for accidents involving non-U.S. airlines operating U.S. manufactured aircraft or engines.

Under certain provisions of ICAO Annex 8 (Airworthiness of Aircraft), the U.S., as the State of Manufacture, is responsible for monitoring the continuing airworthiness of the aircraft, wherever they are operated. Similarly, Annex 8 specifies that the State of Manufacture is obligated to notify operators of aircraft it has manufactured about airworthiness problems with the aircraft, wherever they are operated. In order to fulfill these obligations, the U.S. must rely on data developed during investigations of accidents, wherever they occur.

The delegates to the February 1992 meeting of the ICAO Accident Investigation Divisional Meeting (AIG/92) held in Montreal recognized the need for the State of Manufacture to have enhanced rights and obligations under the provisions of Annex 13 to ICAO. Recommended amendments to Annex 13 made by the delegates to AIG/92 have recently been forwarded to the ICAO Council for approval. The proposed applicability date is November 10, 1994. Once adopted, the enhanced provisions will provide for improved accident prevention measures. The NTSB led the U.S. initiatives to formulate these important provisions in cooperation with many other States. The NTSB recognizes that, along with the new "rights" come new "obligations."

The NTSB is fully prepared, on behalf of the U.S. aviation industry, to support the spirit of cooperation that was highly evident at the AIG/92 meeting. Hopefully, the other facets of the international aviation community are prepared to support these efforts that are essential to maintain the growth and safety of the world's civil aviation system.

The NTSB and other facets of the U.S. aviation industry are fully aware of the concerns of many States about sovereignty, judicial, and privacy issues. The NTSB is also aware of the concerns on the part of many States about the "reality" or

"appearance" of a conflict of interest on the part of the representatives of other States, such as the U.S., that are assigned to participate in an investigation. It should be emphasized that the NTSB is an independent agency that is prepared to provide oversight and control of any U.S. aviation industry interests to comply with the spirit of cooperation intended by Annex 13 and the other provisions of ICAO to prevent future accidents. The NTSB will make every attempt to prevent "special interests" from adversely affecting the investigations. The NTSB provides this important role for accident investigations in the U.S. and certainly would do so during investigations led by other States.

The NTSB also is prepared to provide other types of support to investigations being conducted outside of the U.S. For example, the NTSB will offer to provide a readout of CVRs and FDRs and metallurgical analyses of failed parts for other investigation authorities. The NTSB offers its assistance in accordance with the provisions of Annex 13 and would follow the procedures and spirit of cooperation intended by Annex 13. Upon request, the NTSB would also provide aircraft performance studies for other investigations, resources permitting.

The NTSB, in coordination with the FAA, often provides investigative oversight at manufacturers' facilities during teardown examinations of engines or other components to support an overseas investigation when the investigation authority wishes not to travel to the U.S. Of course, if the investigative authority wished to travel to the U.S., the NTSB would facilitate such travel. In these types of cases, the NTSB would ensure that a proper and timely report is completed and sent to the investigation authority.

**Conclusion**

In closing, the NTSB believes that the team concept, using all available technical expertise available from the parties with an ability to take accident prevention measures, is essential in conducting a proper major accident investigation. To do otherwise, prolongs the investigation and provides an opportunity to overlook important evidence and corrective actions.

In the past, the NTSB has encountered difficulties during a few investigations that are of concern. For example, there have been cases in which the State of Occurrence of an accident, or another State that has offered assistance to the State of Occurrence, has restricted access to information as it developed or limited participation in certain phases of the investigations. Such restrictions have

precluded the NTSB and its advisors from obtaining important information that could be used for the prevention of accidents. In fact, these restrictions have on certain occasions precluded the U.S. from fulfilling its obligations under specific ICAO provisions, particularly Annex 8. Reasons used by the States on such occasions to justify the restrictions have included privacy concerns, perceived or real conflicts of interest, judicial matters, or simple "procedural restrictions."

Aviation safety is achieved by hard work and constant vigilance to prevent accidents. A safe aviation operation is achieved by ensuring compliance with the voluminous regulations, policies, practices, and procedures adopted by the aviation industry over the past several years, as well as using the valuable accident prevention programs available. However, once the accident prevention system fails and an accident occurs--it happens too often--the system must be prepared to react and manage the investigation in a spirit of openness and cooperation to prevent the next accident. The NTSB is dedicated to this goal. (See attachment).

**BERNARD S. LOEB**
**DIRECTOR, OFFICE OF RESEARCH AND ENGINEERING**
**NATIONAL TRANSPORTATION SAFETY BOARD**

## TECHNICAL SUPPORT FROM THE OFFICE OF RESEARCH AND ENGINEERING

The Office of Research and Engineering employees about 50 people and is structurally comprised of six divisions (see attached organizational chart) including: Safety Studies; Computer and Engineering Services; Materials Laboratory; Hazardous Materials; Analysis and Data; and Vehicle Performance.

Functionally, we are assigned a variety of responsibilities:

### Safety Studies Program

While the Safety Board is best known for its investigation of catastrophic accidents, the safety studies program is a very important part of the Board's functions.

A safety study is a research project on a transportation safety issue of national significance. In selecting subjects for safety studies, the Safety Board considers the potential for reducing accident losses and for improving the safety effectiveness of other government transportation programs.

The data gathered to support a safety study can come from a review of existing Safety Board accident investigation reports, from a set of new accident investigations conducted specifically to support the study topic, and from a review of existing literature on a particular safety issue. Safety studies can take a few months to a few years to complete. Once a study is completed the findings and recommendations are discussed by the Board at a public meeting.

The most recent study completed by the Board addressed flightcrew-involved major air carrier accidents. In this study the Board examined flight crew errors and the contexts in which they occurred for 37 accidents in which the Board had conducted a major investigation and cited the crew as a cause or contributing factor. The study found that the captain was the flying and the first officer the non-flying pilot in a surprisingly large proportion of the accidents, and that

monitoring/challenging failures constituted a very high proportion of crew errors. A common pattern observed in many accidents was a tactical decision error by the captain followed by the non-flying first officer's failure to challenge the decision.

On the basis of this study the Board made recommendations to the FAA to improve training programs, and to improve the error-tolerance of air carrier checklist procedures.

**Data Retrieval and Analysis**

Part of the Safety Board's mandate is to maintain the official U.S. census of aviation accidents. This is done through our maintenance of the NTSB's aviation accident data base, which includes records of all accidents from 1962 to the present and resides in three separate formats:

| Calendar Years | Contents |
|---|---|
| 1962 - 1981 | 84,702 Accidents and 1,396 Incidents |
| 1982 | 3,430 Accidents and 117 Incidents |
| 1983 - 1994 | 29,456 Accidents and 1,010 Incidents |

We provide aviation accident information services from this data base to government, industry, and the public.

A variety of output products is available from the data base. Among them are the two-page "Brief Report of Aviation Accident;" lists of specific characteristics of selected accidents, aircraft, or pilots; tabulations of the frequency of all causes and factors in selected accidents; and partial or complete copies of the data base on diskettes or reel-to-reel tape. We also publish annual reviews of both air carrier and general aviation accidents, as well as special statistical studies of selected types of accidents.

A related service provided by the Division is the maintenance and retrieval upon request of the NTSB's accident investigation reports--both the formal reports published for major accidents and the factual reports produced for all accident and incident investigations. The Division is transitioning from archiving on microfiche to optical scanning and electronic storage technology for NTSB reports. The Department of Commerce's National Technical Information Service (NTIS)

provides Safety Board reports and copies of dockets to the public on a fee for service basis.

The Division also provides data services to NTSB's Office of Surface Transportation Safety. We have direct access to DOT data bases for highway, railroad, marine, and pipeline accidents. We use these data bases, which are maintained by agencies within the DOT, to provide support for NTSB safety studies, special investigations, and accident investigations.

**Hazardous Materials, Fires and Explosions**

When hazardous materials cargo, or "dangerous goods," are found to have been transported onboard an aircraft that was involved in an accident, the Office of Research and Engineering provides technical support to help determine if the cargo transported contributed to the cause or the severity of the accident. Specialists from the Office's Hazardous Materials Division examine the physical, chemical and toxicological properties of dangerous goods and document the effect the release of those materials may have had on the flightcrew or the aircraft. Evidence is examined to determine if any dangerous goods may have leaked from containers before the accident and if the flightcrew had adequate information about the cargo, such as the hazards posed by the materials and where the cargo was stowed.

Investigation of fires and explosions represents another area of support provided by the Office of Research and Engineering to both aviation and surface transportation accident investigations. Determination of the origin of a fire or an explosion in aviation accidents involves the collection and use of information from multiple sources, including: eye witness accounts, when eye witnesses exist, CVR, FDR, recent maintenance records up to 6 months prior to the fire, careful examination of hardware, knowledge of material performance that include melting temperatures, flammability, ignitability, indicators of over-temperature, and soot-burn patterns.

In support of the information obtained from these sources, various analytical measurements can be used for documentation. These measurements include frequency analysis of CVR tapes; residue analysis, such as gas chromatography, mass spectrometry, and Fourier Transform infrared spectrometry. Toxicological measurements on victims can also provide information on the type and extent of the fire and whether the fire was inflight or post accident in nature.

**Materials Laboratory Services**

The Safety Board operates a well equipped materials laboratory located on the fifth floor of its headquarters building in Washington D.C. The laboratory is staffed by five engineers (metallurgical and materials) and one physical science technician who perform failure analysis on a wide variety of materials and components involved in both aviation and surface transportation accidents. This laboratory performs fracture, chemical and microstructural analyses, material parameter and dimensional measurements, using sophisticated equipment such as the scanning electron microscope with supporting X-ray energy dispersive analyzers, hardness and tensile testing machines, and computer controlled dimensional measuring equipment.

The laboratory is also equipped to perform most of the routine, non-destructive inspection techniques (dye penetrant, magnetic particle, ultrasonic, and eddy current) to detect both surface and subsurface cracks and flaws. In addition, the laboratory has a supplemental space available on the ground floor for handling large and heavy components for disassembly and sectioning.

Besides performing failure analysis in the laboratory, the materials laboratory personnel support on-site general and major aviation accident investigations in the field as consultants or group chairmen (such as Sioux City and Aloha Airlines) and has on many occasions supported foreign governments in their accident investigations (for example El AL accident in the Netherlands and JAL in Japan). Most materials investigations are completed within 60 days but are subject to the resources and priorities available at the time of the request, and in complex investigations may take longer.

Most initial materials examinations are done by Safety Board materials engineers. If materials issues are observed, engineering data for the components (such as drawings, specifications, and prior failure history) are obtained from the manufacturer or operator and the Safety Board materials engineer performs the failure analysis. Appropriate parties are encouraged to provide input on methodologies to be used before and during the failure analysis examination; however, decisions on courses of action to take in the examination lies solely with the representatives of the Safety Board. On major air carrier accidents where a materials failure is causal to the accident, parties will be invited to observe parts before testing and participate in the development of a testing protocol. In those cases, Safety Board policy dictates that the participants be full time employees of

the parties and that they be able to contribute to the failure analysis investigation (examples: metallurgists, materials engineers, stress design or maintenance personnel, and operators or product support employees familiar with the components). General observers, consultants who are not full time employees of the parties, lawyers, or representatives of insurers are not allowed to participate. Whether or not parties participate in the materials examination, a factual report is prepared by the NTSB specialist that will be available to the parties as part of the public docket on the accident.

**Flight Recorders**

Flight Data Recorders (FDR or DFDR) and Cockpit Voice Recorders (CVR) are required on board certain aircraft by Federal regulations. They are required to be preserved for exclusive NTSB use to determine the facts, conditions and circumstances relating to an accident or reportable incident. This responsibility is one of the major contributions of the Office of Research and Engineering to aviation accident investigation. Some important issues that often arise are discussed next. (See attachments I and II).

Handling of Recorders.--Some of the most frequently asked questions immediately after a crash are: how should the recorder be recovered, and how should the recording medium be protected? Normally, Safety Board staff will be directly involved in recovering the recorders on accidents in the United States. You should only handle the recorders under the direction of the IIC. However, in emergency situations, you may have to act on your own to preserve perishable data. Here are some instructions that we would like for you to follow:

There should be no attempt to remove or play a tape in the field.

If the case is broken, do not remove the tape or solid state memory, but pack the entire unit in polyethylene or paper. If you have questions, please call the lab.

If the tape is separated from the recorder, try not to wrinkle the tape. Carefully wrap the tape on a spool or cardboard tube. Never stuff the tape into a box. Enclose all fragments, no matter how small.

If found in the water, do not allow the medium to dry. If the medium is accessible, rinse in fresh water. Otherwise, rinse the recorder in fresh

water and immerse the tape or recorder in fresh water. Make sure that the tape or recorder stays immersed in water until it arrives at the laboratory. The tape must not be allowed to dry out. Ship by the fastest means available.

Cockpit Voice Recorder Analysis.--The recording from a CVR is treated differently from other factual information developed during the course of an investigation. Because of the sensitive nature of the oral communications within the cockpit, and the considerable media attention given to the contents of the CVR tape from a major accident when released to the public, Congress has bestowed special status on CVR information. The law specifically prohibits public disclosure of the tape recording of oral communications. However, it does not prohibit the NTSB from making public use of other sounds, such as clicks, snaps, aural warnings from aircraft systems, engine sounds and such, from the CVR recording at any time. The Safety Board is not required to release a verbatim transcript; instead, the transcript includes only those portions the Board deems "relevant and pertinent" The Safety Board generally does not release to the public a transcript of the entire tape, and may characterize portions of the conversations without providing the full text. The transcript is released at the public hearing, but if no hearing is held, it is released at the time when a majority of the other factual reports are made public.

It should also be noted that analysis of CVR data extends far beyond the transcription of cockpit conversations. The Engineering Services Laboratory is well equipped to perform sound spectral analyses that support a comprehensive evaluation of all of the data obtained from the CVR.

An important consequence of the special treatment accorded CVR data by Congress is the need to assure a high degree of security for the CVR tape and its transcript. Therefore, access to the recording and transcript are strictly controlled to prevent unauthorized disclosure.

Early in the on-scene phase of a major investigation, the IIC will usually establish a CVR group, chaired by an NTSB CVR specialist, in Washington. Generally the CVR group will be composed of one representative each from FAA, the operator, the pilot organization union, and the aircraft manufacturer. The recorder is sealed at the accident site and transported, unopened, to Washington, where the CVR group chairman will prepare the original tape for the reproduction of necessary copies.

The initial audition of the tape and the preparation of working copies may be attended only by the Directors of the Office of Research and Engineering and Aviation Safety (or their designees). All subsequent work will be done using a copy tape, unless special circumstances, such as a need to enhance the quality of an area of interest with a poor signal-to-noise ratio, is demonstrated. Upon hearing the tape, the Director, Office of Aviation Safety (or designee) will telephone the on-scene command post to relay any critical CVR information to the IIC. The CVR Group is then convened and briefed on procedures, precautions, and security. No notes or personal recorders are permitted, only one copy of the transcript is prepared. The CVR group may conduct a sound spectrum or other non-verbal study; that work will be done in the audio lab under the same security procedures used to prepare a transcript. Working notes and draft papers will be destroyed when the final transcript has been completed. The CVR will be released to the owner at the time the transcript is released to the public.

Flight Data Recorders.--The Vehicle Performance Division is responsible for reading out flight data recorders, as well as train event recorders and marine course recorders. I would like to briefly outline our procedures for recovering data from a recorder and how that information is distributed:

On a major accident, the process to recover data starts as soon as the recorders arrive.

As soon as data is being retrieved, the IIC, Chief of Major Accident Investigations, and office directors are informed of pertinent data. That information is provided to group chairmen or parties if the IIC, Chief, or office directors determine that such a need exists.

Within several days, a group will be formed in virtually all major accidents and less often in field accident investigations. Group members will normally posses knowledge of the method of data recording and the relationship of the recorded variables to the airplane systems. The coordinators will provide the names of their representative to the IIC, who will in turn notify the FDR Group Chairman.

The group will work until the group chairman is satisfied that all pertinent data has been recovered. During the process of recovering data, the group will determine that the data appear reasonable and provide timely delivery of that information to the IIC.

As soon as the preliminary data are ready, the IIC and group members will be provided a copy.

Dissemination of the preliminary data to the parties not on the FDR group will be coordinated with the IIC and will be based on their ability to assist the NTSB.

Tape copies may be provided. Data sets and print files in computer memory may be transmitted electronically, again upon approval of the IIC.

Typical problems include inadequate documentation of the FDR parameters. We currently have a large library of DFDR directories, which allows us to decode the FDR tape. However, we have found that each airplane may be configured differently, as related to the FDRS. It is the responsibility of the operators to maintain current documentation and to provide that immediately if an accident occurs. We have attempted to solicit such documentation ahead of time and have found that many operators do not maintain adequate records. When that happens, the readout of the FDR is delayed.

**Airplane Performance Analysis**

An additional responsibility of the Vehicle Performance Division is the conduct of airplane performance and radar studies, creation of computerized video accident reconstructions, and support of GPS surveys in major accident investigations. The initial task of the airplane performance group is to define the motion of the airplane. The group intends to use all available data including:

Cockpit Voice Recordings
Flight Data Recordings
Recorded Radar Data
Recorded Air Traffic Conversations
Photographs
Video Recordings
Witness Statements
Ground Scars
Airplane Damage
Airplane Configuration
Weights And Balance

Airplane Aerodynamic Data
Airplane Performance Data
Engine Data
Weather Data, Llwas

Using these data the engineers reconstruct the motion of the airplane. We evaluate the factors that could have produced the defined motion, such as weather disturbances, engine anomalies, flight control deflections, and pilot actions.

The performance group does not convene until the FDR, CVR, and radar data are in a usable form, and until sufficient information is available from the field. The group is normally formed in Washington, but may meet at the manufacturer's facility.

A staff performance engineer generally launches with the go-team to the accident scene on most major accidents, especially where airplane performance may be of concern. For example, a failure to take off and climb is one such type of accident. These types of accidents have resulted from ice contaminated wings or retracted flaps. Even determining that the performance was normal is important. The performance investigation is just a tool. For example, there are no CVR related accidents, but you use the CVR as a tool.

While on scene, the performance group chairman (the performance engineer) will act as an assistant to the IIC to provide advise on performance related issues, such as trajectory studies or preliminary time/distance calculations. The performance engineer may accompany other groups and assist in gathering performance related material, such as measurements, radar data, or maps. For example, certain ground scars or structural damage may not be important to the structures or systems group, but may be significant to the performance group.

The performance group chairman may leave the scene early to start the formal performance group functions.

Group members representing the parties to the investigation should be performance engineers or the equivalent. However, if a small airline does not have a performance engineer we will allow a person from the airline to participate on the group.

## Computerized Video Reconstructions

Computerized video reconstructions of accident sequences are not produced to provide pretty pictures. There are two prime reasons to produce a computerized video reconstruction:

1. We can present large amounts of data in a format that more people can comprehend.

2. Video animations also depict the time element, something that is not as readily apparent in other data.

Simple reconstructions are relatively easy to produce. Once the DFDR data is available, some of that data can be displayed on the video. That type of display may be useful to operationally oriented investigators. However, once we start adding ground tracks or airport scenes, the work load increases dramatically.

## Global Positioning System Studies

The Board has purchased numerous GPS receiving units which may be used in the field. In addition, the lab has a more sophisticated GPS unit that may be used for sub-meter measurements.

## ATTACHMENT I

## EXCERPTS FROM INVESTIGATORS MANUAL DFDR

### FLIGHT RECORDERS

This section discusses the methods for handling Cockpit Voice Recorders (CVR)s and Flight Data Recorders (FDR)s and related matters. This section is prepared for the information of and to assist NTSB employees. This section is not regulatory in nature, is not a statement of policy, and this information is not all-inclusive. This section should not be used as a definitive interpretation of any law or rule, and it can be changed at any time.

The Flight Recorder Section is divided into ten parts:

1. General - Background and requirements
2. Field Procedures - Handling both types of recorders
3. Obtaining Readouts - Both types of recorders
4. Flight Data Recorders - Lab procedures
5. Cockpit Voice Recorders - Lab procedures
6. Readouts for Foreign Investigations - Procedures
7. FAA and Military Requests - Procedures
8. Accredited Representatives - Considerations
9. Other Recordings - Maintenance and digital avionics

### 1. General

Flight Data Recorders and Cockpit Voice Recorders are required on board certain aircraft by regulations set forth in Parts 121, 125, 135 and 91 of Title 14 of the Code of Federal Regulations (CFR) for the purposes of accident investigation and prevention. They are required under 49 CFR 830 to be preserved by the operator for exclusive NTSB use to determine the facts, conditions and circumstances relating to an accident or reportable incident. Flight recorders found optionally installed on aircraft not requiring them are also required to be preserved for NTSB use.

(a) Background and Regulations

Flight Data Recorders are required on all 14 CFR 121 and 125 air carrier aircraft in the United States. As of October 11, 1991, many 14 CFR 135 and 91 aircraft are also required to be equipped with FDRs. The FDR requirements differ depending on the number and type of engines, number of passengers and date of manufacture.

(i) All 14 CFR 121 and 125 aircraft are required to be equipped with an FDR that records 25 hours of information in a digital format.

* Recorders on aircraft certificated prior to September 1969 and manufactured before October 11, 1991, must record 5 parameters until May 1994 when the recorders on such aircraft will be required to record 11 parameters.

* Recorders on aircraft certificated after September 1969 and manufactured before October 11, 1991, must record 17 parameters.

* Recorders on aircraft manufactured on or after October 11, 1991, must record 28 parameters.

(ii) All existing 14 CFR 135 multi-engine, turbine-powered aircraft that are capable of carrying 20 or more passengers must, as of October 11, 1991, be retrofitted with FDRs that record:

* 11 parameters if type certificated before October 1, 1969

* 17 parameters if type certificated on or after October 1, 1969

* 28 parameters if manufactured on or after October 11, 1991.

(iii) All 14 CFR 135 multi-engine, turbine-powered aircraft that are capable of carrying 10 to 19 passengers and are manufactured on or after October 11, 1991, must be equipped with FDRs that record 17 parameters for a duration of 8 hours.

(iv) All 14 CFR 91 multi-engine, turbine-powered aircraft that are capable of carrying 10 or more passengers and are manufactured on or after October 11, 1991, must be equipped with FDRs that record 17 parameters for a duration of 8 hours.

Cockpit Voice Recorders are required on all 14 CFR 121 and 125 air carrier aircraft in the United States. As of October 11, 1991, many 14 CFR 135 and 91 aircraft are also required to be equipped with CVRs. The CVR requirements are different for different aircraft and are as follows:

(v) All 14 CFR 121 and 125 aircraft are required to be equipped with a CVR that records 30 minutes of audio information on 4 channels.

(vi) All 14 CFR 135 multi-engine, turbine-powered aircraft capable of carrying 20 or more passengers and requiring two pilots are required as of October 11, 1991, to be retrofitted with CVRs that record a minimum of 30 minutes of audio information on 4 channels.

(vii) All 14 CFR 135 and 91 multi-engine, turbine-powered aircraft capable of carrying 6 or more passengers and requiring two pilots are required, as of October 11, 1991, to be retrofitted with CVRs that record a minimum of 15 minutes of audio information on 4 channels.

(b) Public Disclosure of the CVR Transcript

The recording from a CVR is treated differently from other factual information developed during the course of an investigation. Because of the sensitive nature of the oral communications within the cockpit, and the considerable media attention given to the contents of the CVR tape from a major accident when released to the public, Congress has bestowed special status on CVR information. As amended in 1990, section 306(c) of the Independent Safety Board Act (49 U.S.C. section 1905(c)) prohibits the Board from ever releasing any parts of the CVR tape of oral communications. In addition, this legislation governs the content and timing of the release of the CVR transcript. The Board is not required to release a verbatim transcript; instead, the transcript includes only those portions the Board deems "relevant and pertinent." The Board generally does not release to the public a transcript of the entire tape (about 30 minutes), and the Board may characterize portions of the conversations without providing the full text of conversations. With respect to when the transcript is to be made public, the transcript is released at the public hearing, but if no hearing is held, it is released at the time when a majority of the other factual reports are made public.

49 U.S.C. Section 1905(c) provides in pertinent part:

"(c) Public Disclosure of Cockpit Voice Recorder Recordings and Transcriptions. -

(i) General Rule. - Notwithstanding any other provision of law, the Board shall withhold from public disclosure cockpit voice recorder recordings and transcriptions, in whole or in part, of oral communication by and between flight crew members and ground stations, that are associated with accidents or incidents investigated by the Board.

(ii) Exception.- Portions of a transcription of oral communications described in paragraph (1) which the Board determines relevant and pertinent to the accident or incident investigation shall be made available to the public by the Board -

(a) if the Board conducts a public hearing with respect to such accident or incident, at the time of such hearing; and

(b) if the Board does not conduct such a public hearing, at the time when a majority of other factual reports regarding the accident or incident are placed in the public docket.

(iii) References to Cockpit Voice Recorder Information in Safety Recommendations. - Nothing in this section shall restrict the Board at any time from referring to cockpit voice recorder information in making safety recommendations."

An important consequence of the special treatment accorded CVR data by Congress is the need to assure a high degree of security for the CVR tape and its transcript. Therefore, party access to the recording and transcript and NTSB staff access to the recording and transcript are strictly controlled to prevent unauthorized disclosure.

The law specifically prohibits public disclosure of the tape recording of oral communications. However, it does not prohibit the NTSB from making public use of other sounds, such as clicks, snaps, aural warnings from aircraft systems, engine sounds and such, from the CVR recording at any time.

The Engineering Services Division of the Office of Research and Engineering is responsible for recovering data from these recorders to support NTSB investigations. It is very important to secure these recorders as soon as possible after an accident or incident and deliver them intact to the Engineering Services Division's laboratory at Washington headquarters so that the laboratory may obtain the best possible recovery of the relevant data in a controlled atmosphere using an experienced staff.

## 2. Field Procedures

(a) Exterior Appearance

Flight data recorders and cockpit voice recorders are most commonly painted bright orange or red although a few are painted bright yellow. Reflective tape should have been applied and the words "FLIGHT RECORDER-DO NOT OPEN" may appear on the outside surface in one or more languages. Both voice and data recorders are required to be mounted in airplanes as far aft as practical, but there is no similar requirement for helicopters. The FDR is a standard one-half ATR rack long unit (5"x8"x21") and the CVR is a one-half ATR short unit(5"x8"x13"). Obviously, if the accident involves high impact forces, or fire, or both, the recorders may be deformed, or discolored, or both.

(b) Handling of Digital Flight Data Recorders and Cockpit Voice Recorders

The FDR and the CVR must be handled in accordance with the following instructions.

CAUTION: UNDER NO CONDITIONS SHOULD ANY ATTEMPT BE MADE TO REMOVE OR TO PLAY A TAPE FROM AN FDR OR CVR IN THE FIELD. THE TAPE COULD BE ERASED OR DAMAGED.

(i) Protect the recorder from strong magnetic fields. Remember that an X-ray transmitter at an airport security station may damage the data. If a recorder, tape or solid state memory unit is mailed, please mark the package "SENSITIVE FLIGHT RECORDING WITH CRITICAL DATA. DO NOT EXPOSE TO X-RAY RADIATION OR MAGNETIC FIELDS."

(ii) NEVER, NEVER open the recorder. Do not allow anyone to remove the tapes or solid state memory unit under any circumstances.

(iii) If the recorder is dry and undamaged, use a shipping container obtained from the operator involved in the accident

or incident, if possible. Otherwise package it carefully for shipment, unless it is to be hand-carried; it is not necessary to package an undamaged recorder for hand-carriage.

(iv) If the case is broken, DO NOT remove the tape or solid state memory unit from the device. Wrap the entire recorder and its contents in polyethylene or similar material or heavy paper before packaging for shipment. If you have any questions about what to look for, e.g., how many internal subassemblies exist, etc., please contact the Engineering Services Division.

(v) If the tape reels or solid state memory boards are separated from the unit, wrap them in polyethylene or paper before applying sealing tape. NEVER apply sealing tape directly to the recording medium. DO NOT remove the recording medium from the reels or enclosure.

(vi) If the recording is a tape and it is found separated from the recorder, try not to wrinkle or crease it. Carefully wrap it on a spool or cardboard tube or something similar. Wrap this in polyethylene or paper and pack it carefully. NEVER stuff the tape randomly into a box or container. Data are easily degraded; creases and wrinkles can cause electronic noise and permanent data loss.

(vii) If the recording is a tape and is found broken and separated from the recorder, follow instructions as in (vi) above and enclose all fragments of tape, no matter how small.

(viii) If the recorder is from a major accident, get it to the Engineering Services Division lab by the fastest, most secure means possible. If the team travels to the scene via the FAA airplane, and the airplane is returning to Washington immediately, arrange to ship the recorder on it. Otherwise, the recorder must be hand-carried back to headquarters by an NTSB employee or a person designated and approved by senior NTSB management. Circumstances may require the recorder be transported back to Washington on a non-stop

commercial flight in the custody of the flight crew. If transported this way, it is imperative that the transfer be coordinated by the IIC and the lab, and that the recorder be picked up at the destination by NTSB personnel. If the recorder is from a non-major accident or incident in which its quick return is not essential, it may be shipped (properly packaged) by registered mail overnight express, commercial shipping service or hand-carried.

(ix) If the recorder is found in water, DO NOT attempt to dry it. Observe the following instructions.

Rinse it in fresh water, preferably distilled, then arrange to ship the recorder IMMERSED IN WATER to the lab in a watertight container. Make sure the recorder stays immersed in water until it arrives at the laboratory. Pack it very securely. If the recording medium is a tape, it MUST NOT BE ALLOWED TO DRY OUT UNDER ANY CIRCUMSTANCES.

Note: Ship by fastest means available.

(c) Underwater Recovery Techniques

Flight data recorders and cockpit voice recorders from aircraft operating under Parts 121 and 125 must have an approved device to assist in locating them under water (underwater locator beacon or ULB's). These devices are ultrasonic beacons that operate at 37.5 khz. They are cylindrical in shape (1-3/8"x4") and are usually mounted on the face of the recorder. However, some foil recorders have them mounted internally.

ULB Receiver kits are available from the manufacturer (Dukane Corporation, 2900 Dukane Drive, St. Charles, Illinois, 60174, (312) 584-2300), and can either be purchased or rented. In addition, several U.S. Navy and Coast Guard facilities have Dukane kits available. Call the lab if your diving team needs help in locating one.

Further, the ULB is supposed to operate for 30 days. However, searchers should be keenly aware that operation for a full 30 days is not assured.

There are several circumstances that may adversely affect operating life. (See Laboratory Services Investigative Note LS-IN-82-1, April 20, 1982, for details).

Because locator beacon battery operating time is limited, and because flight recorders containing vital accident data deteriorate in a water environment, they should be given a very high priority in the recovery operation.

### 3. Obtaining Readouts

All requests for CVR and FDR readouts must be made to the Chiefs of the Computer Services Division and the Vehicle Performance Division. The Chiefs, or the acting Chiefs, are almost always available by phone or by beeper. The following information will be needed:

* Type and condition of recorders

* Circumstances of the accident or incident

* Arrangements for method of shipping

For flight data recorders, the following information is required to facilitate the data readout:

* Local altimeter setting at time of occurrence

* Elevation at accident/incident site

* Accident runway (if applicable)

* Location of previous takeoff, runway used, and field elevation

* Local altimeter setting at time of takeoff

* Flight number

* Coordinated universal time of departure

* Coordinated universal time of accident

* A flight itinerary, if the recorder is not pulled immediately after the event.

When accepting custody of a recorder from airline personnel or others at an accident site, complete an NTSB Form 6120.15, Receipt of Wreckage, enclosing one copy in the shipping container. This should provide to the Board information on how to return the recorder to the owner as well as provide documentation on the Board's receipt of the recorders from the owner. A copy of the 6120.19A should also be enclosed, if one is available.

Address all shipments to :

National Transportation Safety Board
Office of Research and Engineering, RE-20
L'Enfant Plaza
Washington, DC 20594

## 4. Flight Data Recorders

(a) General Information

The required parameters recorded by the FDRs for each aircraft type are detailed in the applicable FARs but many operators record additional information. Because of the large variation in recording parameters among aircraft operators, the FDR laboratory of the Engineering Services Division maintains a computer system to catalog the decoding software.

There are two distinct types of FDRs in existence. By far, the vast majority of these is composed of the magnetic tape recorder, referred to at times as the Digital Flight Data Recorder (DFDR). The other, an extremely new technology recorder, is the Solid State Digital Flight Data Recorder (SSDFDR). The two are functionally equivalent and are visually similar. The SSDFDR has the advantage of having no moving parts and should, therefore, prove more reliable in extended use.

Regardless of the type of recording medium, magnetic tape or solid state memory, the FDR is required to record a minimum of 25 (or 8) hours of data. Most accident investigations will be satisfactorily served with 25 (or 8) hours of recorded data available. However, in some investigations of incidents, the NTSB must take timely possession of the FDR, or pertinent flight information may be lost.

Likewise, if FDRs from aircraft not involved in the accident or incident need to be examined, and if the appropriate FDRs are not withdrawn from service within 25 (or 8) hours, pertinent data will be lost. For those cases, expeditious notice to the airlines to remove and hold those recorders is necessary to prevent the required data from being overwritten.

(b) Foreign Operators in the United States

While all FDRs in use in the United States are required to record data in a digital format, there are obsolete types of oscillographic (foil) FDRs in use by some foreign operators flying into and out of this country under 14 CFR 129. Most of these are, externally, identical to current FDRs. However, one model, the Lockheed model 109C, looks like a big bright yellow or international orange metal ball. If older foil type FDRs are encountered during an investigation, please call the Engineering Services Division for special instructions.

(c) The Flight Recorder Readout

The Engineering Services Division laboratory is prepared to give accident investigation FDR readouts the highest priority. That includes investigative support around the clock, 7 days a week, if necessary. Laboratory staff will begin to prepare for the readout of an FDR before its actual arrival at NTSB headquarters. Upon notification of an FDR readout request, lab staff will begin collecting the necessary documentation to decode the FDR. As soon as that information is collected, the IIC will be provided with the parameter list. This could occur almost immediately if the lab has the documentation on hand; provision of the list to the IIC could take a day or two if the lab does not have the documentation on hand. Because the notification of an FDR readout request generally precedes the arrival of the FDR in the lab by a like amount of time, the day or two delay is generally not a problem.

Upon receipt of the FDR in the laboratory, it will be inspected, disassembled if necessary, and its condition documented. The specialist assigned will then perform a preliminary readout. Any significant information developed, such as discovering a malfunctioning FDR yielding no data, or information, such as a flaps up indication on a takeoff accident, will be immediately transmitted to the IIC. Work on the readout will progress whether or not an FDR group is expected to convene.

(d) FDR Group

Not every investigation will require an FDR group to be convened. Obviously, a major go-team type accident will usually involve an FDR group; however, field investigations may also result in the formation of a group. With the growing complexity of aircraft systems being reflected in the increased complexity of the FDR recorded data, formation of a FDR groups for non-major investigations is occurring more often. The Engineering Services Division staff specialist assigned will recommend to the IIC on the advisability of forming an FDR group. The group, if convened, will be comprised of those parties who can provide specific technical assistance (generally one representative for each such party). The type of expertise required generally is a knowledge of the method of data recording and the relationships of the recorded variables to the aircraft systems.

The group will work until the group chairman is satisfied that a preliminary readout of the pertinent parameters is obtained. During the process of recovering data from the recorder, the data will be examined in sufficient detail to determine if the parameters appear reasonable and to provide for timely delivery of relevant information to the IIC. Dissemination of preliminary data to party representatives not actively participating in the group effort will be coordinated with the IIC and will be based on their ability to assist the NTSB in understanding the accident and for prevention purposes. If a party is requested by the NTSB to examine the FDR data, and that party has the capability to directly read the FDR tape, the FDR group chairman may make a copy of that tape for the party to use. However, the group chairman will not release any copies of the original FDR tape recording to any parties until the group has finalized the preliminary readout and is preparing to disband. In the event the FDR has a Solid State memory instead of a tape, no copy can be made.

As soon as the group has prepared a preliminary readout, the IIC and the group members will be provided with a copy.

Copies of the original FDR tape, disk or tape copies of the reduced data, may then be made available to parties with a need and with permission from the IIC.

The FDR group will be not be dismissed until the IIC is consulted and authorizes the FDR group chairman to do so.

(e) The FDR Factual Report

The FDR Factual report is a document that details the factual aspects of the recovery of the FDR data, and presents the FDR data in the form of a tabular listing, or plots or both. The FDR Factual Report will not interpret the data. While the assigned specialist may provide interpretation in the internal, confidential Analysis Report, the optimal use of the FDR data and the most effective presentation of the derived information as it relates to other areas of the investigation is in the form of related studies.

(f) FDR Related Studies

An aircraft flight path reconstruction is necessarily the product of detailed interpretation of the FDR data. Likewise, the determination of how an aircraft's system performed often relies heavily on an interpretation of FDR data. If an IIC needs the FDR data interpreted, or placed into context with other factual data, that need should be discussed with the Chief, Engineering Services Division. The FDR specialist will not include such interpretations within the FDR Factual report, although that specialist (or another specialist) may be assigned to prepare the related study.

5. Cockpit Voice Recorders

(a) Procedures to Initiate a CVR Readout - Major Investigations

Early in the on-scene phase of a major investigation, the IIC will usually establish a CVR group. The group will be chaired by an NTSB CVR specialist in Washington.

The IIC, in coordination with the CVR specialist, will decide which parties the Board needs for direct CVR group participation. In addition to the group chairman, generally the CVR group will be composed of one representative each from FAA, the operator, the pilot organization union, and the aircraft manufacturer. The need for additional members with other qualifications will be determined by the group chairman in coordination with the IIC. The IIC should ensure that only one representative be appointed for each party invited to participate on the CVR group, unless special circumstances, such as our need for assistance in multiple disciplines from one party, dictate otherwise.

It is desirable that these representatives meet as many of the following criteria as possible:

* Qualified and current in the type of aircraft involved in the accident

* Personally know the flight crew members' voices

* Has detailed knowledge of the accident flight's planned operation

* Has detailed knowledge of the aircraft's systems and procedures

The IIC will inform appropriate party coordinators of the place and time the group is to be convened and will advise the CVR group chairman of the names and affiliations of the designated members. The IIC must inform all persons assigned to the CVR group that they will be required to remain with the group until its activity has been completed. No one will be admitted to the group activity unless the IIC has forwarded the names directly to the CVR group chairman.

The IIC will inform the appropriate party coordinators of the extremely sensitive nature of the CVR data, the special CVR readout procedures, and security program to be followed by the CVR group.

(b) Procedures to Initiate a CVR Readout - Non-Major Investigations

In non-major investigations, the CVR readout may be conducted less formally; however, it can be conducted exactly as done in a major investigation if needed. If the IIC and the CVR specialist jointly determine that CVR investigative needs can be served without, for example, a full transcript and corresponding group activity, then an abridged procedure will be followed. The IIC will discuss with the specialist those areas of recorded information that he or she wishes to be transcribed or processed. The specialist may prepare a short transcript of selected areas, or the CVR information retrieved may be solely non-verbal, such as sound spectrum data. If any party desires to come to Washington for the readout or study, the party must request participation from the IIC and not the CVR specialist. The specialist will advise the IIC on the need or desirability for that participation.

(c) Initial CVR Information Processing

Upon receipt of the recorder in Washington, the CVR group chairman will prepare the original tape for the reproduction of necessary copies. Because damage to the recorder may be extensive, cutting tools or other special equipment may be needed to retrieve the recording medium and the assistance of several laboratory employees may be necessary. This phase of the CVR processing is not considered to be part of the group activity.

The initial audition of the tape and the preparation of working copies may be attended only by the Directors of the Office of Research and Engineering and Aviation Safety (or their designees). The CVR group chairman shall be in complete charge during the initial audition and preparation of the working copies of the CVR tape. The CVR group chairman shall be free to perform whatever actions are necessary to prevent degradation of information on the original recording. All subsequent work will be done using a copy tape, unless special circumstances, such as a need to enhance the quality of an area of interest with a poor signal-to-noise ratio, is demonstrated.

(d) CVR Data to the IIC

Upon hearing the tape, the Director, Office of Aviation Safety (or designee) will telephone the on-scene command post to relay any critical CVR

information to the IIC. The tape will not be played over the telephone. Under no circumstances should a portable (cellular or satellite) telephone be used to discuss this information.

(e) CVR Group

Upon arrival of the CVR group members at NTSB headquarters, the CVR Group Chairman will meet with them to discuss the sensitivity of the CVR, purpose of the group activity, party system, security procedures, NTSB investigation procedures and objectives, and duties of group members. No notes are to be kept and no personal audio recorders will be permitted. If the purpose of the CVR group is to prepare a transcript, the group chairman will stress that only one copy of the transcript will be prepared. The group will then be told to follow NTSB security procedures and to not discuss the group's work with the press or with anyone except their respective coordinators. Copies of 49 CFR 831, "National Transportation Safety Board Aircraft Accident/Incident Investigation Procedures," will be distributed; group members will be told to note especially Paragraphs 831.11(b) and 831.13(b).

"Participants in the field investigation shall be responsive to the direction of the appropriate Board representative and may be relieved from participation if they do not comply with their assigned duties or if they conduct themselves in a manner prejudicial to the investigation."

"All information concerning the accident or incident obtained by any personnel participating in the field investigation shall be passed to the investigator-in-charge, through appropriate channels. Upon approval of the investigator-in-charge, parties to the investigation may relay to their respective organization information which is necessary for purposes of accident prevention or remedial action. Under no circumstances shall accident information be released to, or discussed with an unauthorized person whose knowledge thereof might adversely affect the investigation."

Each CVR Group member will be required to sign a "Statement of Representative of Party to NTSB Investigation" and a "CVR Nondisclosure Agreement."

(f) CVR Information Processing (Transcript)

If the purpose of the CVR group is to prepare a transcript, as soon as a suitable tape is available, the group will prepare the transcript and determine event timing while working in the laboratory's audio room. The group will work until the preliminary transcript is complete.

For major accidents, a complete, unabridged transcript will be prepared. For non-major accidents in which a transcript is to be prepared, the scope of CVR data to be transcribed will be determined by the CVR Group Chairman and the IIC.

The transcription will be punctuated. The punctuation will be performed on all oral communications, including the radio transmissions received by the aircrew. Where there is ambiguity in inflection, for any particular word or phrase, resulting in failure of the group to determine the correct punctuation, special notation will be used to reflect that. Every statement, or abbreviated statement segment, must end with punctuation. Absence of punctuation will not be used to imply the existence of any type of punctuation by default.

Upon completion of the transcript, the CVR group chairman will brief each group member on the sensitive nature of the material and emphasize the absolute confidentiality of the material, collect and destroy any notes that were made. The CVR group chairman will retain the master copy of the transcript in a locked receptacle in the audio laboratory. Group members will not be permitted to take a copy with them.

The CVR group will be not be dismissed until the IIC is consulted and authorizes the CVR group chairman to do so.

(g) CVR Information Processing (No Transcript)

If the CVR group is to conduct a sound spectrum or other non-verbal study, the work will be done in the audio lab under the same security procedures used to prepare a transcript.

The Engineering Services Division has the capability to perform sound spectrum and other acoustical studies. Therefore, all such work should be

expected to be performed in the audio lab. If however, the CVR specialist learns of a technique available only at another facility, the group may reconvene at that facility. Because of the extreme sensitivity of the CVR tape, only techniques that provide for data enhancement unattainable in the NTSB CVR lab will provide grounds for reconvening at an outside facility. The Directors of the Offices of Aviation Safety and Research and Engineering must approve any activity that requires work on the CVR recording at any outside facility.

The CVR group will be not be dismissed until the IIC is consulted and authorizes the CVR group chairman to do so.

(h) Surviving Crewmembers

Surviving flight crewmembers will not participate as CVR group members. Surviving flight crewmembers will be allowed to listen to the CVR tape and review the draft CVR transcript. This opportunity will be made at least once, but the flight crew may be granted additional auditions from the IIC upon request. The flight crew may be accompanied by one person of his or her choice, provided that person is part of the CVR group. After reviewing the draft transcript, the flight crewmembers may submit comments concerning the transcript. If the flight crews' comments are deemed by the CVR group chairman to be of a potentially substantive nature, the CVR group chairman, in consultation with the IIC, may require the group be reconvened to review them. The transcript may be revised to reflect any altered interpretation of the CVR tape based on these comments, but any altered interpretations must be based entirely on that which can be heard by the group. Following a revision, the IIC may advise the flight crew and allow a follow-up audition.

(i) Disposition of the CVR Group Chairman's Factual Report (With Transcript)

The CVR group chairman will destroy the original preliminary transcript, all copies, and all corrected pages of the typed document when the content of the transcript is finalized. Meanwhile, they must be kept in a locked drawer or cabinet in the CVR lab.

The completed CVR group Chairman's factual report (the transcript will be an attachment to the factual report) is to have a cover sheet that notes in all

capital letters at the top and bottom of the sheet; "PRELIMINARY -- DUPLICATION OF THIS DOCUMENT IS PROHIBITED." It shall also contain a statement of the CVR caveat: "Warning: The reader of this report is cautioned that the transcription of a CVR tape is not a precise science but is the best product possible from an NTSB group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The attached CVR transcript should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information."

The completed group chairman's factual report will, at this time, be reviewed by the Directors of the Office of Research and Engineering and Office of Aviation Safety. The Directors will take into consideration the recommendations of the IIC, the CVR Group Chairman, the Chief of the Major Investigations Division or Field Operations and General Aviation Division, in determining what portions, if any, of the transcript are deemed non-pertinent and to be deleted; deletions will be labeled accordingly.

Restrictions on report duplication and report access will be removed when the report is officially released to the public through the Director, Office of Aviation Safety. The note --"Preliminary -- Duplication of this Document is PROHIBITED--" on the transcript pages will be removed before the public release, but the CVR caveat on the cover sheet will remain as part of the CVR report. The manner of the public release of the transcript is dependent on the Safety Board's decision to hold a public hearing.

If the Safety Board convenes a public hearing, the CVR group members will be permitted, upon request, to return to Washington to review the transcript in final form. This review will be scheduled to take place approximately one week prior to the pre-hearing conference.

A copy of the transcript will be made available to each of the party coordinators at the opening of the public hearing, or one hour before, at the discretion of the Chairman of the Board of Inquiry. The transcript will be made available to the public at the time of the hearing.

If no hearing is convened, the transcript will be made available when a majority of the other factual reports regarding the accident or incident are placed in the public docket. The CVR group members will be permitted, upon request, to

return to Washington to review the transcript in final form. This review will be scheduled to take place approximately one week prior to the opening of the public docket. Copies of the final transcript will be made available to the party coordinators one calendar day prior to the opening of the public docket.

(j) Disposition of CVRs and Original Tapes

Public release of the CVR transcript generally marks the completion of the Safety Board effort concerning the CVR tape. However, there may be circumstances requiring additional investigation that cannot be completed before the public release date. There also may be unresolved controversies about the accident that require the Safety Board to maintain continued control of the original recording. Therefore, after the public release of the transcript, the Board may elect to provide a high quality copy of the CVR tape to the owner rather than the original tape. After the Safety Board has adopted its final report, the original tape will be returned to the owner if it has not already been returned. Return of the original tape following the public release of the transcript will be determined jointly by the Directors of the Office of Aviation Safety and the Office of Research and Engineering. If the Board decides to keep the original, the owner, and the other parties, will be advised of the reasons for such determinations.

(k) Request to Hear the CVR Tape or Review the Preliminary Transcript

Requests from NTSB specialists and group chairmen, and Federal Aviation Administration officials who have a need to hear the tape or review the transcript should be made directly to the IIC. If the IIC concurs with the need for such a request, the request will be forwarded to the Directors of the Offices of Aviation Safety and Research and Engineering for their approval. The Directors will decide who will hear the tape or review the transcript and provide a written list of names of approved reviewers to the Chief, Engineering Services Division who will then arrange for the tape or transcript to be reviewed in the lab. Board Members and the Investigator-in-charge may audition the CVR tape at any time, review the preliminary transcript, and otherwise have unrestricted access to the CVR laboratory.

A group chairman other than the CVR group chairman may determine the need for his or her group to audition the tape. Auditions by an entire group may be approved by the Director of the Office of Research and Engineering but such

requests will not be considered for approval until after public release of the CVR transcript.

The CVR group chairman will keep a log of all reviewers of CVR tapes and preliminary transcripts. This log will note the date of the review, the name of the reviewer and whether the review included an audition of the tape, a review of the transcript, or both. For those accidents involving more than one CVR, separate entries in the log will be required for each CVR tape and transcript review.

### 6. Readouts for Foreign Investigations

The Engineering Services Division may be called upon to provide readout services for foreign investigations. The NTSB may provide for readout services as the State of Operator, State of Registry, or State of Manufacture for ICAO signatories upon coordination through appropriate channels. Coordination of these readouts will be affected by the U.S. Accredited Representative of the NTSB in consultation with the Chief of the Engineering Services Division.

The NTSB may also provide recorder readout services to foreign governments under situations not covered by ICAO agreement, if it is in the best interests of the Safety Board to do so. Arrangements for such services will be coordinated by the Office of Aviation Safety in consultation with the State Department Aviation Liaison and the Office of Research and Engineering. The services may be provided directly by NTSB technical staff, resources permitting, or the NTSB may effect the requested services through an outside party. If accomplished through an outside party, any service charges applicable will be submitted to the requesting country.

Whether the NTSB is actively participating in a major foreign investigation or assisting in a readout, the IIC (or his representative) from the responsible country is to remain in control of the recorder and readout activity. Lab specialists, coordinating with our U.S. Accredited Representative, will work at the IIC's (or his representative's) direction. The recorders, recordings and all data recovered are to be given to the IIC (or his representative) and not retained by the lab.

## 7. FAA and Military Requests

(a) FAA Requests

The NTSB and the DOT have formally agreed on certain procedures for FDR readouts for the FAA by the NTSB. This agreement is contained in the 1976 Reimbursable Memorandum of Agreement as amended in 1986. The substance of the entire agreement is contained in NTSB Board Order NTSB 1700.2 but the three aspects of importance here are:

(i) The NTSB will provide the FAA copies of every FDR readout produced.

(ii) The NTSB will provide readouts of FDRs produced by the FAA for safety related purposes only. The NTSB will not provide readouts for FAA certificate actions or litigation.

(iii) The FAA must provide a qualified person to witness the readout because NTSB personnel cannot be called on to be expert witnesses.

(b) Military Requests

The NTSB frequently is called upon to assist the U.S. military in their investigations. Sometimes this assistance consists of CVR and FDR readouts. The NTSB has no agreement, formal or informal with any branch of the military, but staff will cooperate with DOD personnel and provide assistance on an ad hoc, resources permitting basis. Coordination of such requests and work performed will be conducted by the Office of Aviation Safety in consultation with the Office of Research and Engineering.

## 8. Accredited Representatives

Accredited representatives and designated advisors from other countries sometimes participate in our CVR and FDR readouts. In the spirit of ICAO Annex 13, they are to permitted access to all factual information derived in the investigation. Further, any requests by the NTSB for technical assistance from foreign manufacturers or operators in recovering data from flight data recorders or

cockpit voice recorders, or in interpreting such recovered data, must be made through these representatives. However, all transfer of data to foreign governments must be consistent with the transfer of data within the NTSB party system and must be approved by the Directors of the Offices of Aviation Safety and Research and Engineering.

## 9. Other Recordings

Many aircraft in service today have recordings other than CVRs and FDRs. These recordings are not required by regulation, nor are they crashworthy. Nonetheless, valuable information may be recovered from them if they are not damaged. They generally fall into two categories; maintenance recorders and non-volatile memories from digital avionics systems, engine fuel controls, and other components.

Maintenance recorders are used by the operators to track the health of the aircraft and its various systems. They sometimes record information far in excess of what is required on the FDR. These recorders may be referred to as quick access recorders (QAR)s, airborne information data systems (AIDS) recorders or airborne information management system (AIMS) recorders. The NTSB has no capability of reading these recorders, but the operators will provide an expeditious readout using their maintenance facilities under our direction or supervision.

Non-volatile memory units from digital avionics systems may also provide valuable information if they are not damaged. Non-volatile memory may exist for autopilot systems, flight management systems, electronic engine controllers, navigation systems and so on. The NTSB can't extract data from these either, but the manufacturers probably can.

There is little specific guidance we can provide on what to look for on any particular aircraft, but, the Engineering Services Division will provide advice and assistance to the extent it can. As a general rule, you should ask the appropriate party if there is a quick access or maintenance recorder on board. Determining the existence of non-volatile memory is more difficult, because you will have to ask the supplier of that specific subsystem about it, and usually a representative is not on scene.

## ATTACHMENT II

## EXCERPTS FROM INVESTIGATORS MANUAL AIRPLANE PERFORMANCE

## INVESTIGATION OUTLINE - AIRCRAFT PERFORMANCE

**I. The Performance Group will be responsible for:**

(a) Determining and developing factual aircraft performance information related to:

(1) Flightpath and trajectory

(2) Touchdown/rotation points

(3) Runway braking/acceleration

(4) Flight characteristics in normal and abnormal regimes

(b) Correlation of various factual data:

(1) CVR/DFDR correlation to a common time reference

(2) ATC radar data and voice communications

(3) Site evidence such as scar marks, impact damage, etc.

(4) Video recordings

(c) Visibility Studies

(d) Trajectory Studies

**II. Group Participation**

(a) Parties shall be invited by the IIC with representation based on investigative need as determined by the Performance Group chairman.

Every effort should be made to limit group participation to those representatives who are absolutely essential to the development of factual performance information.

(b) The Performance Group chairman should visit the scene, if necessary, to insure that factual crash data be documented adequately for the needs of the performance group. Group members may be identified and accompany the Performance Group chairman on scene, although normally the group will not be convened to perform on-scene duties. Generally, the group should not be delayed even though the Performance Group requires data that may not be developed for several weeks, such as final CVR transcripts and FDR data.

(c) The purpose of group participation is to elicit the necessary assistance to get the job done. As the factual report is developed, parties are urged to comment; however, the decision as to the content of the report will remain with the Group chairman.

## III. Simulations and Flight Tests

In the event that the Performance Group determines that simulations or flight tests are required to develop the necessary factual information, this need will be transmitted to the IIC who shall coordinate the request for such activity. The actual tests or simulations shall be supervised by the Performance Group chairman.

## IV. Visibility Studies

Determination of the need for visibility studies should be made early in the investigation. There is much work required to prepare for a visibility study, such as acquisition and processing of ATC radar data, processing of flight recorder data, and acquisition and computer digitization of the appropriate cockpit binocular photographs. The lead time to perform all these tasks is considerable.

## V. Determination of Need for a Performance Study

(a) A Performance Group shall be convened for any major aviation accident.

(b) A Performance Group should be convened for accidents involving transport and commuter category aircraft in the following situations:

(1) Runway overruns

(2) Landing undershoots

(3) Windshear events

(4) Any accident or incident where a nonperformance-related causal factor is not immediately identified or any event for which a performance factor might be involved

**ROBERT BENZON**
**SENIOR AIR SAFETY INVESTIGATOR**
**MAJOR INVESTIGATIONS DIVISION**
**NATIONAL TRANSPORTATION SAFETY BOARD**

# PUBLIC HEARINGS AND ACCIDENT REPORT PREPARATION

Following the approximate 1 to 2 week on-scene phase of the investigation, the investigators involved in the case begin a rather lengthy period of further fact gathering, often involving a public hearing, and final analysis of the facts that have been gathered. This process results in a publicly available printed report that barring reconsideration at a later date, is the US. government's final product concerning the investigation. As most of you realize, the report includes a list of findings concerning the accident, recommendations to prevent a repetition of the accident, and a probable cause statement for the accident.

Shortly after our team returns from the accident site to Washington, DC., a tentative schedule of about 14 follow-on events will be established by the Investigator in Charge. For planning purposes only, this schedule will encompass a six calendar month block of time. Please understand that this is not a six month limit on our activity. We will investigate until enough facts have been uncovered to support logical conclusions and recommendations to improve the safety of commercial aviation. Recently, Major Investigation Division cases have spanned as little as four months to well over a year. Most of the steps in our report preparation process are of importance to parties to an NTSB investigation, and parties should be familiar with all our processes to fully understand NTSB investigation methodology.

## Work Planning Meeting

The actual report writing process begins with a work planning meeting. This is an internal meeting of the Safety Board Group Chairmen and senior staff, chaired by the IIC. During the work planning meeting the staff decides what remains to be done concerning component teardowns, follow-on interviews with witnesses or survivors, and the like. The report writing schedule is discussed during this meeting. Lastly, the need for interim and/or urgent safety recommendations is discussed.

**Factual Report Due Date**

The factual report due date, decided upon during the work planning meeting, is the date the IIC can expect the Group Chairmen to have their final factual reports completed, so he and the report writer, if one is assigned, can begin consolidating the reports into the factual portion of the Board's final report. The non-NTSB investigative group members, from the various parties to the investigation, will have been provided an opportunity to review and comment on the draft factual reports directly with the Group Chairmen prior to this date.

**Factual Reports Mailed to Parties**

The next step in the process is the mass mailing of factual reports to the parties to the investigation. The IIC will approve and mail copies of all the finalized factual reports directly to the party coordinators, with some exceptions. If a public hearing is to be held, you will not receive the CVR transcript or other reports that use direct quotes from the CVR recording. We consider the cockpit voice recorder to be a useful but very intrusive investigation tool, and by law, CVR material can only be released on the day of the public hearing. Other procedures will apply, concerning CVR-related reports, if no public hearing is held.

Also, on occasion, some complex reports cannot be completed by the time this initial mass mailing occurs. In these cases, you will receive these additional reports later, but always in time to use them for the public hearing. The reports you receive prior to the hearing are sometimes referred to as hearing exhibits and will be the final, IIC-approved versions. All preliminary or draft versions in your company's possession should be discarded or very clearly marked as drafts, to avoid future confusion. These factual reports and amendments that may be produced later, along with the transcript from the public hearing should be the only basis for your party submissions to the Safety Board.

**Prehearing Conference**

If it is decided that the investigation warrants a public hearing, parties to the hearing will attend a prehearing conference held either at the site of the public hearing or in Washington, DC. This will occur about one or two weeks prior to the first day of the public hearing. At this meeting, ground rules for conduct and questioning during the hearing will be outlined. Also, the areas of questioning and the witnesses to be questioned will be discussed. This will be the last formal

opportunity for parties to request that certain areas be explored, certain witnesses be questioned, and new exhibits be included in the record, during the hearing.

**Public Hearing**

Most catastrophic airline accidents involving a large loss of life, important aviation safety issues, great public interest and the like, usually call for a Safety Board public hearing. An NTSB Public Hearing is another step in the Safety Board's fact gathering process. It is usually held in a city near where the accident occurred and is a proceeding where witnesses are questioned under oath by the IIC and the NTSB Group Chairmen (called the Technical Panel), and a Board of Inquiry. Each of the party spokesmen is also afforded an opportunity to question the witnesses after their initial questioning by the Safety Board technical staff. These witnesses could be FAA policy makers, surviving crewmembers or passengers, air traffic controllers, fire and rescue personnel, manufacturer's design engineers, and the like. The hearing is under the overall direction of the Presiding Officer (an NTSB Board Member). Administrative matters for the hearing are controlled by the NTSB Hearing Officer who is sometimes, but not always, also the Investigator in Charge of the investigation.

On the morning of the first day of the public hearing all the factual reports generated to that date, including the CVR transcript and reports using direct quotes from the CVR recording, are entered into the public docket for this accident. The public docket is the formal collection of documents relating to the investigation, and is open to public review. The CVR information is also released to the party spokesmen at that time. Generally, no witnesses related to CVR information are questioned on this first day, so that the parties will have time to fold CVR information into their lines of questioning of the witnesses. Sometimes, witnesses dealing with issues not pertinent to CVR information (rescue personnel, for example) are heard on the first day.

Also during this session, the Presiding Officer reads an opening statement concerning hearing protocol and the Investigator in Charge reads a statement concerning facts gathered to date into the public record.

Since this will be the first opportunity for the media to have access to written factual information concerning the accident, parties should be prepared for press inquiries. The CVR transcript often becomes the focus of their interest and crew comments in that transcript are often taken out of context. As always, the NTSB is

prepared to field any or all press questions, but the hard and fast rule on media contact that the Board enforced on-scene no longer applies. In other words, since the factual reports have been released, if a party feels a need to talk to reporters, the NTSB would not object to the disclosure of accurate information of a factual nature about the accident. The Safety Board does not hold formal press conferences during or after a public hearing.

The remaining days of the hearing are used to question witnesses. Depending upon the complexity of their testimony, five to seven witnesses are questioned each day. Testimony and statements during the hearing are transcribed by a court reporter and transcripts can be obtained from the court reporter about one month after the hearing.

My short time with you this morning is inadequate to fully explain an NTSB public hearing. Rest assured that parties to the public hearing will receive further information from the hearing officer once the decision to hold a hearing is made. As always, the Investigator in Charge is also available to answer questions.

**Report Outline Issued**

Following the public hearing, the IIC and the report writer, if they are not the same person, will create a detailed report outline for the entire consolidated final report soon after the public hearing. It is for our internal use, to ensure that no issues are left out.

**Report Planning Meeting**

The next step in our process is the report planning meeting. This is an internal meeting to discuss and modify the aforementioned report outline, if required.

**Analytical Report Due Date**

The next milestone is the analytical report due date. This is the date that the Group Chairmen have agreed to furnish the IIC with their analysis of the facts they have gathered in their areas of expertise. The parties may have input to the analytical reports via their continued contact with the NTSB Group Chairmen and the IIC. The parties may also have input to the Safety Board's overall analytical process through the "party submissions." I will explain party submissions shortly.

The analytical reports themselves however, are for Safety Board use and will not be released to the parties or the public. As with the factual reports, the IIC and the report writer will consolidate the analytical reports in the final version of the report of the investigation.

**Party Submissions**

Any party to the investigation is encouraged to submit to the Safety Board written recommendations as to the proper findings and conclusions to be drawn from the evidence produced during the course of the investigation. The Safety Board believes that after the completion of the investigative activities relating to the accident and before determination of probable cause is made, it is the responsibility of each party to the investigation to make known to the Safety Board its interpretation of the findings and conclusions to be drawn from the evidence. If a party chooses to furnish the Safety Board with a submission, that party must also concurrently provide copies of the submission to the other parties to the investigation. The party submissions become part of the public docket of the investigation.

Submissions will be due to the IIC within 30 days after the public hearing transcript become available, or on a date selected by the IIC if no hearing is held. These party submissions are extremely important because they are the only way the parties can officially inform the IIC, report writer, the senior NTSB staff, and the Board Members of their beliefs and opinions concerning the accident issues. Party submissions are the formal tool used by parties to enter into the Board's analytical process.

There is no set format for party submissions. Some parties simply write a letter expressing their views. Others follow the NTSB report format. The choice is up to the party, and the choice to submit something is voluntary.

**Technical Review Meeting**

The parties to the investigation may be invited to an optional technical review meeting in Washington, DC. NTSB personnel who attend this meeting are the Investigator in Charge, the Group Chairmen, and mid level NTSB supervisors. Only party coordinators and party specialists assigned to investigative groups may attend. Each factual report written by the Group Chairmen will be offered up for final technical review. The goal here is to make sure that each factual report is accurate

and complete. Grammatical editing, the tone or style of the reports, and the like, are not the focus of this meeting.

For accident investigations of lesser scope, the parties may be invited to review the first draft of the factual section of the final investigation report through the mail. In this case, this review will serve as the technical review by parties to the investigation.

**Initial Draft Distributed**

Following the technical review, the IIC will distribute an internal initial draft of the entire report to the group chairmen and mid-level NTSB supervisors for their review and comments. The entire document is not made available to the parties, however the factual portion of the report may be made available, as I just mentioned.

**Director's Draft Distribution**

After comments and corrections from the group chairmen (and appropriate party analysis through their submissions to the Safety Board) have been added to the initial draft, it becomes the Director's draft. This internal draft is then given to the Directors of our Office of Aviation Safety, Office of Safety Recommendations, Office of Research and Engineering, General Counsel, and the NTSB Managing Director, for their comments and corrections.

**Director's Review Meeting**

Once they have finished their review of the Director's draft, the NTSB office Directors will schedule an internal meeting to discuss report content, organization, and the like. It is a closed meeting for the NTSB senior staff.

**Notation Draft Distribution**

The director's draft with the office director's changes becomes the notation draft. The notation draft is the final version of the report that is presented to the five Presidential appointees that are the Safety Board. They then review the draft for several weeks in preparation for the Board Meeting. It is interesting to note here that according to established policy, the Safety Board will not accept any written

inputs from parties to the investigation after the Board Members receive the notation draft of the final report.

**Board Meeting**

Following review of the report by the Board Members, a public Board Meeting will be held in Washington DC. This is sometimes referred to as the "Sunshine Meeting." The NTSB staff (the IIC, the group chairmen and others) will present and comment on the report before the Board. Party representatives are welcome to observe this meeting. However, all dialogue is between the NTSB staff and the Board Members.

At this meeting the Board may require further investigation or rewriting before approving the report; they may adopt the report in its entirety; or they may adopt it with changes that are discussed during the meeting. After considering the accident report, the Members will discuss and vote on the findings, recommendations, and the probable cause of the accident. Media representatives will be present at this meeting and usually conduct interviews after the meeting.

As soon as possible after the meeting, usually within an hour, the Board's Office of Public Affairs releases the last few pages of the report that was just adopted, with changes made during the meeting. These pages contain the Board's conclusions, probable cause and safety recommendations. Parties can be expected to be questioned on this material by the press that day.

Once changes decided upon during the Board Meeting are included in the report, a camera-ready copy is sent to the printer. Bound copies become available about three weeks after that. The publishing of the final report is normally the final step in the NTSB investigative process.

**Request for Reconsideration of Probable Cause**

Although the publishing of a final report is the final step in the investigative process, NTSB investigations are never formally closed. Parties to our investigations can petition the Board to reconsider and modify the findings and probable cause of an accident for two reasons:

- The party believes the Board's finding are erroneous, and the Board made a mistake in its analysis during its original assessment of probable cause.

- The party discovers new evidence that would require modification of the original findings and probable cause.

Parties can petition the Board to reconsider the findings and probable cause at any time after the Board Meeting. Lastly, by law, petitions for reconsideration from parties that do not offer up submissions to the Safety Board during the investigation will not be entertained.

This concludes my brief description of the report preparation and public hearing process. Material for this presentation was taken from our recently updated Guidance for Party Coordinators pamphlet that I believe is part of the opening proceedings for this symposium. As a personal aside, I have assisted in the investigation of airplane accidents in eight foreign countries so far, and by a wide margin, I believe our report preparation process, is the most open and accessible to party participants. Our procedures have stood the test of time, but we always encourage your input to improve them.

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1. Work Planning Meeting
2. Factual Report Due Date
3. Factual Reports Mailed To Parties
4. Prehearing Conference
5. Public Hearing
6. Report Outline/Report Planning Meeting
7. Analytical Reports Due Date
8. Party Submission Due Date
9. Technical Review Meeting
10. Initial Draft Distribution
11. Director's Draft Distribution
12. Director's Review Meeting
13. Notation Draft Distribution
14. Board Meeting

**BARRY STRAUCH**
**CHIEF, HUMAN PERFORMANCE DIVISION**

# HUMAN PERFORMANCE INVESTIGATIONS

## INTRODUCTION

The National Transportation Safety Board announced the creation of the human performance division at the most recent symposium on aircraft accident investigation that was held in Springfield, Virginia, in 1983. Participants at that symposium were told of the proposed new division that was to be located within the then-Bureau of Technology. In his address to the symposium, Jim Danaher explained that the purpose of the division would be to determine what errors personnel committed that led to an accident, and what were the human performance-related reasons that led to those errors.

Shortly thereafter, the human performance division was created and placed under the supervision of a former aviation investigator-in-charge. Division investigators were expected to contribute their human performance expertise to all transportation modes, as appropriate. Since then, the division has been modified, and modified a second time. Ten years later it is again under the supervision of a former aviation investigator in charge, but investigators now only participate in aviation accident investigations. In the near 11 years since the last symposium, the division's role has become more defined and its methodology established. The purpose of this presentation is to examine the work of the division and how it carries out its mission for the Safety Board. I would also like to examine some of the challenges it has faced, and recognize some of the division's accomplishments in the 11 years since its formation.

### Human Performance Methodology

Human performance investigators focus on the person or persons believed to contribute to the cause of an accident. This typically involves pilots, but may also involve air traffic controllers and maintenance personnel, according to the issues of the accident. Our work requires us to obtain information about the person or persons and the particular job or task being performed at the time of the accident to explain the human factors anomalies that were suspected of having been factors in the accident.

Investigators will attempt to collect information that could explain the nature of the operator tasks and/or decisions that may have been factors in the accident. The information may describe the person, the particular equipment being operated, or salient aspects of the "environment" at the time of the accident. Information sought about the person will enable the investigator to describe his or her ability to perform the particular tasks required at the time of the accident. The information could include: the activities performed before the accident, physical fitness, health condition, and attitude and mood, as appropriate. Information about the machine could include characteristics of the control station, controls, displays, and level of automation and types of automated tasks performed. Information about the environment could include external demands on the attention of the operator, such as air traffic control communications, environmental conditions, managerial influences, and labor-management issues, as appropriate. Investigators will also attempt to learn about those portions of the operator-machine relationship considered relevant.

The methodology of the human performance investigator is relatively simple. Investigators ask straightforward questions and obtain pertinent records and documentation. Information is obtained primarily from two sources, documentation such as company, FAA, and physicians' records, and information supplied by people, such as family members, friends, colleagues, and current and former employers. With these data, they attempt to learn about the performance of the operator, controller or maintenance technician at the time of the accident.

Of course, when possible, the most critical information will come from the individuals themselves involved in the accident, i.e., pilots, controllers, or mechanics. Investigators will attempt to find out from them what they did or what decisions they made at the time of the accident. In addition, human performance investigators will ask the operators to give them as much information about other factors that may be relevant to the accident. These include company procedures, training and supervision, and other pertinent information. Investigators are sensitive to the conditions, both physical and psychological, of individuals who have just been involved in major accidents and recognize that even in the absence of physical injuries, pilots, controllers, and maintenance technicians are often deeply affected by the results of an accident. Investigators are trained to be professional in conducting such interviews by respecting the dignity of the interviewee, and recognizing and responding to his or her concerns.

We may also obtain the person's driver and arrest record. This could reveal a history of chemical-related driving offenses or potential patterns of reckless operation of motor vehicles. In addition, we may ask the person to submit specimens for toxicological analyses. These requests are made routinely and do not imply that alcohol or drug use is suspected.

Investigators will obtain this information to learn about the state of the person at the time of the accident. If the person is preoccupied and this preoccupation may have affected the performance, information about the person's mood and activities before the accident could be helpful. In addition, investigators will attempt to assess workload level by examining such factors as the nature of the task being performed or decision being made, the presence of other competing tasks or requirements that may have demanded the attention of the operator, company expectations regarding the task or decision, the ease of performing the task or making the decision, the training provided to the operator to perform the task or make the decision, and the elements of the machine that may have affected the ability of the operator to perform the task or make the decision.

Investigators are aware that much of the information that is sought will be very sensitive, and that sometimes individuals may have difficulty providing critical information. Sometimes the information that investigators acquire may portray people or parties negatively. The very nature of an aircraft accident suggests that someone made a mistake. Investigators attempt to be as objective as possible in their activities yet be aware of the sensitivities of people and parties with regards to certain information.

**Human Performance Applications**

Several examples illustrate human performance methods in obtaining information, and the application of the information to reduce the chances of similar errors occurring. In December 1983, a DC-10 crashed in Anchorage, Alaska, after attempting to take off from the wrong runway, at a point considerably beyond the runway threshold, during restricted visibility conditions. Seven years later, two transport aircraft collided in Detroit, Michigan, when a DC-9 mistakenly entered the active runway during restricted visibility conditions. In both accidents, human performance investigators examined the information available to the crews about their positions on the runway and recognized that applying human factors principles to airport surface signs could enhance the ability of the crews to determine their positions on the airport when visibility is limited. Because of many of these human

performance efforts, the FAA has since required United States airport operators to apply a common set of standards for runway and taxiway signs, standards that meet basic human factors principles to help prevent pilots from inadvertently entering an active runway. By substantially differentiating the "appearance" of the signs, pilots can more easily perceive their different visual characteristics, and more important, more readily recognize that differently shaped and colored signs signify very different intersections on the airport surface.

Human performance investigators have also repeatedly identified crew resource management (CRM) issues in both air transport and regional operations when deficiencies were found in the skills that pilots were found to have performed together. Poor crew communication and coordination have hindered the performance of otherwise highly skilled pilots, and led directly to a number of aircraft accidents. Largely because of the efforts of human performance investigators and the human factors community, all major airlines and most regional airlines currently provide their pilots with training in CRM. Those overseeing these programs are, for the most part, highly qualified in CRM and respected by the pilots they interact with. Since the last symposium, airline efforts in the area of crew coordination no longer involve deciding whether or not to implement a CRM program, but how to refine and improve the ongoing programs. These programs are aimed at improving the ability of flightcrews to work together to deal with realistic problems that may be encountered on the flight line.

The Safety Board has also investigated several accidents in which pilots attempted to reject the takeoff of aircraft that had encountered anomalies during the high speed regime of a takeoff roll. Human performance investigators discovered that airlines were, for the most part, providing their pilots with little information regarding airplane performance at or near $V_1$. As a result, pilots were making decisions on whether to reject a takeoff without recognizing the potential effect of critical airplane performance-related parameters on their ability to stop the airplane on the remaining runway. Partly as a result of this work, airlines have begun to recognize the importance of providing pilots with information to help them make better takeoff-related decisions and ultimately, reduce the incidence of unnecessary high speed rejected takeoffs. The FAA's rejected takeoff training aid, developed by the Boeing Company, has been a significant culmination of the efforts of human performance investigators and many others in the aviation community.

Perhaps most important, other countries have applied human performance expertise to the investigation of aircraft accidents under their jurisdictions. Most

civil aviation officials around the world, as in the United States, have recognized the importance of the role of human factors in accident investigation. These countries include India and Nepal, to name a few, countries whose governments recently devoted considerable efforts to assess human performance issues found in major accidents that occurred in their territories. The human performance community is most encouraged by this development and we in the Safety Board's human performance division look forward to cooperating with our overseas counterparts to enhance the quality of the human performance contribution to accident investigations.

**Challenges**

At the same time, the Safety Board's human performance division must respond to several challenges. Perhaps the most fundamental challenge has been a result of the unrealistic expectations that many have regarding potential accomplishments of human performance investigations, a challenge that does not appear to be faced by other disciplines. For example, materials scientists in the Safety Board's Materials Laboratory can often point to a particular pattern of striations on a critical component and opine, with confidence, that "metal fatigue" was present. By contrast, even with considerable evidence documenting the precise amount of time a pilot had slept before an accident, a human performance investigator cannot cite the presence of "operator fatigue" without substantial additional evidence about that pilot's activities in the days preceding the accident. These include the regularity, duration, quality, and schedule of sleep, the circadian rhythms established, the physical condition of the operator, as well as the operator's eating habits. Further, because fatigue can interact with specific cognitive tasks, affect reaction time, and influence decision making, an investigator would still be required to examine the nature of the error and then relate it to possible fatigue before operator fatigue can be cited as a factor in the accident with reasonable confidence.

In addition, human performance investigators in aviation cannot rely on an extensive record of productive research that may be available to engineers, metallurgists, and meteorologists, to name a few. Although recent decades have produced substantial contributions to the scientific literature, human performance specialists frequently encounter topics in which little research is available to support their activities. To illustrate, despite the fact that faulty decision making by pilots has repeatedly been found to be contributory or causal to many major accidents, research into pilot decision making is a very recent phenomenon.

Attempting to determine why a pilot or crew made a faulty decision or series of such decisions is demanding under the best of circumstances. But in the absence of substantial research in the area of pilot decision making, drawing conclusions about the antecedents of the errors and drafting recommendations to address the future occurrence of those antecedents is difficult at best.

Human performance is also hampered by the lack of commonly accepted definitions of factors that are often believed to be central to assessing human performance. Terms such as workload and ability or ability, for example, have no commonly accepted definitions. Yet, these terms are often believed to influence the performance of individuals involved in accidents. Measuring them and relating their influence to levels of human performance is prerequisite to understanding their roles in aviation accidents.

Human performance has also been challenged by the absence of commonly accepted standards of expertise for its specialists. By comparison, one cannot claim expertise in aircraft performance without substantial training in aeronautical engineering. Yet, individuals routinely attempt to act as human performance investigators without formal education or experience in the field. The fact remains that expertise in another field, whether gained in medical school or from attending symposia, regardless of the benefit these endeavors provide, do not bestow the expertise needed to perform credible human performance investigations. Consequently, when parties nominate individuals to serve on the human performance group without the necessary expertise, little benefit can be expected from their participation in the investigations.

**Future Developments**

Despite the many challenges that the field has encountered over the years, the future of human performance and its role in enhancing aviation safety is a promising one. Human performance experts will likely influence the issues such as the level of automation, air traffic control procedures and maintenance training and procedures. It is quite possible, for example, that pilot duty time limitations in the near future will be examined with input from human performance specialists. Regulations that were developed in an era of low technology aircraft, when disruption to pilot circadian rhythms was uncommon, may no longer be relevant given the current state of knowledge about fatigue and pilot performance.

Human performance specialists will also likely increasingly address the performance of aircraft maintenance technicians. As operator error has been a focus of human performance inquiry over the last decade, so maintenance error will be examined, to determine how human performance issues affect the quality of maintenance technicians' efforts as well. For example, the repetitiveness with which maintenance technicians perform their tasks, under difficult conditions, must be reduced to enhance their ability to perform their duties.

As more researchers address critical issues in the field, and more members of the aviation community understand the importance of human performance to the safety of the airspace system, more answers to the fundamental questions of the role of human performance in accident causation will be answered. The next decade promises to be an exciting time in the aviation field in general, and in the aviation human performance field in particular. All in the aviation community can expect to see the role of human performance grow, and with it, a better understanding of human error, and it is hoped, a reduced frequency of human error-influenced accidents.

**BARRY M. SWEEDLER**
**DIRECTOR, OFFICE OF SAFETY RECOMMENDATIONS**
**NATIONAL TRANSPORTATION SAFETY BOARD**

# SAFETY RECOMMENDATIONS PROGRAM

## ABSTRACT

The National Transportation Safety Board (NTSB) considers the recommendations it makes to prevent accidents and improve the safety of the United States transportation system to be its most important product.

In its 25-year history the NTSB has made more than 9,300 safety recommendations covering needed improvements in all the modes of transportation to more than 1,250 recipients. These recommendations are made to anyone the NTSB believes can make the change that is necessary to improve safety. Recommendations have been directed to Federal, State and local government agencies, private transportation companies, labor unions, trade associations and others.

Overall, more than 80 percent of the NTSB's safety recommendations have been accepted by the recipients and the changes called for have been implemented. This has had a very significant positive impact on the safety of the U.S. transportation system. The NTSB is very proud of this record. The changes that have taken place as a result of the NTSB's recommendations have saved thousands of lives and prevented many accidents.

How has the NTSB achieved such a good record? The basic foundation and most important reason for this achievement is the NTSB's independence. This independence lends the NTSB creditability. Recipients of the NTSB's recommendations are more willing to carefully and seriously consider taking the action recommended. The second essential reason for the NTSB's creditability is the highly competent, technical qualifications of its investigators and the thoroughness of its investigations and studies. The NTSB also is very careful and prudent in making its recommendations. Each proposed recommendation is carefully evaluated to make sure it is practical, feasible and capable of being implemented. The credibility of the NTSB has grown over the years, and along with that has come an increase in the acceptance rate of the recommendations.

This paper will describe the NTSB's safety recommendation program, how it achieves improved safety, its important elements, such as the Most Wanted Safety Recommendation program and the Safety Recommendation Information System.

## INTRODUCTION

Over the years the NTSB has directed recommendations to more than 1,250 different addressees. The number one recipient of its more than 9,300 recommendations, as would be expected, is the U.S. Department of Transportation (DOT) and its modal administrations, such as the Federal Aviation Administration (FAA), the Federal Railroad Administration, the Federal Highway Administration or the Coast Guard. Because of the differences in the operation, regulatory scenario and historical development in each mode of transportation, recommendations are directed to different segments of the industry in each mode.

In the U.S. each transportation industry operates in a different regulatory climate. For example, the aviation industry is heavily regulated by the FAA, while in the highway mode, much more control for safety lies with the 50 States. Because of these differences, the NTSB sends its recommendations to different agencies and levels of government in each mode. In aviation, most of the NTSB recommendations are directed to the FAA, while to improve highway and traffic safety most recommendations are directed to State governments and to the individual manufacturers of vehicle. In the marine, railroad, hazardous materials and pipeline industries, a mixture of various agencies and companies receive NTSB recommendations.

The highest percent of the NTSB's recommendations have addressed aviation safety. Table 1 provides a breakdown of the number and percentage of recommendations covering each mode of transportation.

### Source of Recommendations

The recommendations made by the NTSB come from three main sources. Recommendations are proposed by NTSB field investigators who investigate more than 2,000 civil aviation accidents each year. These accidents primarily involve small general aviation aircraft. The proposed recommendations that come from these investigations are generally focused on a mechanical problem with a particular aircraft or a safety problem applicable only to one airport or location. However, in some instances, these recommendations do have national implications.

## TABLE 1

## SAFETY RECOMMENDATIONS ISSUED BY MODE (SINCE 1967)

| Mode | Issued | Percent |
|---|---|---|
| Aviation | 3242 | 34.6 |
| Highway | 1,531 | 16.3 |
| Intermodal | 183 | 2.0 |
| Marine | 1,836 | 19.6 |
| Pipeline | 1,003 | 10.7 |
| Railroad | 1,578 | 16.8 |
| Totals | 9,373 | 100.0 |

The most visible, and generally wide sweeping, are those recommendations that result from the investigation of major accident. For example, the investigation of aircraft collisions at Atlanta, Georgia, Detroit, Michigan and Los Angeles, California resulted in broad reaching recommendations to prevent runway incursions. Recommendations do not have to wait for the completion of an investigation. They can, and often are, issued at any time during the investigation when it becomes clear to investigators that a safety problem needs immediate attention.

A third source of safety recommendations are the safety studies conducted in all modes by the NTSB. The recommendations that result from studies generally have national implications and in some instances demand greater respect, primarily because they are based on many accidents that occurred over a long period of time. For example, the 1989 study on the safety of passenger vessels operating from U.S. ports contained 41 recommendations addressed to the U.S. Coast Guard and 6 other agencies or associations. The recommendations were based on data and information the NTSB had developed through its investigation of many passenger vessel accidents over its 25 year history.

In addition, the NTSB can and does issue recommendations whenever and wherever it becomes aware of a safety problem in the transportation system.

## Effectiveness of NTSB Recommendations

Overall, 82 percent of the 9,300 NTSB safety recommendations have been accepted by the recipients and the changes called for have been, or are being, implemented. The implementation of these recommendations have prevented many accidents and saved thousands of lives. For example, after a series of crashes of large air carrier aircraft into terrain in the 1970's, the NTSB called for the installation of ground proximity warnings systems (GPWS) on all large air carrier aircraft. The implementation of GPWS has virtually eliminated this type of accident in the U.S.

Another example was the recommendation the NTSB sent to each State calling for the raising of the legal purchase age of alcoholic beverages to 21 years in all States. This began a National debate that led to the passage of such laws in all States. Studies have shown that more than 12,000 lives have been saved as a result.

The basic foundation and most important reason for the high rate of acceptance of its recommendations is the NTSB's independence. This independence is a major reason for the NTSB's high creditability. Recipients of the NTSB's recommendations are more willing to carefully and seriously consider taking the action recommended. The second essential reason for the NTSB's creditability is the highly competent, technical qualifications of its investigators and the thoroughness of its investigations and studies. The NTSB also is very careful and prudent in making its recommendations. Each proposed recommendation is carefully evaluated to make sure it is practical, feasible and capable of being implemented. The creditability of the NTSB has grown over the years, and along with that has come an increase in the acceptance rate of the recommendations. It should be pointed out that all NTSB recommendations, and the reports that justify them, are made public at the time they are issued. In fact, much of the NTSB's work on an investigation or study is done in public and with the cooperation of the interested parties. Hearings to gather evidence in an investigation, and meetings of the Board to adopt recommendations are open to the public and the media.

## Safety Recommendation Followup Program

There is a another very important ingredient that helps account for the high rate of acceptance of the NTSB's recommendations. That is the comprehensive and formal recommendation followup program conducted by NTSB. The important work conducted by the NTSB investigators does not, by itself, improve safety. Nor

does issuing a recommendation improve safety. It is the implementation of the recommendation that actually brings about the change that leads to improved safety. The NTSB considers its activities designed to achieve implementation of its recommendations to be one its most important functions. To oversee this activity, the NTSB has an Office of Safety Recommendations, one of whose main functions is to work toward the highest rate of acceptance of its recommendations as possible.

Since 1967, the NTSB has issued more than 9,300 safety recommendations to more than 1,250 addressees. These addressees include the U. S. Department of Transportation, other Federal agencies, State governments, private transportation related companies, labor unions, transportation trade organizations and others. Because of its preeminent role in the safety of the transportation system, 58 percent of NTSB's recommendations have been addressed to the U.S. DOT and its modal administrations. The NTSB also uses different approaches and strategies in its aggressive program to obtain implementation of its recommendations. The DOT is the only recipient of NTSB recommendations that is required to respond formally to NTSB. By law, the DOT must, within 90 days, advise the NTSB what action it plans to take concerning each recommendation or explain why it is not planning to accept the recommendation. Even though other recipients, such as State Governors or private airlines or railroads are not required to formally respond, the NTSB has been quite successful in obtaining a response. One of the reasons is the NTSB's willingness to advise the public and the Congress that no reply has been received. No organization involved in public transportation wants to be labeled as unwilling to address safety concerns.

**Status of Recommendations**

When the NTSB receives an answer to its recommendations from a recipient, a through review of the action planned is undertaken and a status is assigned to each recommendation. The recipient is then advised of the status. The various status categories are listed in Table 2.

The level and method of followup activity is based, to a great extent, on the assigned status. Since the assignment of an "unsatisfactory response" can have an unwanted impact on the image of an agency or company, recipients generally attempt to comply with the intent of the recommendation, either by doing exactly what the NTSB recommends or suggesting other actions to solve the safety problem identified by the NTSB.

## Table 2

## Safety Recommendations Status Classifications

**Open--Await Response:**
Safety recommendation issued and no response received from addressee or response does not specifically address the recommendation.

**Open--Response Received:**
A response has been received from addressee but the evaluation has not yet been approved by the Board Members.

**Open--Acceptable Response:**
Response by addressee indicates a planned action which would comply with the safety recommendation when implemented.

**Open--Acceptable Alternate Response:**
Response by addressee indicates an alternative plan or implementation program which would satisfy the objective of the safety recommendation when implemented.

**Open--Exceeds Recommended Action:**
Addressee responds with a proposed action that is both timely and goes beyond the actual recommended action.

**Open--Unacceptable Response:**
The addressee responds by expressing disagreement with the need outlined in the recommendation. There is enough supporting evidence to ask the addressee to reconsider the position taken.

**Closed--Acceptable Action:**
Action on the safety recommendation has been completed by the addressee. The action complies with the safety recommendation.

**Closed--Acceptable Alternate Action:**
Addressee responds with an alternative course of action which is completed and meets the objectives of the safety recommendation.

**Closed--Exceeds Recommended Action:**
Addressee responds with a completed action that is both timely and goes beyond the actual recommended action.

**Closed--Unacceptable Action:**
The addressee responds by expressing disagreement with the need outlined in the safety recommendation. There is no further evidence to offer and it is concluded that further correspondence on or discussion of the matter would not change the addressee's position.

**Closed--Unacceptable Action-No Response Received:**
Addressee fails to provide a response to the safety recommendation even after a reminder has been communicated.

**Closed--No Longer Applicable:**
The recommended actions have been overtaken by events.

**Closed--Reconsidered:**
Addressee rejects the safety recommendations and supports the rejection with a rationale in which the Safety Board concurs; or in situations where the recipient of a recommendation was in compliance before the recommendation was issued.

**Closed--**CURRENT STATUS**/Superseded:**
Applicable to safety recommendations held in any open status. To be applied in instances where a new more appropriate safety recommendation is issued which includes the necessary elements of the existing safety recommendation to be closed. The listing of the current status before the "superseded" will provide historical information for future reference. A new evaluation of the current status should be made prior to any closeout action.

One recently implemented strategy involves a meeting of the NTSB Chairman and the heads of the DOT administrations, trade associations and companies to discuss important recommendations that have not been implemented. These high level meetings have led to followup meetings at the staff level. In some instances, such as with the AMTRAK passenger train company, meetings are scheduled quarterly to discuss progress on implementing the recommendations or to clear up misunderstandings that could occur. There are occasions where the recipient may not fully grasp exactly want the NTSB would like accomplished. These meetings have helped clarify the exact intent of various recommendations and resulted in safety improvements, where in the past no action would have been taken primarily because of a misunderstanding. In the past 4 years, more than 150 meetings have taken place, at which more than 1,200 of the 1,700 open safety recommendations have been discussed.

**Safety Recommendations Information System**

Prior to 1976, these safety recommendations were tracked only through maintenance of hard copy files. By 1977, the Safety Board had issued 2,300 safety recommendations and the manual/hard copy filing procedures were fast becoming obsolete.

The need to track all safety recommendations issued by the NTSB was included in the legislation setting up the independent safety board -- the Board is required by that legislation to provide an annual report to the Congress on its activities, including what action has been taken as a result of its safety recommendations. Further, as more accidents occurred and additional recommendations were issued, it became vital to provide a discussion of what action the Board had previously taken on recurring safety issues. As the number of recommendations grew and the amount of correspondence on each recommendation increased, it became apparent that the information would have to be digitized.

In 1976, work was begun on a computerized Safety Recommendations Information System (SRIS), which was to be designed to include all pertinent data related to transactions and activities surrounding each of the NTSB's recommendations.

The SRIS was designed as an interactive database which would allow searches of the text data bases by either any number of assigned "key words," or by a global search by a character string. The SRIS was also constructed to allow for

the development of trend information regarding the status of the recommendations, i.e., the number of recommendations successfully acted on by individual addressees, by mode, or other groupings. For example, the rate of acceptance of NTSB recommendations by the U.S. DOT modal administrations varies considerably. The total acceptance rate for DOT is 82 percent, varying from 87 percent by the Federal Highway Administration to a low of 74 percent for the Coast Guard. Table 3, generated from the data in the SRIS, shows the acceptance rate for each administration.

The SRIS provides for the digitizing of 31 different informational fields including: date and location of the accident, make and model of the vehicle in the accident, the operator, mode of operation, safety recommendation number, date of issue of safety recommendation, date of addressee response(s), date of NTSB followup action, date of closeout, NTSB assigned status, and NTSB classification. These fields are linked and each recommendation can be accessed through any of the fields. Preformatted reports have been programmed for ease of use; but individualized reports can be constructed by the user.

The SRIS makes it possible for staff of the Office of Safety Recommendations to provide Board members and accident investigators information on previously addressed issues at the time of a "Go-Team" launch to an accident. For example, when the NTSB was notified of the U.S. Air, F-28 crash at La Guardia Airport in a snowstorm on March 22, 1992, the investigator-in-charge was provided with a printout, before he left for the scene of the accident, of all past recommendations, and the accidents they came from, concerning the F-28, La Guardia Airport, and the problem of aircraft icing.

The system also allows staff to provide the Board members, the Congress, the media and the public with statistical information regarding the success of our recommendations. Figure 1 shows different uses made of the statistical data retrieved from the SRIS. Data in the SRIS are publicly available upon request and plays an important role in the NTSB's activities to achieve implementation of its recommendations.

One of the most important uses of the SRIS, is in the development of new safety recommendations. The SRIS provides a detailed, historical record of the actions the NTSB has taken, and the action, or lack of action, on the part of recipients of the past recommendations.

# National Transportation Safety Board

## Status of Safety Recommendations by Mode

February 1994

| MODE | CEX | CAA | CAAA | CUA | CUAS | CR | CS | CNLA | Total Closed | OAA | OAAR | OUR | ORR | OAR | Total Open | Total Issued | Acceptance Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aviation | 0 | 1755 | 365 | 425 | 10 | 105 | 44 | 34 | 2738 | 253 | 22 | 56 | 95 | 78 | 504 | 3242 | 82.99% |
| Highway | 3 | 766 | 117 | 116 | 1 | 53 | 31 | 67 | 1154 | 208 | 6 | 22 | 34 | 107 | 377 | 1531 | 88.78% |
| Intermodal | 1 | 85 | 8 | 16 | 1 | 3 | 0 | 22 | 136 | 22 | 2 | 14 | 2 | 8 | 48 | 184 | 79.19% |
| Marine | 3 | 838 | 150 | 337 | 10 | 83 | 15 | 74 | 1510 | 197 | 22 | 45 | 21 | 42 | 327 | 1837 | 75.53% |
| Pipeline | 0 | 618 | 49 | 103 | 0 | 20 | 14 | 35 | 839 | 99 | 3 | 14 | 22 | 26 | 164 | 1003 | 86.79% |
| Railroad | 2 | 833 | 105 | 254 | 10 | 45 | 16 | 94 | 1359 | 121 | 2 | 25 | 24 | 47 | 219 | 1578 | 78.62% |
| TOTALS | 9 | 4895 | 794 | 1251 | 32 | 309 | 120 | 326 | 7736 | 900 | 57 | 176 | 198 | 308 | 1639 | 9375 | 82.02% |

**Definition of Status Assignments:**

CEX: Closed--Exceeds Recommended Action
CAA: Closed--Acceptable Action
CAAA: Closed--Acceptable Alternate Action
CUA: Closed--Unacceptable Action
CUAS: Closed--Unacceptable Action/Superseded
CR: Closed--Reconsidered
CS: Closed--Superseded
CNLA: Closed--No Longer Applicable

OAA: Open--Acceptable Response
OAAR: Open--Acceptable Alternate Response
OUR: Open--Unacceptable Response
ORR: Open--Response Received
OAR: Open--Await Response

# National Transportation Safety Board

## Status of Safety Recommendations by DOT Administration

February 1994

| MODE | CEX | CAA | CAAA | CUA | CUAS | CR | CS | CNLA | Total Closed | OAA | OAAR | OUR | ORR | OAR | Total Open | Total Issued | Acceptance Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SEC DOT | 0 | 101 | 17 | 11 | 0 | 12 | 5 | 20 | 166 | 21 | 1 | 10 | 7 | 1 | 40 | 206 | 86.96% |
| FAA | 0 | 1623 | 348 | 417 | 10 | 100 | 44 | 28 | 2570 | 203 | 19 | 49 | 63 | 47 | 381 | 2951 | 82.17% |
| FHWA | 0 | 233 | 44 | 34 | 1 | 19 | 15 | 8 | 354 | 42 | 3 | 7 | 0 | 4 | 56 | 410 | 88.46% |
| NHTSA | 0 | 108 | 39 | 29 | 0 | 21 | 7 | 13 | 217 | 24 | 2 | 0 | 1 | 0 | 27 | 244 | 85.64% |
| FRA | 1 | 184 | 39 | 79 | 8 | 23 | 15 | 24 | 373 | 35 | 0 | 10 | 2 | 3 | 50 | 423 | 72.75% |
| RSPA | 1 | 148 | 19 | 55 | 0 | 12 | 14 | 23 | 272 | 51 | 2 | 13 | 4 | 3 | 73 | 345 | 76.47% |
| FTA | 0 | 32 | 7 | 11 | 0 | 1 | 0 | 3 | 54 | 4 | 0 | 0 | 0 | 1 | 5 | 59 | 79.63% |
| USCG | 1 | 415 | 97 | 177 | 10 | 51 | 14 | 29 | 794 | 162 | 21 | 36 | 6 | 6 | 231 | 1025 | 75.73% |
| MARAD | 0 | 11 | 1 | 0 | 0 | 0 | 0 | 5 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 100.00% |
| TOTALS | 3 | 2855 | 611 | 813 | 29 | 239 | 114 | 153 | 4817 | 542 | 48 | 125 | 83 | 65 | 863 | 5680 | 80.76% |

Definition of Status Assignments:

| | | | |
|---|---|---|---|
| CEX: | Closed--Exceeds Recommended Action | OAA: | Open--Acceptable Response |
| CAA: | Closed--Acceptable Action | OAAR: | Open--Acceptable Alternate Response |
| CAAA: | Closed--Acceptable Alternate Action | OUR: | Open--Unacceptable Response |
| CUA: | Closed--Unacceptable Action | ORR: | Open--Response Received |
| CUAS: | Closed--Unacceptable Action/Superseded | OAR: | Open--Await Response |
| CR: | Closed--Reconsidered | | |
| CS: | Closed--Superseded | | |
| CNLA: | Closed--No Longer Applicable | | |

Figure 1

Example of Data Retrieved from SRIS

**National Transportation Safety Board**
**Report Date: 11/05/92**

**Report:** AAR-86-06
**Accident Date:** August 25, 1985
**Accident City:** Auburn
**Accident State:** ME

**Recommendation Number(s)**
A-86-109

**Abstract:**
The Investigation of 3 recent commuter air carrier accidents have prompted the National Transportation Safety Board's concern about several significant safety issues. On August 25, 1985, Bar Harbor Airlines Flight 1808, a Beech Model 99, crashed during an instrument landing system (ILS) approach to Auburn-Lewiston Airport, Auburn, Maine. The airplane struck trees at an elevation of 345 feet mean sea level (MSL) in a wings-level attitude 4,000 feet from the end of the runway threshold and 440 feet to the right of the extended runway centerline; all eight persons aboard were fatally injured. On September 23, 1985, Henson Airlines Flight 1517, a Beech B99, crashed during an ILS approach to Shenandoah Valley Airport, Weyers Cave, Virginia. The airplane struck trees at an elevation of 2,400 feet MSL in a wings-level attitude about 6 miles east of the airport; all 14 persons aboard were fatally injured. On March 13, 1986, Simmons Airlines Flight 1746, an Embraer EMB-110P1, crashed during an ILS approach to Phelps Collins Airport, Alpena, Michigan. The airplane struck trees at an elevation of 724 feet MSL in a wings-level attitude about 1.5 miles from the end of the runway threshold and about 300 feet to the left of the extended runway centerline; three of the nine airplane occupants were fatally injured. All 3 accidents involved scheduled domestic passenger flights operating under 14 CFR Part 135.

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**Recommendation Number:** A-86-109
**Date of Issue:** October 9, 1986
**NTSB Status:** Closed--Acceptable Action
**Closeout Date:** June 10, 1992

**Recommendation Subject:**
The NTSB recommends that the Federal Aviation Administration: Amend 14 CFR 135.153 to require after a specified date the installation and use of Ground Proximity Warning Devices in all multiengine, turbine-powered fixed-wing airplanes, certificated to carry 10 or more passengers.

**Addressee:** FAA

**Date of Response:** 01/08/1987
The FAA initiated a regulatory project for the development of a Notice of Proposed Rulemaking (NPRM) for a ground proximity warning system for 14 CFR 135 operators. The rationale and requirements for the NPRM have been finalized and will be presented to the Regulatory Review Board in early 1987.

*****A synopsis of each exchange of correspondence would follow in chronological order to the final closeout letter to the Addressee.*****

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One of the fields listed for the SRIS is "Classification." This particular piece of information was added to the safety recommendations in the early 1970's. The Board decided then that the relative sense of urgency for each of the individual safety recommendations needed to be conveyed to the recipient and to provide guidance for NTSB followup, and a system of classification was developed. The system arrived at includes 3 levels of urgency:

CLASS I: Urgent Action - To be used where it is determined that completion of action is necessary to avoid imminent loss due to similar accidents that could occur under the same circumstances if a deficiency is not corrected.

CLASS II: Priority Action - To be used where it is determined that a high priority for action should be set to avoid a probable loss due to similar accidents that could occur under the same circumstances if a deficiency is not corrected.

CLASS III: Longer Term Action - To be used where it is determined that an immediate or near future similar accident is not likely if an identified deficiency is not corrected, or where the desired action cannot reasonably be expected to be accomplished within 2 years.

The Board members determine the classification to be applied to each recommendation at the time of adoption.

As would be expected, only 9 percent of the NTSB's recommendations are classified as "Urgent." Eighty six percent are classified "Priority" and 5 percent "Longer Term."

**"Most Wanted" Safety Recommendations Program**

In the Fall of 1990, the NTSB adopted a formal program to highlight certain transportation safety issues that the Board believed required the highest visibility and the strongest followup activity. The program as adopted by the Board was named the "Most Wanted" Safety Recommendations Program.

While the NTSB considers all of its safety recommendations to be important, it does realize that some will have a greater impact toward reducing transportation

accidents than others. A transportation safety issue can be considered for placement on the "Most Wanted" list if the issue will impact/enhance safety on a national transportation system level; the issue has a high level of public visibility/interest, i.e., the completion of the recommended action will build a more positive or secure view of the national transportation system in the eyes of the public; the recommended action can be completed in a reasonable period of time; and there has been consideration of previous loss of life/property, potential for future loss of life/property, public risk exposure, and of internal Board processes.

The original list contained 18 transportation safety issue areas in which the Board had issued safety recommendations that were then considered in an "open" status. These issues constituted what the Board believed to be those transportation safety topics requiring the highest priority actions by government and industry.

The issue areas on the "Most Wanted" list are pursued and highlighted through the following activities: Public awareness activities, i.e., press conferences and releases, media interviews with both Board members and Safety Board staff, articles submitted to industry and trade periodicals by both Board members and staff; testimony at the Federal, State, and local legislative hearings; speeches to trade and industry groups; rulemaking comments; and participation in workshops, seminars, and conferences.

The number of issues on the "Most Wanted" list is variable. However, the Board expressed a desire to keep the number on the low side so as not to dilute the impact of the program. The program was designed specifically to be multi-modal, but that coverage would not be forced to balance evenly by mode.

Procedurally, only the Board acting at an open meeting can place issues on the list or remove them from the list. Staff is to report semiannually on the progress of the various issue areas and make recommendations to the Board concerning the addition or removal of items from the list.

In the three years since its adoption, the program has proven very effective. Two aviation issues have been removed from the list:

Identification of pilots with substance abuse problems -- action by the Federal Aviation Administration (FAA); and

Requirements for Ground Proximity Warning Systems on all commuter class aircraft -- action also by the FAA.

There are currently 16 issues on the "Most Wanted" Safety Recommendations Program list. Aviation issues include: runway incursions, conflict alert in terminal areas, human fatigue, brake wear on transport airplanes and structural fatigue testing of aircraft. These are shown in figure 2.

## CONCLUSION

Investigating accidents or conducting studies of transportation safety problem, in themselves, does not improve safety or prevent accidents from recurring; nor does the issuance of safety recommendations. Investigating accidents and issuing recommendations are just steps along the path change. It is only by the implementation of the recommendation, does real change take place. It is this change that makes the difference. This concept is well recognized by the NTSB. This leads to a very dedicated, active advocacy program by the NTSB. Only by undertaking such a program can the NTSB meet its goals of improving safety.

Figure 2


THE NATIONAL TRANSPORTATION SAFETY BOARD

# MOST WANTED

## Transportation Safety Improvements

***"...a program to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives."***

**Recreational Boating Safety**
-Strengthen Legislation, Enforcement, and Education Programs to Prevent Boating Accidents
*Action Needed* by State Legislatures

**Administrative Revocation of Driver's License**
-Pull Driver's License on the Spot of Anyone Failing or Refusing a Chemical Test for Alcohol
*Action Needed* by State Legislatures

**Airport Runway Incursion**
-Provide Safer Control of Aircraft on the Ground
*Action Needed* by the Federal Aviation Administration (FAA)

**Positive Train Separation**
-Require a Railroad Collision Avoidance System
*Action Needed* by the Federal Railroad Administration (FRA) & the Railroad Industry

**Mode C Intruder Conflict Alert in Terminal Areas**
-Install Collision Avoidance Systems for Airport Terminal Areas
*Action Needed* by the Federal Aviation Administration (FAA)

**Fishing Vessel Safety**
-Require Operators' License and Load Line Information for Commercial Fishing Vessels
*Action Needed* by the United States Coast Guard (USCG)

**Youth Highway Crashes**
-Strengthen age 21, zero BAC, and licensing legislation; improve enforcement, licensing, and education programs for persons under age 21
*Action Needed* by State Legislatures

**Pipeline Excess Flow Valves**
-Require the Installation of Excess Flow Valves in High Pressure Residential Natural Gas Distribution Systems
*Action Needed* by the Research and Special Programs Administration (RSPA) & the American Gas Association

**Railroad Hazardous Materials Tank Cars**
-Require Improved Protection of Railroad Tank Cars Carrying Hazardous Materials
*Action Needed* by Federal Railroad Administration (FRA) & the Research and Special Programs Administration (RSPA)

**Human Fatigue in Transportation Operations**
-Study the Relationship of Fatigue and Work/Rest Cycles in the Transportation Industry and Update Applicable Regulations
*Action Needed* by the Department of Transportation (DOT)

**School Bus Safety**
-Safer Transportation for Schoolchildren
*Action Needed* by the National Highway Traffic Safety Administration (NHTSA)

**Structural Fatigue Testing of Aircraft**
-Require Testing of Aircraft to the Equivalent of Two Lifetimes of Use
*Action Needed* by the Federal Aviation Administration (FAA)

**Small Passenger Vessel Safety**
-Require lifesaving equipment, passenger briefings, and crew emergency training.
*Action Needed* by the United States Coast Guard (USCG)

**Alcohol/Drug Detection**
-Require Uniform Collection, Handling, Processing, and Testing for Alcohol and Other Drugs
*Action Needed* by the Department of Transportation (DOT)

**Brake Wear on Transport Airplanes**
-Require Improved Braking for Transport Category Airplanes
*Action Needed* by Federal Aviation Administration (FAA)

**Heavy Commercial Truck Safety**
-Prevention of Accidents Caused by Fatigue, Alcohol, Drug Use and Medical Problems; and a requirement for Anti-lock brake systems.
*Action Needed* by Federal Highway Administration (FHWA) and the States

May 1994

DANIEL D. CAMPBELL
GENERAL COUNSEL
NATIONAL TRANSPORTATION SAFETY BOARD

# NTSB INVESTIGATIONS -- PARTY AND NON-PARTY RIGHTS

## INTRODUCTION

There is an unavoidable tension between the National Transportation Safety Board's mandate to search efficiently for the cause of an accident and the right of private litigants to pursue or defend disputes over civil liability. The Safety Board's objective, as defined by statute, is the determination of probable cause -- its mission is the prevention of similar occurrences. On the other hand, the driving purpose in litigation is the determination of liability and compensation. While few doubt the power of potential liability to produce cautious behavior, the prevention of accidents is at best a by-product of civil litigation. For the NTSB, it is the only legitimate product.

The focus of this paper is an understanding of the rights (and obligations) of parties to NTSB investigations, and the related rights (or protections) afforded to those other "non-parties" who are nevertheless often equally interested persons. It is essential to recognize at the outset that all individuals affected by an aircraft disaster have legitimate claims to full disclosure of the circumstances of an accident. NTSB investigation is given, by federal law, priority over litigative discovery process, but this is borne largely of necessity.[1] Speed is of the essence for the NTSB, particularly in the early going. Rules of evidence and niceties of proof are subordinated to a vigorous search for useful information. Careful documentation and rigorous analysis initially supplant the adversarial structure which is fundamental to our legal system. But disruption of the legal process is to be minimized so far as that can be accomplished without impeding NTSB work. The procedures employed by the NTSB were emphatically not designed with an intention to afford any class of disputants an advantage in subsequent litigation.

[1]For most accidents, the work of the NTSB is also accorded priority over other federal investigations. See 49 U.S.C. app. § 1903(a)(1).

**Statutory Authority**

The Independent Safety Board Act of 1974[2] established the Safety Board and charged it with the responsibility to:

> investigate or cause to be investigated (in such detail as it shall prescribe) and determine the facts, conditions, and circumstances and the cause or probable cause or causes of any--
>
> (A) aircraft accident which is within the scope of functions ... transferred (from) title VII of the Federal Aviation Act of 1958, as amended.[3]

To carry out this charge, the Board is authorized to " ... enter any property wherein a transportation accident has occurred or mwreckage from any such accident is located and do all things therein necessary for a proper investigation...."[4] The Independent Safety Board Act also contains additional provisions which authorize the Board to:

> compel the production of witnesses and evidence;
> examine and test physical evidence;
> inspect records and facilities;
> order autopsies;
> accept voluntary and uncompensated services; and
> establish rules and regulations.[5]

Thus the Safety Board is provided with sufficient authority to establish the primacy of its investigative work, and to provide it with the tools and flexibility

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[2] 49 U.S.C. app. § 1901, et seg.

[3] 49 U.S.C. app. § 1903(a)(1)(A). Pertinent provisions of the Federal Aviation Act of 1958 are found at 49 U.S.C. SS 1441-43.

[4] 49 U.S.C. app. § 1903(b)(2).

[5] 49 U.S.C. app. §§1903(b)(1), (2), (3),(5), (6) &(12). See also, 49 U.S.C. § 1441(c).

necessary to accomplish its task.[6] The particulars of any investigation are left to the Safety Board's discretion. Because of recent challenges to the exercise of this discretion, the Safety Board's authority over the manner of its investigations was reemphasized in an amendment made to the Board's authorizing legislation. The amendment reads:

> The Board shall have sole authority to determine the manner in which testing will be carried out under this paragraph... including determining the persons who will conduct the test, the type of test which will be conducted, and the persons who will witness the test. Such determinations are committed to the discretion of the Board and shall be made on the basis of the needs of the investigation being conducted by the Board and, where applicable, the provisions of this paragraph.[7]

**Accident Investigation Rules**

NTSB regulations are found beginning at 49 C.F.R. Part 800. section 831 details the rules governing accident investigations and follows the contours outlined by statute. Pertinent provisions provide that accident investigations are factfinding proceedings with no formal issues and no adverse parties and are not subject to the provisions of the Administrative Procedure Act.[8] The rules state explicitly that NTSB investigations are not conducted for the purpose of determining the rights or liabilities of any person, but are aimed instead at the prevention of similar occurrences.[9]

In keeping with the factfinding nature of the investigation, the Safety Board's investigator-in-charge (IIC) is given great latitude in organizing and controlling the on-scene phase of an investigation. This IIC will choose, among other things, who

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[6]The provision permitting the acceptance of voluntary and uncompensated services is unusual, and provides the NTSB with the legal basis for its characteristic party-system investigation.

[7]Independent Safety Board Act Amendments of 1990, Pub. L. 101641, § 3(b), 104 STAT. 4654, 4656, amending 49 U.S.C. app. 1903 (b)(2).

[8]49 C.F.R. § 831.4

[9]*Id.*

will assist the Board and in what capacity. Typically, in the context of a major accident investigation, this process will result in the selection of parties that include the affected air carrier, the airframe and engine manufacturers, a pilots' union, and affected governmental authorities.[10] These parties will propose representatives for service on the various technical groups, and, if the nominees are technically competent, they will in all likelihood be accepted by the IIC for participation. Selection for participation may give an individual privileged access to the accident scene, to examination of wreckage, to review of company records, perhaps even to the tightly controlled analysis of cockpit voice recordings. The access given any particular individual depends on the technical group to which the individual is assigned. Party status also provides the entity with access to daily progress meetings which are not open to the public. Hence, as a result of providing the Board with technical assistance, parties are given an array of opportunities to learn what has happened and to assist in directing the search for answers. With these privileges comes responsibility.

Though most NTSB-selected parties to an investigation, whether it is a major go-team event or a regional general aviation accident, are interested in the legal sense of the term, they are not selected because of their interest in the matter, but rather because of their ability to provide qualified personnel who can assist the Board's work.[11] Still, the selection process commonly gives rise to a perplexing asymmetry from the standpoint of private litigants. Operators, engine and airframe manufacturers, and many other potential defendants are almost always parties. But representatives of passengers, or even of a decedent aircraft owner's estate, are not. Consequently, the Board has specified a number of rules that are designed to protect the integrity of the Board's processes and to insure the availability of information to all interested persons. Adherence to these rules is vital to the continued existence of the party process.

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[10]Unlike all other parties, the Secretary of Transportation has a statutory right to participation. Consequently, participation of the Federal Aviation Administration is automatic. Where there is significant air traffic control involvement, FAA will likely designate a representative to the ATC group. Hence, even the federal government in its posture as potential defendant, will have immediate access to information at a time and in detail not immediately achievable by plaintiffs.

[11]Id. at § 831.11. Parties are limited to those agencies, companies, and associations whose employees, functions, activities, or products were involved in the accident.

To insure adherence to the Board rules, Part 831 specifies that parties are to be responsive to the direction of the appropriate Board representative, typically the IIC or the group chairman controlling a particular representative's technical area.[12] And the regulation specifies that lack of responsiveness or other actions prejudicial to the investigation will result in removal. Particularly important in this regard is a provision that requires that all information concerning the accident obtained by any participant in the investigation shall be passed to the IIC through group channels. Relay of information by private parties back to corporate headquarters is explicitly subordinated to this requirement and may be done only with consent of the IIC when necessary for accident prevention purposes.[13]

These last provisions regarding the flow of information should be understood in context. Elsewhere, the accident investigation rules provide that the Board (and only the Board), through one of several possible designated spokesmen, will release factual information as it is developed. There is, thus, no intention on the part of the Board to withhold any of the facts or circumstances of an accident from other interested persons or the public at large. On the contrary, the Board believes that the dissemination of such information is a requirement of law. The rules restricting party disclosure are thus aimed entirely at preventing a party from using its privileged status to litigating or public relations advantage.

**Rules For The Protection Of Non-Party Rights**

There are both statutory and regulatory rules that are designed with the protection of the rights of persons who will not have been party to an investigation. Chief among these are the provisions of statute that require disclosure of all the facts and circumstances of an accident,[14] and that forbid the use of an NTSB accident report in civil litigation.[15]

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[12] 49 C. F. R. § 831.11(c).

[13] 49 C.F.R. 831.13(b). This section provides further that under no circumstances will information be released or discussed with unauthorized persons who have the potential for jeopardizing the investigation.

[14] 49 U.S.C. App. §§ 1903(a)(2), 1905.

[15] 49 U.S.C. App. §§ 1441(e) and 1903(c).

Full disclosure is obviously an obligation whose roots lie in simple fairness. Private rights and liabilities could not be readily determined if the Board were to do anything less than make available all its findings, particularly since much of the Board's work will be impossible to duplicate, either because of the passage of time and events or because of the destructive nature of much of post-accident testing. The Board not only imposes the obligation of disclosure on itself, but makes clear that parties and their representatives are likewise required to tell what they have seen and learned. This is accomplished first through the requirement that all information developed during the course of an investigation be passed through channels to the IIC. An additional safeguard is found in the "Statement of Party Representatives" which each participant is asked to sign before acceptance on an investigatory team. This statement indicates that the representative will decline to assert or allow others to assert on his behalf any claim of privilege with respect to information or documents obtained as a result of participation in the party process. There were other times and are other places where a privilege against disclosure may have been acquired through the assistance of the government in an investigation, but NTSB accident investigations are decidedly not among these.

Equally important to the protection of third party rights, and also critical for the integrity of the Board's processes, is the prohibition against the use of Board accident reports in civil litigation. Our reports are the result of an investigative process which has been vigorously isolated from the pressures of private litigation in order to cultivate a more open and cooperative atmosphere where prevention, not liability, is the core concern.[16] Besides fostering a cooperative environment for our work, the distancing of our investigations from private litigation is necessary to protect against the possibilities that NTSB determinations would have unwarranted influence on civil juries, and that the NTSB's internal decision-making process would be drawn into controversies. obviously the rights of third parties could not be guaranteed in a regime in which those who assisted the Board during an accident investigation knew in advance that favorable Board analysis would later be introduced into litigation in support of their private interests.

Fortunately, the distancing of our activities from civil litigation is congressionally-established and judicially approved, and is based on sound principles and common sense experience. of particular pertinence are the unconditional statutory prohibitions against the admission in evidence or other use

[16] See Thomas Brooks Chartered v. Burnett, 920 F.2d 634 (10th Cir. 1990).

of NTSB "reports" in actions for damages arising from any matter mentioned in the reports.[17] The authoritative Senate Report explained that the legislative prohibitions on the use or admission of NTSB reports reflect Congress' "strong ... desire to keep the Board free of the entanglement of such suits."[18] By admitting an NTSB report or allowing experts to discuss and rely on such a report, a court thwarts the express intent of Congress to preclude embroiling the NTSB in the litigation.

Most courts have had little difficulty recognizing the core intent of the legislation -- forbidding, at minimum, the use of the conclusionary statements in NTSB reports.[19] There is a recent, thorough and thoughtful decision barring the use or admission of the NTSB's accident report in its entirety. In re Air Crash Disaster at Sioux City, Iowa, on July 19, 1989, 780 F. Supp 1207 (E.D. Il. 1991). This decision is the most definitive analysis to date of the restrictions on the use of NTSB

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[17] 49 U.S.C. App. §§ 1441(e) and 1903(c). Read literally, the law would embrace every report of the NTSB which would arguably place all of the written products of this agency beyond the use of litigants. A key to correctly applying the statutory prohibition on the use or admission of NTSB reports, therefore, is defining the scope of reports subject to the coverage of the statutory bar. As the agency charged with administering and implementing this provision, the NTSB has promulgated detailed rules governing the testimony of employees which include a definition of the critical term "Board's accident report." 49 C.F.R. Part 835. "Board accident report" means:

> "the report containing the Board's determinations, including the probable cause of an accident, issued either as a narrative report or in computer format (briefs of accidents). Pursuant to section 701 (e) of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1441(e)) (FA Act) and section 304(c) of the Independent Safety Board Act of 1974 (49 U.S.C. 1903(c)) (Safety Act), no part of these reports may be admitted as evidence or used in any suit or action for damages growing out of any matter mentioned in such reports." § 835.2.

[18] Rep. No. 93-1182 93d Cong., 2d Sess., 44 (1974). Perhaps the most direct regulatory reflection of the Board's posture towards litigation is the provision in both Part 831 and Part 845 which states that a party to the field investigation (or a party to the hearing) cannot be represented by any person who also represents claimants or insurers. This provision is based on the premise that the claimants and insurers are the principal parties in interest in the litigation and participation by their representatives in the Board's investigation would necessarily result in an "entanglement" of the two proceedings.

[19] See, e.g., Curry v. Chevron, USA, 779 F.2d 272 (5th Cir. 1985); Protectus Alpha Navigation Co. v. North Pacific Grain Growers, Inc., 767 F.2d 1379 (9th Cir. 1985).

reports, and it will likely become the authoritative case in the field because of the force and logic of the opinion.

The strict limitations on the use of NTSB reports do not foreclose any party in litigation from developing evidence necessary for the prosecution of its case, nor are they biased in favor of any particular class of parties. Part 835 provides that Board employees may use copies of their factual accident reports as a testimonial aid, and may refer to those reports during their testimony or use them to refresh their memory. As the NTSB recently stated in the notice of proposed rulemaking amending 49 C.F.R. § 835.3:

> "Recognizing that there are legitimate reasons for the use of Board developed information in private litigation--tests conducted by the Board cannot always be repeated--the Board has established procedures which permit reasonable disclosure and/or discovery of factual information. The NTSB has and will continue to furnish litigants with any factual information acquired through its investigative activities of which it has unique knowledge." 55 FR 30942, July 30, 1990.[20]

## CONCLUSION

Party status confers privileges, but these are clearly subordinate to the responsibilities that also attach: the responsibility to join the Board in an earnest and open evaluation of the circumstances of an accident and to avoid using the privileges of party status for the pursuit of private advantage. The Board seeks to protect the rights of all interested persons through its rules on disclosure, discovery, and public access. The continued viability of the party system and the team concept of accident investigation requires the exercise of good faith by all involved. The alternatives, purely governmental investigation or openly adversarial proceedings, are neither desirable nor likely to be as efficient as the process that has developed over nearly six decades.

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[20] In this connection, it should also be noted that the NTSB establishes a public docket which includes factual information concerning matters it investigates, and, unlike the Board's accident report, this information is available for use by any person.

**MATTHEW M. MCCORMICK**
**CHIEF, SURVIVAL FACTORS DIVISION**
**NATIONAL TRANSPORTATION SAFETY BOARD**

# BLOODBORNE PATHOGENS AND THE AVIATION ACCIDENT INVESTIGATOR

The Safety Board has a commitment to comply with the Occupational Safety and Health Administration's (OSHA) standard to protect its employees from exposure to bloodborne pathogens that can be present at aviation accident sites. The Safety Board encourages parties to our investigations to also comply with the OSHA standard to protect their employees from bloodborne pathogens.

The OSHA Standard contained in Code of Federal Regulations 29 Section 1910.1030 requires that employers have a program that will contain procedures to protect its employees from exposure to bloodborne pathogens. These pathogens can be present in fatally injured persons as well as injured survivors of aircraft accidents. The standard applies to employees who may come into contact with human blood, bodily fluids and tissue. We as accident investigators can be exposed to these materials at accident sites such as inside cockpits and cabins and the ground on which fatalities and injured survivors have lain.

Since bloodborne pathogens such as the immunodeficiency virus (HIV) and the hepatitis B virus (HBV) can be transmitted through direct contact with the mucous membranes (eyes, nose, mouth) or an open cut, sore or rash on your skin, universal precautions must be taken by employees.

The OSHA standard requires that employers develop a written Exposure Control Plan (ECP) that clearly cites the employer's universal procedures to protect employees from exposure to bloodborne pathogens such as the HIV, the HBV, and other contagious bodily fluids. The ECP must:

- Identify employees by job classifications who in the performance of their duties, may be exposed to bloodborne pathogens.

- Contain initial and recurrent training programs that will instruct employees on universal precautions that will be taken. This training will include information on the advisability of employees being

inoculated against the Hepatitis B virus at no cost to the employee; the prescribed use of personal protective equipment; the transmission of HIV and HBV; and the availability of personal protective equipment that must be used by employees, in our case, accident investigators.

- Explain work practices and engineering controls that will be used at accident sites and at other locations where evidence will be examined.

- Explain universal procedures for the disposal of contaminated materials such as personal protective equipment and investigative equipment that cannot be rendered safe with disinfectants.

- Explain the use of labels and signs that will be posted at accident scenes to warn persons that biohazards are present and that precautions must be taken.

- Explain the use of labels on containers that are used to ship contaminated evidence to laboratories and other places that are used to examine evidence.

- Cite procedures for the maintenance of records of training received by employees, records of employee HBV vaccinations, and confidential medical records and employee counseling following an incident in which someone is actually exposed to bloodborne pathogens.

The Safety Board and the Federal Aviation Administration (FAA) have developed similar Exposure Control Plans, a common training program, and common protective methods to be used during accident investigations. For example, as a collaborative effort, the Safety Board and the FAA have trained teams of trainers (each team includes a physician, a health and safety officer, and an FAA inspector from each of the FAA's 9 regions) who will train all NTSB and FAA accident investigators. Investigators have been offered the opportunity to become vaccinated against the hepatitis B virus. Tasks that Safety Board employees perform during accident investigations have been identified and analyzed for each

job classification. This analysis identified the articles of personal protective equipment that is worn for each task.

Procedures have been developed for the shipment of contaminated articles that must be examined away from the accident scene. Procedures that have been in place for several years remain unchanged for the shipment of toxicological specimens in containers provided by the FAA.

Most importantly, onscene investigative procedures will change. Primarily, the procedures modify the behavior of investigators while they are working in biohazard areas that contain bloodborne pathogens.

Personal protective equipment as the situation requires, will be worn. This equipment will include liquid proof gloves worn under heavy duty work gloves; eye protection such as face shields or a dust mask worn over the nose and mouth and goggles; liquid proof covers worn over boots; and depending upon the degree of contamination, a disposable full body liquid proof coverall with hood will need to be worn.

Also, such behaviors as eating, drinking, smoking, applying lip balm, manipulating contact lenses, and using rest rooms will not be permitted inside the biohazard-secured area. As the situation dictates, local authorities assisted by the investigator-in-charge will determine the size of the biohazard area that will be secured. The secured area will have one entry/exit point and contaminated personal protective equipment will be removed in a prescribed manner and deposited in approved biohazard containers. In some situations it may be necessary to designate a person to control the entry/exit point and oversee the disposal of contaminated materials. Upon leaving the secured area, the investigators' hands will be washed with soap and water; if soap and water are not available, then approved disposable disinfectant wipes can be used until hands can be washed with soap and water.

Investigative equipment will be carefully chosen and only that which is absolutely necessary will be brought to the accident scene; this will minimize the number of articles that can become contaminated. Finally, the number of persons who are permitted into the secured biohazard area will be limited to those who are absolutely necessary for the conduct of the investigation, and they will be expected to follow the universal precautions used by the Safety Board and FAA personnel.

I and members of the FAA team that developed the universal precautions for our agencies to follow in accordance with the OSHA standard will be staffing an information center in the reception area outside this room. We can answer any questions you may have and videos from the training program will be shown. We also will have a display of typical personal protective equipment as well as literature on the HBV inoculations.

Bloodborne *facts*

# Reporting Exposure Incidents

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA's new bloodborne pathogens standard includes provisions for medical follow-up for workers who have an exposure incident. The most obvious exposure incident is a needlestick. But any specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials is considered an exposure incident and should be reported to the employer.

Exposure incidents can lead to infection from hepatitis B virus (HBV) or human immunodeficiency virus (HIV) which causes AIDS. Although few cases of AIDS are directly traceable to workplace exposure, every year about 8,700 health care workers contract hepatitis B from occupational exposures. Approximately 200 will die from this bloodborne infection. Some will become carriers, passing the infection on to others.

## WHY REPORT?

Reporting an exposure incident right away permits immediate medical follow-up. Early action is crucial. Immediate intervention can forestall the development of hepatitis B or enable the affected worker to track potential HIV infection. Prompt reporting also can help the worker avoid spreading bloodborne infection to others. Further, it enables the employer to evaluate the circumstances surrounding the exposure incident to try to find ways to prevent such a situation from occurring again.

Reporting is also important because part of the follow-up includes testing the blood of the source individual to determine HBV and HIV infectivity if this is unknown and if permission for testing can be obtained. The exposed employee must be informed of the results of these tests.

Employers must tell the employee what to do if an exposure incident occurs.

## MEDICAL EVALUATION AND FOLLOW-UP

Employers must provide free medical evaluation and treatment to employees who experience an exposure incident. They are to refer exposed employees to a licensed health care provider who will counsel the individual about what happened and how to prevent further spread of any potential infection. He or she will prescribe appropriate treatment in line with current U.S. Public Health Service recommendations. The licensed health care provider also will evaluate any reported illness to determine if the symptoms may be related to HIV or HBV development.

The first step is to test the blood of the exposed employee. Any employee who wants to participate in the medical evaluation program must agree to have blood drawn. However, the employee has the option to give the blood sample but refuse permission for HIV testing at that time. The employer must maintain the employee's blood sample for 90 days in case the employee changes his or her mind about testing--should symptoms develop that might relate to HIV or HBV infection.

The health care provider will counsel the employee based on the test results. If the source individual was HBV positive or in a high risk category, the exposed employee may be given hepatitis B immune globulin and vaccination, as necessary. If there is no information on the source individual or the test is negative, and the employee has not been vaccinated or does not have immunity based on his or her test, he or she may receive the vaccine. Further, the health care provider will discuss any other findings from the tests.

The standard requires that the employer make the hepatitis B vaccine available, at no cost to the employee, to all employees who have occupational exposure to blood and other potentially infectious materials. This requirement is in addition to post-exposure testing and treatment responsibilities.

## WRITTEN OPINION

In addition to counseling the employee, the health care provider will provide a written report to the employer. This report simply identifies whether hepatitis B vaccination was recommended for the exposed employee and whether or not the employee received vaccination. The health care provider also must note that the employee has been informed of the results of the evaluation and told of any medical conditions resulting from exposure to blood which require further evaluation or treatment. Any added findings must be kept confidential.

## CONFIDENTIALITY

Medical records must remain confidential. They are not available to the employer. The employee must give specific written consent for anyone to see the records. Records must be maintained for the duration of employment plus 30 years in accordance with OSHA's standard on access to employee exposure and medical records.

*This is one of a series of fact sheets that discusses various requirements of the Occupational Safety and Health Administration's standard covering exposure to bloodborne pathogens. Single copies of fact sheets are available from OSHA Publications, Room N-3101, 200 Constitution Avenue, N.W., Washington, DC 20210 and from OSHA regional offices.*

# Synopsis
# Final Rule:
# OCCUPATIONAL EXPOSURE TO BLOODBORNE PATHOGENS

By HELEN SCHRECK

OSHA has issued the final occupational exposure to bloodborne pathogens standard (29 CFR 1910. 1030) as published in the *Federal Register* on Dec. 6, 1991. The following is a synopsis of the contents of that *Federal Register* section.

### OVERVIEW

This is a performance-oriented standard in that OSHA states what the required standards are and then allows the employer to "craft the most protective and cost effective programs possible." The standard affects any employee who may come in contact with human blood and other potentially infectious materials and who comes under OSHA's purview. Some identified populations at risk include workers in healthcare facilities, funeral homes, industrial facilities, research laboratories, linen services, law enforcement, fire and rescue operations, correctional facilities, waste removal, lifesaving and personnel services.

In general, the standard requires: a written exposure control plan; identification of employees with occupational exposure to blood and other infectious material; use of personal protective equipment; and employee training. Housekeeping requirements and decontamination procedures, including a written schedule for cleaning and discarding sharps and regulated wastes, are also addressed by the standard.

Limiting worker exposure to bloodborne diseases is achieved through implementation of the following categories of controls:

- Engineering controls
- Immunization programs
- Work practices, such as procedures for handling sharps
- Disposal and handling of contaminated waste
- Use of personal protective equipment, such as gloves and gowns
- Use of mouth pieces, resuscitation bags or other ventilation devices
- Use of disinfectants
- Labeling and signs
- Training and education programs

### SELECTED DEFINITIONS

**Contaminated:** the presence or reasonably anticipated presence of blood or other potentially infectious materials on an item or surface. (Contaminated was not defined in the proposed standard.)

**Contaminated laundry:** laundry soiled with blood or other potentially infectious materials or sharps. (This was not defined in the proposed standard.)

**Contaminated sharps:** any contaminated object that can penetrate the skin, including (but not limited to) needles, scalpels, broken glass, broken capillary tubes and exposed ends of dental wires. (This definition was expanded from the proposed standard which defined "sharps.")

**Decontamination:** use of physical or chemical means to remove, inactivate or destroy bloodborne pathogens on a surface or item to the point where they can no longer transmit infectious particles and the surface or items are rendered safe for handling, use or disposal. (Decontamination was not defined in the proposed standard.)

**Exposure incident:** specific eye, mouth, mucous membrane, non-intact skin or parenteral contact with blood or other potentially infectious materials that results from performance of an employee's duties.

**Handwashing facilities:** a facility providing an adequate supply of running potable water, soap and single-use towels or hot-air drying machines.

**Occupational exposure:** reasonably anticipated skin, eye, mucous membrane or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties. (This definition contains the criteria that trigger application of the final standard. The second sentence in the proposed standard definition was deleted as it created confusion from exposures such as in the "Good Samaritan Act.")

**Other potentially infectious materials:** 1) the following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, amniotic fluid, saliva in dental procedures, any body fluid visibly contaminated with blood and all body fluids in situations where it is difficult or im-

possible to differentiate between body fluids; 2) any unfixed tissue or organ (other than intact skin) from a human (living or dead); and 3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs or other tissues from experimental animals infected with HIV or HBV. [OSHA used the Centers for Disease Control (CDC) definitions from its June 1988 update of guidelines for healthcare workers. This definition is a modification from the proposed standard.]

**Production facility:** a facility engaged in industrial-scale, large-volume or high-concentration production of HIV or HBV.

**Regulated waste:** liquid or semi-liquid blood or potentially infected materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items caked with dried blood or other potentially infectious materials and capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or potentially infectious materials. (Regulated waste was referred to as infectious waste in the proposed standard.)

**Research laboratory:** a laboratory producing or using research-laboratory-scale amounts of HIV or HBV—however, not in the volume found in production facilities.

**Source individual:** any individual (living or dead) whose blood or other potentially infectious materials may be a source of occupational exposure to employees. (This definition was changed from defining blood donors as "patients" in the proposed standard. OSHA has chosen to use the term "source individual" because it provides the best description without the limiting qualities inherent in the word "patient.")

**Work practice controls:** controls that reduce the likelihood of exposure by altering how a task is performed. [As they relate to this standard, examples of some work practice controls include: 1) adherence to the practice of universal procedures in all occupational exposure situations; 2) prohibiting recapping of needles or other sharps by a two-handed technique; and 3) prohibiting pipetting or suctioning by mouth.]

## THE STANDARD SUMMARIZED

### *Exposure Control*

An exposure control plan is required by, and is a key provision of, the standard. An employer must identify individuals who will be affected by training, protective equipment, vaccination and other provisions of this standard. The plan must be in writing so employees can access it and learn what provisions are in place within that workplace.

A written plan also enhances enforcement. By reviewing the plan, an OSHA compliance officer can become familiar with: the employer's determination of tasks and procedures with occupational exposure; job classifications with duties that include those identified tasks; and implementation of and revisions to the exposure control plan. The standard does not prohibit the plan from being part of a larger document.

The exposure control plan also requires the employer to state procedures for evaluation of exposure incidents. The exposure control plan must be reviewed and updated at least annually (and as necessary) to reflect new or modified tasks and procedures that affect occupational exposure and to reflect new or revised employee job classifications with occupational exposures. The standard allows exposure determination to be based primarily on a list of job classifications.

### *Methods of Compliance*

Universal precautions shall be observed to prevent contact with blood and/or other potentially infectious materials. In situations where differentiation between body fluid types is difficult or impossible, the standard requires that all body fluids be considered potentially infectious materials. The exemption to the use of universal precautions in the proposed standard has been moved to paragraph (d)(3)(ii), Personal Protective Equipment-Use. OSHA intended that this exemption apply only to the use of personal protective equipment; it was not intended to provide an excuse for non-adherence to the overall concept of universal precautions.

Engineering controls serve to reduce employee exposure in the workplace either by removing the hazard or isolating the worker from the exposure. These controls encompass process or equipment redesign (i.e., self-sheathing needles), process or equipment enclosure (i.e., biosafety cabinets), and employee isolation. In general, engineering controls act on the hazard source and eliminate or reduce employee exposure without relying on the employee to take self-protective action.

Handwashing was required in the proposed standard; however, OSHA overlooked requiring that a means of handwashing be provided to employees. Comments noted that exposures can occur in numerous environments where sinks and running water are unavailable. The standard states that when provision of handwashing facilities is not feasible, the employer must provide either an appropriate antiseptic hand cleaner in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.

Contaminated needles and other contaminated sharps shall not be bent, recapped or resheathed except as noted in paragraphs (d)(2)(vii)(A) and (d)(2)(vii)(B). Shearing or breaking needles is prohibited. This provision does not totally prohibit recapping or removal, as the proposed standard was mistakenly interpreted to require by some respondents. The final standard states that contaminated needles and other contaminated sharps shall not be removed or recapped unless the employer can demonstrate that no alternative is feasible or that such action is required by a specific medical procedure.

Specific provisions regarding storage containers for used sharps are detailed in the standard (puncture-resistant, labeled or color-coded, leakproof on sides and bottom). When a facility utilizes universal precautions in handling all specimens, labeling/color-coding of specimens is not necessary, provided containers are recognizable as containing specimens. This exemption applies only while such specimens/containers remain within the facility.

Labeling/color-coding requirements

do apply when specimens/containers leave the facility. The standard requires that specimens of blood or other potentially infectious materials shall be placed in a container that prevents soak-through or leakage during collection, handling, processing, storage, transport and shipping. The term "leak-proof," used in the proposed standard, has been replaced by these words.

### *Personal Protective Equipment*

When engineering controls and work practices are insufficient to eliminate exposure, personal protective equipment must be utilized to address remaining exposure potential. When occupational exposure exists, the employer shall provide—at no cost to the employee—appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields (or masks and eye protection), and mouthpieces, resuscitation bags, pocket masks or other ventilation devices. An employer's obligation to provide a particular item is based upon whether an item will function as protection against contamination with blood or other potentially infectious materials.

Note that the terms "fluid-resistant" and "fluid proof" have been removed in the final standard. The performance-oriented standard contains performance criteria delineating the characteristics of "appropriate" personal protective equipment. The standard supplies the criteria necessary for proper equipment selection, and increases flexibility in attaining compliance. OSHA believes that the personal protective equipment required by this standard is the minimum equipment dictated by the exposure circumstances requiring its use.

The standard requires that the employer clean, launder and dispose of personal protective equipment as described in the standard. OSHA states that this will prevent contamination outside the work area and that washing contaminated personal protective equipment at home is not acceptable. Further, all personal protective equipment must be removed before leaving the work area.

A new provision added to the final standard permits limited exception to the use of gloves for phlebotomy when this activity is performed in volunteer blood donation centers. However, when the employer judges that routine gloving for all phlebotomies is not necessary, the employer must: 1) periodically reevaluate this policy; 2) make gloves available to all employees wishing to use them for phlebotomy; 3) not discourage the use of gloves for phlebotomy; and 4) require that gloves be used for phlebotomy in the following circumstances: (a) when an employee has cuts, scratches or breaks in his or her skin; (b) when the employee judges that hand contamination with blood may occur (i.e., when performing phlebotomy on an uncooperative source individual); and (c) when the employee is receiving training in phlebotomy.

Masks in combination with eye protection devices, such as goggles or glasses with solid side shields, or chin-length face shields, shall be worn whenever splashes, sprays, splatter or droplets of blood or other potentially infectious materials may be generated and eye, nose or mouth contamination can be reasonably anticipated. The final standard specifically states that if glasses are the chosen method of eye protection, they must be equipped with solid side shields.

The standard requires that appropriate protective clothing such as, but not limited to, gowns, aprons, lab coats, clinic jackets or similar outer garments shall be worn in occupational exposure situations. The type of clothing and its characteristics depend upon the task being performed and the degree of exposure anticipated.

### *Housekeeping*

Under housekeeping, the standard requires employers to ensure that the worksite is maintained in a clean and sanitary condition. The employer must determine and implement an appropriate written schedule for cleaning and a method of decontamination based upon location within the facility, type of surface to be cleaned, type of soil present, and tasks and procedures being performed. The term "worksite" refers not only to permanent, fixed facilities but also covers temporary, non-fixed workplaces such as bloodmobiles.

The purpose of a written schedule of cleaning and method of decontamination is twofold: 1) the schedule helps ensure that routine cleaning is performed and that decontamination method deemed appropriate by the employer is followed; and 2) employees can utilize the schedule to determine when to conduct such cleaning and what method should be used to properly accomplish the task.

A new provision added to the final standard states that reusable sharps contaminated with blood or other potentially infected materials shall not be stored or processed in a manner that requires employees to reach by hand into containers where these sharps have been placed. This provision will eliminate or minimize the risk of percutaneous injury resulting from reaching into such containers.

Contaminated sharps shall be discarded immediately or as soon as feasible in containers that are: a) closable; b) puncture-resistant; c) leakproof on the sides and bottom; and d) labeled or color-coded in accordance with this standard. Containers must be closable to ensure that contaminated sharps remain inside the unit during transportation and handling prior to terminal disposal. This provision was revised to require that sharps containers be located not only where sharps are used but also in areas where contaminated sharps could be found.

The standard permits utilization of reusable containers for discarding contaminated sharps. However, the final standard places restrictions on processing these containers to ensure that employees handling them are not exposed to the risk of percutaneous injury.

OSHA's intent is not to set rigid regulations regarding regulated waste handling and disposal, but to promulgate minimum requirements for containing waste that the Agency has determined warrants special handling to protect employees against exposure to bloodborne pathogens. The standard requires that disposal of all regulated waste be in accordance with applicable regulations of federal, local and territorial governments, and political subdivisions of states and territories.

### *Laundry*

The final standard requires that contaminated laundry shall be handled as little as possible with a minimum of ag-

**This new standard affects any employee who may come in contact with human blood and other potentially infectious materials and who comes under OSHA's purview.**

itation. Bagging and labeling requirements are detailed. OSHA eliminated the term "leakproof" and requires that the chosen container prevent soak-through and/or leakage of fluids to the exterior. The bag or container is not required to be made of any particular material; however, it should satisfy the above performance criteria.

An additional paragraph in the final standard states when a facility ships contaminated laundry off-site to a second facility that does not utilize universal precautions in laundry handling, the facility generating the contaminated laundry must place such laundry in bags or containers labeled or color-coded in accordance with paragraph (g)(1)(i).

### *HIV and HBV Research Laboratories and Production Facilities*

This paragraph of the standard addresses additional requirements to be met by research laboratories and production facilities engaged in the culture, production, concentration and manipulation of HIV and HBV. OSHA requires additional specialized training for employees covered by this paragraph. Requirements in this paragraph are derived primarily from CDC/NIH recommendations found in "Biosafety in Microbiological and Biomedical Laboratories."

### *Hepatitis B Vaccination*

The standard requires that hepatitis B vaccination be made available after the employee has received the training required in paragraph (g)(2)(vii)(I) and within 10 working days of initial assignment to all employees with occupational exposure. The vaccination must be made available, at no cost, to the employee, at a reasonable time and place. It must be performed by or under the supervision of a licensed physician or another appropriately trained and licensed healthcare professional, and provided according to United States Public Health Services (USPHS) recommendations current at the time of evaluation. Participation is voluntary. The standard also requires an employer to make the hepatitis B vaccination available to an employee who initially declines but later decides to accept the vaccination.

In Appendix A of the standard, a statement is provided for an employee to sign when declining the vaccination. This encourages greater participation in the vaccination program by reiterating that an employee who declines the hepatitis B vaccination remains at risk of acquiring hepatitis.

Post-exposure evaluation and follow-up are also included in the standard, requiring employers to provide the exposed employee with a confidential medical evaluation and follow-up. The standard also requires the employer to ensure, following a report of an exposure incident, that the healthcare professional responsible for the employee's hepatitis B vaccination is provided a copy of this regulation.

### *Labels and Signs*

Paragraph (g)(1) of the standard discusses specific labeling and sign requirements for warning employees of hazards to which they are exposed. OSHA does not require that the infection status of source individuals or specimens be identified. The Agency requires only that outer-most containers used to store, transport, ship or dispose of blood or other potentially infectious materials (from any source individual) bear a warning label signaling that appropriate barrier precautions be used if occupational exposure occurs. Specific labeling and signage requirements are further detailed in this section. Containers of blood, blood components or blood products labelled as to contents and released for transfusion or other clinical use, are exempted from the labelling requirements of paragraph(g).

### *Employee Information and Training*

The standard requires the employer to provide all employees who are occupationally exposed to bloodborne pathogens with training about hazards associated with blood and other potentially infectious materials and protective measures to minimize the risk of occupational exposure. Training must be conducted during working hours, at no cost to the employee and at a reasonable location.

The employee training provision is performance-oriented, listing the categories of information that must be provided. This ensures that relevant information is communicated to employees while allowing employers the most flexible approach to providing training. A "grandfather clause" exists for those who have received training on bloodborne pathogens in the year preceding the standard's effective date. Training in provisions of the standard not included in previous training must be provided within 90 days. This section further details the minimum information required in training.

### *Recordkeeping*

The final standard requires that employers maintain records related to bloodborne pathogens, including exposure incidents, post-exposure follow-up, hepatitis B vaccination status and training for all employees with occupational exposure. The standard discusses specific employee medical records that must be maintained and requires employers to retain medical records for the duration of employment plus 30 years. Training records must also be maintained and be accessible to OSHA.

### COMPLIANCE DATES

The final rule is effective 90 days after its publication in the *Federal Register* (12/6/91) – March 6, 1992.

The Exposure Control Plan must be completed within 60 days of the effective date of the final standard – May 5, 1992.

Information and Training and Recordkeeping shall take effect within 90 days of the effective date – June 4, 1992.

Engineering and Work Practice Controls, Personal Protective Equip., Housekeeping, HIV and HBV Laboratories and Production Facilities, Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up, and Labels and Signs shall be effective July 6, 1992. ■

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## Part II (Excerpts)

Pages 64175 thru 64182

# Department of Labor

Occupational Safety and Health Administration

29 CFR Part 1910.1030

Occupational Exposure to Bloodborne Pathogens; Final Rule

XI. The Standard

*General Industry*

Part 1910 of title 29 of the Code of Federal Regulations is amended as follows:

**PART 1910—[AMENDED]**

**Subpart Z—[Amended]**

1. The general authority citation for subpart Z of 29 CFR part 1910 continues to read as follows and a new citation for § 1910.1030 is added:

Authority: Secs. 6 and 8, Occupational Safety and Health Act, 29 U.S.C. 655, 657, Secretary of Labor's Orders Nos. 12–71 (36 FR 8754), 8–76 (41 FR 25059), or 9–83 ( 48 FR 35736), as applicable; and 29 CFR part 1911.

* * * * *

Section 1910.1030 also issued under 29 U.S.C. 653.

* * * * *

2. Section 1910.1030 is added to read as follows:

**§ 1910.1030 Bloodborne Pathogens.**

(a) *Scope and Application.* This section applies to all occupational exposure to blood or other potentially infectious materials as defined by paragraph (b) of this section.

(b) *Definitions.* For purposes of this section, the following shall apply:

*Assistant Secretary* means the Assistant Secretary of Labor for Occupational Safety and Health, or designated representative.

*Blood* means human blood, human blood components, and products made from human blood.

*Bloodborne Pathogens* means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

*Clinical Laboratory* means a workplace where diagnostic or other screening procedures are performed on blood or other potentially infectious materials.

*Contaminated* means the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

*Contaminated Laundry* means laundry which has been soiled with blood or other potentially infectious materials or may contain sharps.

*Contaminated Sharps* means any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.

*Decontamination* means the use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.

*Director* means the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designated representative.

*Engineering Controls* means controls (e.g., sharps disposal containers, self-sheathing needles) that isolate or remove the bloodborne pathogens hazard from the workplace.

*Exposure Incident* means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties.

*Handwashing Facilities* means a facility providing an adequate supply of running potable water, soap and single use towels or hot air drying machines.

*Licensed Healthcare Professional* is a person whose legally permitted scope of practice allows him or her to independently perform the activities required by paragraph (f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up.

*HBV* means hepatitis B virus.

*HIV* means human immunodeficiency virus.

*Occupational Exposure* means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

*Other Potentially Infectious Materials* means

(1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids;

(2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and

(3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

*Parenteral* means piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.

*Personal Protective Equipment* is specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts or blouses) not intended to function as protection against a hazard are not considered to be personal protective equipment.

*Production Facility* means a facility engaged in industrial-scale, large-volume or high concentration production of HIV or HBV.

*Regulated Waste* means liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

*Research Laboratory* means a laboratory producing or using research-laboratory-scale amounts of HIV or HBV. Research laboratories may produce high concentrations of HIV or HBV but not in the volume found in production facilities.

*Source Individual* means any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to the employee. Examples include, but are not limited to, hospital and clinic patients; clients in institutions for the developmentally disabled; trauma victims; clients of drug and alcohol treatment facilities; residents of hospices and nursing homes; human remains; and individuals who donate or sell blood or blood components.

*Sterilize* means the use of a physical or chemical procedure to destroy all microbial life including highly resistant bacterial endospores.

*Universal Precautions* is an approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.

*Work Practice Controls* means controls that reduce the likelihood of exposure by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).

(c) *Exposure control*—(1) *Exposure Control Plan.* (i) Each employer having an employee(s) with occupational exposure as defined by paragraph (b) of this section shall establish a written Exposure Control Plan designed to

eliminate or minimize employee exposure.

(ii) The Exposure Control Plan shall contain at least the following elements:

(A) The exposure determination required by paragraph(c)(2).

(B) The schedule and method of implementation for paragraphs (d) Methods of Compliance, (e) HIV and HBV Research Laboratories and Production Facilities, (f) Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, (g) Communication of Hazards to Employees, and (h) Recordkeeping, of this standard, and

(C) The procedure for the evaluation of circumstances surrounding exposure incidents as required by paragraph (f)(3)(i) of this standard.

(iii) Each employer shall ensure that a copy of the Exposure Control Plan is accessible to employees in accordance with 29 CFR 1910.20(e).

(iv) The Exposure Control Plan shall be reviewed and updated at least annually and whenever necessary to reflect new or modified tasks and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure.

(v) The Exposure Control Plan shall be made available to the Assistant Secretary and the Director upon request for examination and copying.

(2) *Exposure determination.* (i) Each employer who has an employee(s) with occupational exposure as defined by paragraph (b) of this section shall prepare an exposure determination. This exposure determination shall contain the following:

(A) A list of all job classifications in which all employees in those job classifications have occupational exposure;

(B) A list of job classifications in which some employees have occupational exposure, and

(C) A list of all tasks and procedures or groups of closely related task and procedures in which occupational exposure occurs and that are performed by employees in job classifications listed in accordance with the provisions of paragraph (c)(2)(i)(B) of this standard.

(ii) This exposure determination shall be made without regard to the use of personal protective equipment.

(d) *Methods of compliance*—(1) *General*—Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.

(2) *Engineering and work practice controls.* (i) Engineering and work practice controls shall be used to eliminate or minimize employee exposure. Where occupational exposure remains after institution of these controls, personal protective equipment shall also be used.

(ii) Engineering controls shall be examined and maintained or replaced on a regular schedule to ensure their effectiveness.

(iii) Employers shall provide handwashing facilities which are readily accessible to employees.

(iv) When provision of handwashing facilities is not feasible, the employer shall provide either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.

(v) Employers shall ensure that employees wash their hands immediately or as soon as feasible after removal of gloves or other personal protective equipment.

(vi) Employers shall ensure that employees wash hands and any other skin with soap and water, or flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.

(vii) Contaminated needles and other contaminated sharps shall not be bent, recapped, or removed except as noted in paragraphs (d)(2)(vii)(A) and (d)(2)(vii)(B) below. Shearing or breaking of contaminated needles is prohibited.

(A) Contaminated needles and other contaminated sharps shall not be recapped or removed unless the employer can demonstrate that no alternative is feasible or that such action is required by a specific medical procedure.

(B) Such recapping or needle removal must be accomplished through the use of a mechanical device or a one-handed technique.

(viii) Immediately or as soon as possible after use, contaminated reusable sharps shall be placed in appropriate containers until properly reprocessed. These containers shall be:

(A) Puncture resistant;

(B) Labeled or color-coded in accordance with this standard;

(C) Leakproof on the sides and bottom; and

(D) In accordance with the requirements set forth in paragraph (d)(4)(ii)(E) for reusable sharps.

(ix) Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure.

(x) Food and drink shall not be kept in refrigerators, freezers, shelves, cabinets or on countertops or benchtops where blood or other potentially infectious materials are present.

(xi) All procedures involving blood or other potentially infectious materials shall be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets of these substances.

(xii) Mouth pipetting/suctioning of blood or other potentially infectious materials is prohibited.

(xiii) Specimens of blood or other potentially infectious materials shall be placed in a container which prevents leakage during collection, handling, processing, storage, transport, or shipping.

(A) The container for storage, transport, or shipping shall be labeled or color-coded according to paragraph (g)(1)(i) and closed prior to being stored, transported, or shipped. When a facility utilizes Universal Precautions in the handling of all specimens, the labeling/color-coding of specimens is not necessary provided containers are recognizable as containing specimens. This exemption only applies while such specimens/containers remain within the facility. Labeling or color-coding in accordance with paragraph (g)(1)(i) is required when such specimens/containers leave the facility.

(B) If outside contamination of the primary container occurs, the primary container shall be placed within a second container which prevents leakage during handling, processing, storage, transport, or shipping and is labeled or color-coded according to the requirements of this standard.

(C) If the specimen could puncture the primary container, the primary container shall be placed within a secondary container which is puncture-resistant in addition to the above characteristics.

(xiv) Equipment which may become contaminated with blood or other potentially infectious materials shall be examined prior to servicing or shipping and shall be decontaminated as necessary, unless the employer can demonstrate that decontamination of such equipment or portions of such equipment is not feasible.

(A) A readily observable label in accordance with paragraph (g)(1)(i)(H) shall be attached to the equipment stating which portions remain contaminated.

(B) The employer shall ensure that this information is conveyed to all affected employees, the servicing representative, and/or the manufacturer, as appropriate, prior to handling, servicing, or shipping so that appropriate precautions will be taken.

(3) Personal protective equipment—(i) Provision. When there is occupational exposure, the employer shall provide, at no cost to the employee, appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices. Personal protective equipment will be considered "appropriate" only if it does not permit blood or other potentially infectious materials to pass through to or reach the employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment will be used.

(ii) Use. The employer shall ensure that the employee uses appropriate personal protective equipment unless the employer shows that the employee temporarily and briefly declined to use personal protective equipment when, under rare and extraordinary circumstances, it was the employee's professional judgment that in the specific instance its use would have prevented the delivery of health care or public safety services or would have posed an increased hazard to the safety of the worker or co-worker. When the employee makes this judgement, the circumstances shall be investigated and documented in order to determine whether changes can be instituted to prevent such occurences in the future.

(iii) Accessibility. The employer shall ensure that appropriate personal protective equipment in the appropriate sizes is readily accessible at the worksite or is issued to employees. Hypoallergenic gloves, glove liners, powderless gloves, or other similar alternatives shall be readily accessible to those employees who are allergic to the gloves normally provided.

(iv) Cleaning, Laundering, and Disposal. The employer shall clean, launder, and dispose of personal protective equipment required by paragraphs (d) and (e) of this standard, at no cost to the employee.

(v) Repair and Replacement. The employer shall repair or replace personal protective equipment as needed to maintain its effectiveness, at no cost to the employee.

(vi) If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible.

(vii) All personal protective equipment shall be removed prior to leaving the work area.

(viii) When personal protective equipment is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal.

(ix) Gloves. Gloves shall be worn when it can be reasonably anticipated that the employee may have hand contact with blood, other potentially infectious materials, mucous membranes, and non-intact skin; when performing vascular access procedures except as specified in paragraph (d)(3)(ix)(D); and when handling or touching contaminated items or surfaces.

(A) Disposable (single use) gloves such as surgical or examination gloves, shall be replaced as soon as practical when contaminated or as soon as feasible if they are torn, punctured, or when their ability to function as a barrier is compromised.

(B) Disposable (single use) gloves shall not be washed or decontaminated for re-use.

(C) Utility gloves may be decontaminated for re-use if the integrity of the glove is not compromised. However, they must be discarded if they are cracked, peeling, torn, punctured, or exhibit other signs of deterioration or when their ability to function as a barrier is compromised.

(D) If an employer in a volunteer blood donation center judges that routine gloving for all phlebotomies is not necessary then the employer shall:

(*1*) Periodically reevaluate this policy;

(*2*) Make gloves available to all employees who wish to use them for phlebotomy;

(*3*) Not discourage the use of gloves for phlebotomy; and

(*4*) Require that gloves be used for phlebotomy in the following circumstances:

(*i*) When the employee has cuts, scratches, or other breaks in his or her skin;

(*ii*) When the employee judges that hand contamination with blood may occur, for example, when performing phlebotomy on an uncooperative source individual; and

(*iii*) When the employee is receiving training in phlebotomy.

(x) Masks, Eye Protection, and Face Shields. Masks in combination with eye protection devices, such as goggles or glasses with solid side shields, or chin-length face shields, shall be worn whenever splashes, spray, spatter, or droplets of blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can be reasonably anticipated.

(xi) Gowns, Aprons, and Other Protective Body Clothing. Appropriate protective clothing such as, but not limited to, gowns, aprons, lab coats, clinic jackets, or similar outer garments shall be worn in occupational exposure situations. The type and characteristics will depend upon the task and degree of exposure anticipated.

(xii) Surgical caps or hoods and/or shoe covers or boots shall be worn in instances when gross contamination can reasonably be anticipated (e.g., autopsies, orthopaedic surgery).

(4) *Housekeeping.* (i) General. Employers shall ensure that the worksite is maintained in a clean and sanitary condition. The employer shall determine and implement an appropriate written schedule for cleaning and method of decontamination based upon the location within the facility, type of surface to be cleaned, type of soil present, and tasks or procedures being performed in the area.

(ii) All equipment and environmental and working surfaces shall be cleaned and decontaminated after contact with blood or other potentially infectious materials.

(A) Contaminated work surfaces shall be decontaminated with an appropriate disinfectant after completion of procedures; immediately or as soon as feasible when surfaces are overtly contaminated or after any spill of blood or other potentially infectious materials; and at the end of the work shift if the surface may have become contaminated since the last cleaning.

(B) Protective coverings, such as plastic wrap, aluminum foil, or imperviously-backed absorbent paper used to cover equipment and environmental surfaces, shall be removed and replaced as soon as feasible when they become overtly contaminated or at the end of the workshift if they may have become contaminated during the shift.

(C) All bins, pails, cans, and similar receptacles intended for reuse which have a reasonable likelihood for becoming contaminated with blood or other potentially infectious materials shall be inspected and decontaminated on a regularly scheduled basis and cleaned and decontaminated immediately or as soon as feasible upon visible contamination.

(D) Broken glassware which may be contaminated shall not be picked up directly with the hands. It shall be cleaned up using mechanical means.

such as a brush and dust pan, tongs, or forceps.

(E) Reusable sharps that are contaminated with blood or other potentially infectious materials shall not be stored or processed in a manner that requires employees to reach by hand into the containers where these sharps have been placed.

(iii) Regulated Waste.

(A) Contaminated Sharps Discarding and Containment. (*1*) Contaminated sharps shall be discarded immediately or as soon as feasible in containers that are:

(*i*) Closable;

(*ii*) Puncture resistant;

(*iii*) Leakproof on sides and bottom; and

(*iv*) Labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard.

(*2*) During use, containers for contaminated sharps shall be:

(*i*) Easily accessible to personnel and located as close as is feasible to the immediate area where sharps are used or can be reasonably anticipated to be found (e.g., laundries);

(*ii*) Maintained upright throughout use; and

(*iii*) Replaced routinely and not be allowed to overfill.

(*3*) When moving containers of contaminated sharps from the area of use, the containers shall be:

(*i*) Closed immediately prior to removal or replacement to prevent spillage or protrusion of contents during handling, storage, transport, or shipping;

(*ii*) Placed in a secondary container if leakage is possible. The second container shall be:

(*A*) Closable;

(*B*) Constructed to contain all contents and prevent leakage during handling, storage, transport, or shipping; and

(*C*) Labeled or color-coded according to paragraph (g)(1)(i) of this standard.

(*4*) Reusable containers shall not be opened, emptied, or cleaned manually or in any other manner which would expose employees to the risk of percutaneous injury.

(B) Other Regulated Waste Containment.(*1*) Regulated waste shall be placed in containers which are:

(*i*) Closable;

(*ii*) Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;

(*iii*) Labeled or color-coded in accordance with paragraph (g)(1)(i) this standard; and

(*iv*) Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

(*2*) If outside contamination of the regulated waste container occurs, it shall be placed in a second container. The second container shall be:

(*i*) Closable;

(*ii*) Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;

(*iii*) Labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard; and

(*iv*) Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

(C) Disposal of all regulated waste shall be in accordance with applicable regulations of the United States, States and Territories, and political subdivisions of States and Territories.

(iv) Laundry.

(A) Contaminated laundry shall be handled as little as possible with a minimum of agitation. (1) Contaminated laundry shall be bagged or containerized at the location where it was used and shall not be sorted or rinsed in the location of use.

(2) Contaminated laundry shall be placed and transported in bags or containers labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard. When a facility utilizes Universal Precautions in the handling of all soiled laundry, alternative labeling or color-coding is sufficient if it permits all employees to recognize the containers as requiring compliance with Universal Precautions.

(3) Whenever contaminated laundry is wet and presents a reasonable likelihood of soak-through of or leakage from the bag or container, the laundry shall be placed and transported in bags or containers which prevent soak-through and/or leakage of fluids to the exterior.

(B) The employer shall ensure that employees who have contact with contaminated laundry wear protective gloves and other appropriate personal protective equipment.

(C) When a facility ships contaminated laundry off-site to a second facility which does not utilize Universal Precautions in the handling of all laundry, the facility generating the contaminated laundry must place such laundry in bags or containers which are labeled or color-coded in accordance with paragraph (g)(1)(i).

(e) *HIV and HBV Research Laboratories and Production Facilities.* (1) This paragraph applies to research laboratories and production facilities engaged in the culture, production, concentration, experimentation, and manipulation of HIV and HBV. It does not apply to clinical or diagnostic laboratories engaged solely in the analysis of blood, tissues, or organs. These requirements apply in addition to the other requirements of the standard.

(2) Research laboratories and production facilities shall meet the following criteria:

(i) Standard microbiological practices. All regulated waste shall either be incinerated or decontaminated by a method such as autoclaving known to effectively destroy bloodborne pathogens.

(ii) Special practices.

(A) Laboratory doors shall be kept closed when work involving HIV or HBV is in progress.

(B) Contaminated materials that are to be decontaminated at a site away from the work area shall be placed in a durable, leakproof, labeled or color-coded container that is closed before being removed from the work area.

(C) Access to the work area shall be limited to authorized persons. Written policies and procedures shall be established whereby only persons who have been advised of the potential biohazard, who meet any specific entry requirements, and who comply with all entry and exit procedures shall be allowed to enter the work areas and animal rooms.

(D) When other potentially infectious materials or infected animals are present in the work area or containment module, a hazard warning sign incorporating the universal biohazard symbol shall be posted on all access doors. The hazard warning sign shall comply with paragraph (g)(1)(ii) of this standard.

(E) All activities involving other potentially infectious materials shall be conducted in biological safety cabinets or other physical-containment devices within the containment module. No work with these other potentially infectious materials shall be conducted on the open bench.

(F) Laboratory coats, gowns, smocks, uniforms, or other appropriate protective clothing shall be used in the work area and animal rooms. Protective clothing shall not be worn outside of the work area and shall be decontaminated before being laundered.

(G) Special care shall be taken to avoid skin contact with other potentially infectious materials. Gloves shall be worn when handling infected animals and when making hand contact with other potentially infectious materials is unavoidable.

(H) Before disposal all waste from work areas and from animal rooms shall either be incinerated or decontaminated by a method such as autoclaving known to effectively destroy bloodborne pathogens.

(I) Vacuum lines shall be protected with liquid disinfectant traps and high-efficiency particulate air (HEPA) filters or filters of equivalent or superior efficiency and which are checked routinely and maintained or replaced as necessary.

(J) Hypodermic needles and syringes shall be used only for parenteral injection and aspiration of fluids from laboratory animals and diaphragm bottles. Only needle-locking syringes or disposable syringe-needle units (i.e., the needle is integral to the syringe) shall be used for the injection or aspiration of other potentially infectious materials. Extreme caution shall be used when handling needles and syringes. A needle shall not be bent, sheared, replaced in the sheath or guard, or removed from the syringe following use. The needle and syringe shall be promptly placed in a puncture-resistant container and autoclaved or decontaminated before reuse or disposal.

(K) All spills shall be immediately contained and cleaned up by appropriate professional staff or others properly trained and equipped to work with potentially concentrated infectious materials.

(L) A spill or accident that results in an exposure incident shall be immediately reported to the laboratory director or other responsible person.

(M) A biosafety manual shall be prepared or adopted and periodically reviewed and updated at least annually or more often if necessary. Personnel shall be advised of potential hazards, shall be required to read instructions on practices and procedures, and shall be required to follow them.

(iii) Containment equipment. (A) Certified biological safety cabinets (Class I, II, or III) or other appropriate combinations of personal protection or physical containment devices, such as special protective clothing, respirators, centrifuge safety cups, sealed centrifuge rotors, and containment caging for animals, shall be used for all activities with other potentially infectious materials that pose a threat of exposure to droplets, splashes, spills, or aerosols.

(B) Biological safety cabinets shall be certified when installed, whenever they are moved and at least annually.

(3) HIV and HBV research laboratories shall meet the following criteria:

(i) Each laboratory shall contain a facility for hand washing and an eye wash facility which is readily available within the work area.

(ii) An autoclave for decontamination of regulated waste shall be available.

(4) HIV and HBV production facilities shall meet the following criteria:

(i) The work areas shall be separated from areas that are open to unrestricted traffic flow within the building. Passage through two sets of doors shall be the basic requirement for entry into the work area from access corridors or other contiguous areas. Physical separation of the high-containment work area from access corridors or other areas or activities may also be provided by a double-doored clothes-change room (showers may be included), airlock, or other access facility that requires passing through two sets of doors before entering the work area.

(ii) The surfaces of doors, walls, floors and ceilings in the work area shall be water resistant so that they can be easily cleaned. Penetrations in these surfaces shall be sealed or capable of being sealed to facilitate decontamination.

(iii) Each work area shall contain a sink for washing hands and a readily available eye wash facility. The sink shall be foot, elbow, or automatically operated and shall be located near the exit door of the work area.

(iv) Access doors to the work area or containment module shall be self-closing.

(v) An autoclave for decontamination of regulated waste shall be available within or as near as possible to the work area.

(vi) A ducted exhaust-air ventilation system shall be provided. This system shall create directional airflow that draws air into the work area through the entry area. The exhaust air shall not be recirculated to any other area of the building, shall be discharged to the outside, and shall be dispersed away from occupied areas and air intakes. The proper direction of the airflow shall be verified (i.e., into the work area).

(5) *Training Requirements.* Additional training requirements for employees in HIV and HBV research laboratories and HIV and HBV production facilities are specified in paragraph (g)(2)(ix).

(f) *Hepatitis B vaccination and post-exposure evaluation and follow-up—(1) General.* (i) The employer shall make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident.

(ii) The employer shall ensure that all medical evaluations and procedures including the hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are:

(A) Made available at no cost to the employee;

(B) Made available to the employee at a reasonable time and place;

(C) Performed by or under the supervision of a licensed physician or by or under the supervision of another licensed healthcare professional; and

(D) Provided according to recommendations of the U.S. Public Health Service current at the time these evaluations and procedures take place, except as specified by this paragraph (f).

(iii) The employer shall ensure that all laboratory tests are conducted by an accredited laboratory at no cost to the employee.

(2) *Hepatitis B Vaccination.* (i) Hepatitis B vaccination shall be made available after the employee has received the training required in paragraph (g)(2)(vii)(I) and within 10 working days of initial assignment to all employees who have occupational exposure unless the employee has previously received the complete hepatitis B vaccination series, antibody testing has revealed that the employee is immune, or the vaccine is contraindicated for medical reasons.

(ii) The employer shall not make participation in a prescreening program a prerequisite for receiving hepatitis B vaccination.

(iii) If the employee initially declines hepatitis B vaccination but at a later date while still covered under the standard decides to accept the vaccination, the employer shall make available hepatitis B vaccination at that time.

(iv) The employer shall assure that employees who decline to accept hepatitis B vaccination offered by the employer sign the statement in appendix A.

(v) If a routine booster dose(s) of hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose(s) shall be made available in accordance with section (f)(1)(ii).

(3) *Post-exposure Evaluation and Follow-up.* Following a report of an exposure incident, the employer shall make immediately available to the exposed employee a confidential medical evaluation and follow-up, including at least the following elements:

(i) Documentation of the route(s) of exposure, and the circumstances under which the exposure incident occurred;

(ii) Identification and documentation of the source individual, unless the employer can establish that identification is infeasible or prohibited by state or local law;

(A) The source individual's blood shall be tested as soon as feasible and

after consent is obtained in order to determine HBV and HIV infectivity. If consent is not obtained, the employer shall establish that legally required consent cannot be obtained. When the source individual's consent is not required by law, the source individual's blood, if available, shall be tested and the results documented.

(B) When the source individual is already known to be infected with HBV or HIV, testing for the source individual's known HBV or HIV status need not be repeated.

(C) Results of the source individual's testing shall be made available to the exposed employee, and the employee shall be informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual.

(iii) Collection and testing of blood for HBV and HIV serological status:

(A) The exposed employee's blood shall be collected as soon as feasible and tested after consent is obtained.

(B) If the employee consents to baseline blood collection, but does not give consent at that time for HIV serologic testing, the sample shall be preserved for at least 90 days. If, within 90 days of the exposure incident, the employee elects to have the baseline sample tested, such testing shall be done as soon as feasible.

(iv) Post-exposure prophylaxis, when medically indicated, as recommended by the U.S. Public Health Service;

(v) Counseling; and

(vi) Evaluation of reported illnesses.

(4) *Information Provided to the Healthcare Professional.* (i) The employer shall ensure that the healthcare professional responsible for the employee's Hepatitis B vaccination is provided a copy of this regulation.

(ii) The employer shall ensure that the healthcare professional evaluating an employee after an exposure incident is provided the following information:

(A) A copy of this regulation;

(B) A description of the exposed employee's duties as they relate to the exposure incident;

(C) Documentation of the route(s) of exposure and circumstances under which exposure occurred;

(D) Results of the source individual's blood testing, if available; and

(E) All medical records relevant to the appropriate treatment of the employee including vaccination status which are the employer's responsibility to maintain.

(5) *Healthcare Professional's Written Opinion.* The employer shall obtain and provide the employee with a copy of the evaluating healthcare professional's written opinion within 15 days of the completion of the evaluation.

(i) The healthcare professional's written opinion for Hepatitis B vaccination shall be limited to whether Hepatitis B vaccination is indicated for an employee, and if the employee has received such vaccination.

(ii) The healthcare professional's written opinion for post-exposure evaluation and follow-up shall be limited to the following information:

(A) That the employee has been informed of the results of the evaluation; and

(B) That the employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious materials which require further evaluation or treatment.

(iii) All other findings or diagnoses shall remain confidential and shall not be included in the written report.

(6) *Medical recordkeeping.* Medical records required by this standard shall be maintained in accordance with paragraph (h)(1) of this section.

(g) *Communication of hazards to employees*— (1) *Labels and signs.* (i) Labels. (A) Warning labels shall be affixed to containers of regulated waste, refrigerators and freezers containing blood or other potentially infectious material; and other containers used to store, transport or ship blood or other potentially infectious materials, except as provided in paragraph (g)(1)(i)(E), (F) and (G).

(B) Labels required by this section shall include the following legend:

BIOHAZARD

BIOHAZARD

(C) These labels shall be fluorescent orange or orange-red or predominantly so, with lettering or symbols in a contrasting color.

(D) Labels required by affixed as close as feasible to the container by string, wire, adhesive, or other method that prevents their loss or unintentional removal.

(E) Red bags or red containers may be substituted for labels.

(F) Containers of blood, blood components, or blood products that are labeled as to their contents and have been released for transfusion or other clinical use are exempted from the labeling requirements of paragraph (g).

(G) Individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment or disposal are exempted from the labeling requirement.

(H) Labels required for contaminated equipment shall be in accordance with this paragraph and shall also state which portions of the equipment remain contaminated.

(I) Regulated waste that has been decontaminated need not be labeled or color-coded.

(ii) Signs. (A) The employer shall post signs at the entrance to work areas specified in paragraph (e), HIV and HBV Research Laboratory and Production Facilities, which shall bear the following legend:

BIOHAZARD

BIOHAZARD

(Name of the Infectious Agent)
(Special requirements for entering the area)
(Name, telephone number of the laboratory director or other responsible person.)

(B) These signs shall be fluorescent orange-red or predominantly so, with lettering or symbols in a contrasting color.

(2) *Information and Training.* (i) Employers shall ensure that all employees with occupational exposure participate in a training program which must be provided at no cost to the employee and during working hours.

(ii) Training shall be provided as follows:

(A) At the time of initial assignment to tasks where occupational exposure may take place;

(B) Within 90 days after the effective date of the standard; and

(C) At least annually thereafter.

(iii) For employees who have received training on bloodborne pathogens in the year preceding the effective date of the standard, only training with respect to the provisions of the standard which were not included need be provided.

(iv) Annual training for all employees shall be provided within one year of their previous training.

(v) Employers shall provide additional training when changes such as modification of tasks or procedures or institution of new tasks or procedures affect the employee's occupational exposure. The additional training may be limited to addressing the new exposures created.

(vi) Material appropriate in content and vocabulary to educational level, literacy, and language of employees shall be used.

(vii) The training program shall contain at a minimum the following elements:

(A) An accessible copy of the regulatory text of this standard and an explanation of its contents;

(B) A general explanation of the epidemiology and symptoms of bloodborne diseases;

(C) An explanation of the modes of transmission of bloodborne pathogens;

(D) An explanation of the employer's exposure control plan and the means by which the employee can obtain a copy of the written plan;

(E) An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials;

(F) An explanation of the use and limitations of methods that will prevent or reduce exposure including appropriate engineering controls, work practices, and personal protective equipment;

(G) Information on the types, proper use, location, removal, handling, decontamination and disposal of personal protective equipment;

(H) An explanation of the basis for selection of personal protective equipment;

(I) Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and that the vaccine and vaccination will be offered free of charge;

(J) Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials;

(K) An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available;

(L) Information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee following an exposure incident;

(M) An explanation of the signs and labels and/or color coding required by paragraph (g)(1); and

(N) An opportunity for interactive questions and answers with the person conducting the trainmg session.

(viii) The person conducting the training shall be knowledgeable in the subject matter covered by the elements contained in the training program as it relates to the workplace that the training will address.

(ix) Additional Initial Training for Employees in HIV and HBV Laboratories and Production Facilities. Employees in HIV or HBV research laboratories and HIV or HBV production facilities shall receive the following initial training in addition to the above training requirements.

(A) The employer shall assure that employees demonstrate proficiency in standard microbiological practices and techniques and in the practices and operations specific to the facility before being allowed to work with HIV or HBV.

(B) The employer shall assure that employees have prior experience in the handling of human pathogens or tissue cultures before working with HIV or HBV.

(C) The employer shall provide a training program to employees who have no prior experience in handling human pathogens. Initial work activities shall not include the handling of infectious agents. A progression of work activities shall be assigned as techniques are learned and proficiency is developed. The employer shall assure that employees participate in work activities involving infectious agents only after proficiency has been demonstrated.

(h) *Recordkeeping—(1) Medical Records.* (i) The employer shall establish and maintain an accurate record for each employee with occupational exposure, in accordance with 29 CFR 1910.20.

(ii) This record shall include:

(A) The name and social security number of the employee;

(B) A copy of the employee's hepatitis B vaccination status including the dates of all the hepatitis B vaccinations and any medical records relative to the employee's ability to receive vaccination as required by paragraph (f)(2);

(C) A copy of all results of examinations, medical testing, and follow-up procedures as required by paragraph (f)(3);

(D) The employer's copy of the healthcare professional's written opinion as required by paragraph (f)(5); and

(E) A copy of the information provided to the healthcare professional as required by paragraphs (f)(4)(ii)(B)(C) and (D).

(iii) Confidentiality. The employer shall ensure that employee medical records required by paragraph (h)(1) are:

(A) Kept confidential; and

(B) Are not disclosed or reported without the employee's express written consent to any person within or outside the workplace except as required by this section or as may be required by law.

(iv) The employer shall maintain the records required by paragraph (h) for at least the duration of employment plus 30 years in accordance with 29 CFR 1910.20.

(2) *Training Records. (i) Training records shall include the following information:*

(A) The dates of the training sessions;

(B) The contents or a summary of the training sessions;

(C) The names and qualifications of persons conducting the training; and

(D) The names and job titles of all persons attending the training sessions.

(ii) Training records shall be maintained for 3 years from the date on which the training occurred.

(3) *Availability.* (i) The employer shall ensure that all records required to be maintained by this section shall be made available upon request to the Assistant Secretary and the Director for examination and copying.

(ii) Employee training records required by this paragraph shall be provided upon request for examination and copying to employees, to employee representatives, to the Director, and to the Assistant Secretary in accordance with 29 CFR 1910.20.

(iii) Employee medical records required by this paragraph shall be provided upon request for examination and copying to the subject employee, to anyone having written consent of the subject employee, to the Director, and to the Assistant Secretary in accordance with 29 CFR 1910.20.

(4) *Transfer of Records.* (i) The employer shall comply with the requirements involving transfer of records set forth in 29 CFR 1910.20(h).

(ii) If the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director, at least three months prior to their disposal and transmit them to the Director, if required by the Director to do so, within that three month period.

(i) *Dates—(1) Effective Date.* The standard shall become effective on March 6, 1992.

(2) The Exposure Control Plan required by paragraph (c)(2) of this section shall be completed on or before May 5, 1992.

(3) Paragraph (g)(2) Information and Training and (h) Recordkeeping shall take effect on or before June 4, 1992.

(4) Paragraphs (d)(2) Engineering and Work Practice Controls, (d)(3) Personal Protective Equipment, (d)(4) Housekeeping, (e) HIV and HBV Research Laboratories and Production Facilities, (f) Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, and (g) (1) Labels and Signs, shall take effect July 6, 1992.

Appendix A to Section 1910.1030—Hepatitis B Vaccine Declination (Mandatory)

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

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Bloodborne *facts*

# Hepatitis B Vaccination--Protection For You

U.S. Department of Labor
Occupational Safety and Health Administration

## WHAT IS HBV?

Hepatitis B virus (HBV) is a potentially life-threatening bloodborne pathogen. Centers for Disease Control estimates there are approximately 280,000 HBV infections each year in the U.S.

Approximately 8,700 health care workers each year contract hepatitis B, and about 200 will die as a result. In addition, some who contract HBV will become carriers, passing the disease on to others. Carriers also face a significantly higher risk for other liver ailments which can be fatal, including cirrhosis of the liver and primary liver cancer.

HBV infection is transmitted through exposure to blood and other infectious body fluids and tissues. Anyone with occupational exposure to blood is at risk of contracting the infection.

Employers must provide engineering controls; workers must use work practices and protective clothing and equipment to prevent exposure to potentially infectious materials. However, the best defense against hepatitis B is vaccination.

## WHO NEEDS VACCINATION?

The new OSHA standard covering bloodborne pathogens requires employers to offer the three-injection vaccination series free to all employees who are exposed to blood or other potentially infectious materials as part of their job duties. This includes health care workers, emergency responders, morticians, first-aid personnel, law enforcement officers, correctional facilities staff, launderers, as well as others.

The vaccination must be offered within 10 days of initial assignment to a job where exposure to blood or other potentially infectious materials can be "reasonably anticipated." The requirements for vaccinations of those already on the job take effect July 6, 1992.

## WHAT DOES VACCINATION INVOLVE?

The hepatitis B vaccination is a noninfectious, yeast-based vaccine given in three injections in the arm. It is prepared from recombinant yeast cultures, rather than human blood or plasma. Thus, there is no risk of contamination from other bloodborne pathogens nor is there any chance of developing HBV from the vaccine.

The second injection should be given one month after the first, and the third injection six months after the initial dose. More than 90 percent of those vaccinated will develop immunity to the hepatitis B virus. To ensure immunity, it is important for individuals to receive all three injections. At this point it is unclear how long the immunity lasts, so booster shots may be required at some point in the future.

The vaccine causes no harm to those who are already immune or to those who may be HBV carriers. Although employees may opt to have their blood tested for antibodies to determine need for the vaccine, employers may not make such screening a condition of receiving vaccination nor are employers required to provide prescreening.

Each employee should receive counseling from a health care professional when vaccination is offered. This discussion will help an employee determine whether inoculation is necessary.

## WHAT IF I DECLINE VACCINATION?

Workers who decide to decline vaccination must complete a declination form. Employers must keep these forms on file so that they know the vaccination status of everyone who is exposed to blood. At any time after a worker initially declines to receive the vaccine, he or she may opt to take it.

## WHAT IF I AM EXPOSED BUT HAVE NOT YET BEEN VACCINATED?

If a worker experiences an exposure incident, such as a needlestick or a blood splash in the eye, he or she must receive confidential medical evaluation from a licensed health care professional with appropriate follow-up. To the extent possible by law, the employer is to determine the source individual for HBV as well as human immunodeficiency virus (HIV) infecuvity. The worker's blood will also be screened if he or she agrees.

The health care professional is to follow the guidelines of the U.S. Public Health Service in providing treatment. This would include hepatitis B vaccination. The health care professional must give a written opinion on whether or not vaccination is recommended and whether the employee received it. Only this information is reported to the employer. Employee medical records must remain confidential. HIV or HBV status must NOT be reported to the employer.

Bloodborne *facts*

# Personal Protective Equipment Cuts Risk

U.S. Department of Labor
Occupational Safety and Health Administration

Wearing gloves, gowns, masks, and eye protection can significantly reduce health risks for workers exposed to blood and other potentially infectious materials. The new OSHA standard covering bloodborne disease requires employers to provide appropriate personal protective equipment (PPE) and clothing free of charge to employees.

Workers who have direct exposure to blood and other potentially infectious materials on their jobs run the risk of contracting bloodborne infections from hepatitis B virus (HBV), human immunodeficiency virus (HIV) which causes AIDS, and other pathogens. About 8,700 health care workers each year are infected with HBV, and 200 die from the infection. Although the risk of contracting AIDS through occupational exposure is much lower, wearing proper personal protective equipment can greatly reduce potential exposure to all bloodborne infections.

## SELECTING PPE

Personal protective clothing and equipment must be suitable. This means the level of protection must fit the expected exposure. For example, gloves would be sufficient for a laboratory technician who is drawing blood, whereas a pathologist conducting an autopsy would need considerably more protective clothing.

PPE may include gloves, gowns, laboratory coats, face shields or masks, eye protection, pocket masks, and other protective gear. The gear must be readily accessible to employees and available in appropriate sizes.

If an employee is expected to have hand contact with blood or other potentially infectious materials or contaminated surfaces, he or she must wear gloves. Single use gloves cannot be washed or decontaminated for reuse. Utility gloves may be decontaminated if they are not compromised. They should be replaced when they show signs of cracking, peeling, tearing, puncturing, or deteriorating. If employees are allergic to standard gloves, the employer must provide hypoallergenic gloves or similar alternatives.

Routine gloving is not required for phlebotomy in voluntary blood donation centers, though it is necessary for all other phlebotomies. In any case, gloves must be available in voluntary blood donation centers for employees who want to use them. Workers in voluntary blood donation centers must use gloves (1) when they have cuts, scratches or other breaks in their skin; (2) while they are in training; and (3) when they believe contamination might occur.

Employees should wear eye and mouth protection such as goggles and masks, glasses with solid side shields, and masks or chin-length face shields when splashes, sprays, splatters, or droplets of potentially infectious materials pose a hazard through the eyes, nose or mouth. More extensive coverings such as gowns, aprons, surgical caps and hoods, and shoe covers or boots are needed when gross contamination is expected. This often occurs, for example, during orthopedic surgery or autopsies.

## AVOIDING CONTAMINATION

The key is that blood or other infectious materials must not reach an employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions for the duration of exposure.

Employers must provide the PPE and ensure that their workers wear it. This means that if a lab coat is considered PPE, it must be supplied by the employer rather than the employee. The employer also must clean or launder clothing and equipment and repair or replace it as necessary.

Additional protective measures such as using PPE in animal rooms and decontaminating PPE before laundering are essential in facilities that conduct research on HIV or HBV.

## EXCEPTION

There is one exception to the requirement for protective gear. An employee may choose, temporarily and briefly, under rare and extraordinary circumstances, to forego the equipment. It must be the employee's professional judgment that using the protective equipment would prevent the delivery of health care or public safety services or would pose an increased hazard to the safety of the worker or co-worker. When one of these excepted situations occurs, employers are to investigate and document the circumstances to determine if there are ways to avoid it in the future. For example, if a firefighter's resuscitation device is damaged, perhaps another type of device should be used or the device should be carried in a different manner. Exceptions must be limited--this is not a blanket exemption.

## DECONTAMINATING AND DISPOSING OF PPE

Employees must remove personal protective clothing and equipment before leaving the work area or when the PPE becomes contaminated. If a garment is penetrated, workers must remove it immediately or as soon as feasible. Used protective clothing and equipment must be placed in designated containers for storage, decontamination, or disposal.

## OTHER PROTECTIVE PRACTICES

If an employee's skin or mucous membranes come into contact with blood, he or she is to wash with soap and water and flush eyes with water as soon as feasible. In addition, workers must wash their hands immediately or as soon as feasible after removing protective equipment. If soap and water are not immediately available, employers may provide other handwashing measures such as moist towelettes. Employees still must wash with soap and water as soon as possible.

Employees must refrain from eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses in areas where they may be exposed to blood or other potentially infectious materials.

Bloodborne *facts*

# Protect Yourself When Handling Sharps

U.S. Department of Labor
Occupational Safety and Health Administration

A needlestick or a cut from a contaminated scalpel can lead to infection from hepatitis B virus (HBV) or human immunodeficiency virus (HIV) which causes AIDS. Although few cases of AIDS have been documented from occupational exposure, approximately 8,700 health care workers each year contract hepatitis B. About 200 will die as a result. The new OSHA standard covering bloodborne pathogens specifies measures to reduce these risks of infection.

## PROMPT DISPOSAL

The best way to prevent cuts and sticks is to minimize contact with sharps. That means disposing of them immediately after use. Puncture-resistant containers must be available nearby to hold contaminated sharps—either for disposal or, for reusable sharps, later decontamination for re-use. When reprocessing contaminated reusable sharps, employees must not reach by hand into the holding container. Contaminated sharps must never be sheared or broken.

Recapping, bending, or removing needles is permissible only if there is no feasible alternative or if required for a specific medical procedure such as blood gas analysis. If recapping, bending, or removal is necessary, workers must use either a mechanical device or a one-handed technique. If recapping is essential—for example, between multiple injections for the same patient—employees must avoid using both hands to recap. Employees might recap with a one-handed "scoop" technique, using the needle itself to pick up the cap, pushing cap and sharp together against a hard surface to ensure a tight fit. Or they might hold the cap with tongs or forceps to place it on the needle.

## SHARPS CONTAINERS

Containers for used sharps must be puncture resistant. The sides and the bottom must be leakproof. They must be labeled or color coded red to ensure that everyone knows the contents are hazardous. Containers for disposable sharps must have a lid, and they must be maintained upright to keep liquids and the sharps inside.

Employees must never reach by hand into containers of contaminated sharps. Containers for reusable sharps could be equipped with wire basket liners for easy removal during reprocessing, or employees could use tongs or forceps to withdraw the contents. Reusable sharps disposal containers may not be opened, emptied, or cleaned manually.

Containers need to be located as near to as feasible the area of use. In some cases, they may be placed on carts to prevent access to mentally disturbed or pediatric patients. Containers also should be available wherever sharps may be found, such as in laundries. The containers must be replaced routinely and not be overfilled, which can increase the risk of needlesticks or cuts.

## HANDLING CONTAINERS

When employees are ready to discard containers, they should first close the lids. If there is a chance of leakage from the primary container, the employees should use a secondary container that is closable, labeled, or color coded and leak resistant.

Careful handling of sharps can prevent injury and reduce the risk of infection. By following these work practices, employees can decrease their chances of contracting bloodborne illness.

Bloodborne *facts*

# Holding the Line on Contamination

U.S. Department of Labor
Occupational Safety and Health Administration

Keeping work areas in a clean and sanitary condition reduces employees' risk of exposure to bloodborne pathogens. Each year about 8,700 health care workers are infected with hepatitis B virus, and 200 die from contracting hepatitis B through their work. The chance of contracting human immunodeficiency virus (HIV), the bloodborne pathogen which causes AIDS, from occupational exposure is small, yet a good housekeeping program can minimize this risk as well.

## DECONTAMINATION

Every employer whose employees are exposed to blood or other potentially infectious materials must develop a written schedule for cleaning each area where exposures occur. The methods of decontaminating different surfaces must be specified, determined by the type of surface to be cleaned, the soil present and the tasks or procedures that occur in that area.

For example, different cleaning and decontamination measures would be used for a surgical operatory and a patient room. Similarly, d surfaced flooring and carpeting require separate cleaning meth-..s. More extensive efforts will be necessary for gross contamination than for minor spattering. Likewise, such varied tasks as laboratory analyses and normal patient care would require different techniques for clean-up.

Employees must decontaminate working surfaces and equipment with an appropriate disinfectant after completing procedures involving exposure to blood. Many laboratory procedures are performed on a continual basis throughout a shift. Except as discussed below, it is not necessary to clean and decontaminate between procedures. However, if the employee leaves the area for a period of time, for a break or lunch, then contaminated work surfaces must be cleaned.

Employees also must clean (1) when surfaces become obviously contaminated; (2) after any spill of blood or other potentially infectious materials; and (3) at the end of the work shift if contamination might have occurred. Thus, employees need not decontaminate the work area after each patient care procedure, but only after those that actually result in contamination.

If surfaces or equipment are draped with protective coverings such as plastic wrap or aluminum foil, these coverings should be removed or replaced if they become obviously contaminated. Reusable receptacles such as bins, pails and cans that are likely to become contaminated must be inspected and decontaminated on a regular basis. If contamination is visible, workers must clean and decontaminate the item immediately, or as soon as feasible.

Should glassware that may be potentially contaminated break, workers need to use mechanical means such as a brush and dustpan or tongs or forceps to pick up the broken glass—never by hand, even when wearing gloves.

Before any equipment is serviced or shipped for repairing or cleaning, it must be decontaminated to the extent possible. The equipment must be labeled, indicating which portions are still contaminated. This enables employees and those who service the equipment to take appropriate precautions to prevent exposure.

## REGULATED WASTE

In addition to effective decontamination of work areas, proper handling of regulated waste is essential to prevent unnecessary exposure to blood and other potentially infectious materials. Regulated waste must be handled with great care—i.e., liquid or semi-liquid blood and other potentially infectious materials, items caked with these materials, items that would release blood or other potentially infected materials if compressed, pathological or microbiological wastes containing them and contaminated sharps.

Containers used to store regulated waste must be closable and suitable to contain the contents and prevent leakage of fluids. Containers designed for sharps also must be puncture resistant. Tl must be labeled or color-coded to ensure that employees are aware . the potential hazards. Such containers must be closed before removal to prevent the contents from spilling. If the outside of a container becomes contaminated, it must be placed within a second suitable container.

Regulated waste must be disposed of in accordance with applicable state and local laws.

## LAUNDRY

Laundry workers must wear gloves and handle contaminated laundry as little as possible, with a minimum of agitation. Contaminated laundry should be bagged or placed in containers at the location where it is used, but not sorted or rinsed there.

Laundry must be transported within the establishment or to outside laundries in labeled or red color-coded bags. If the facility uses Universal Precautions for handling all soiled laundry, then alternate labeling or color coding that can be recognized by the employees may be used. If laundry is wet and it might soak through laundry bags, then workers must use bags that prevent leakage to transport it.

## RESEARCH FACILITIES

More stringent decontamination requirements apply to research laboratories and production facilities that work with concentrated strains of HIV and HBV.

# IMPORTANT INFORMATION ABOUT HEPATITIS B AND HEPATITIS B VACCINE

*Please Read This Carefully*

HEPATITIS
2/U

## WHAT IS HEPATITIS B?

Hepatitis B is an infection of the liver caused by the hepatitis B virus (HBV). The term "viral hepatitis" is often used for and may include hepatitis B and other similar diseases which affect the liver but are caused by different viruses.

Acute hepatitis generally begins with mild symptoms that may or may not become severe. These symptoms may include loss of appetite, a vague feeling of oncoming illness, extreme tiredness, nausea, vomiting, stomach pain, dark urine, and jaundice (yellow eyes and skin). Skin rashes and joint pain can also occur.

In the United States about 300,000 persons, mostly young adults, catch hepatitis B each year. About one-fourth will develop jaundice, and more than 10,000 will need to be hospitalized. About 250 people die each year from severe acute hepatitis B. Between 6 and 10 of every 100 young adults who catch hepatitis B become chronic carriers (have HBV in their blood for 6 or more months) and may be able to spread the infection to others for a long period of time. Infants who catch hepatitis B are more likely to become carriers than adults. About one-fourth of these carriers go on to develop a disease called "chronic active hepatitis." Chronic active hepatitis often causes cirrhosis of the liver (liver destruction) and death due to liver failure. In addition, HBV carriers are much more likely than others to get cancer of the liver. An estimated 4,000 persons die from hepatitis B-related cirrhosis each year in the United States and more than 800 die from hepatitis B-related liver cancer.

The risk of catching hepatitis is higher in certain groups of people because of their occupation, lifestyle, or environment. Because of the risks of serious problems associated with hepatitis B infection, vaccination to help prevent infections is recommended for these groups.

## HEPATITIS B VACCINE:

Hepatitis B vaccine is made two ways. Plasma-derived vaccine is made from HBV particles that have been purified from the blood of carriers. The method used to prepare the plasma-derived hepatitis vaccine kills all types of viruses found human blood, including the virus that causes Acquired Imm nodeficiency Syndrome (AIDS). Recombinant vaccines made from common baker's yeast cells through genetic en neering. The yeast-derived vaccines do not contain hum blood products. The vaccine is given by injection on thr separate dates. Usually, the first two doses are given 1 mor apart, and the third dose, 5 months after the second. After thr doses, the hepatitis B vaccine is 85%-95% effective in p venting hepatitis B infection in those who received vaccine. alternative schedule of 4 doses of vaccine given at 0, 1, 2, a 12 months is approved for one vaccine. Protection for norm healthy adults and children given vaccine lasts at least 7 yea Booster doses of vaccine are not routinely recommended at present time.

## WHO SHOULD GET HEPATITIS B VACCINE?

The vaccine is recommended for persons at high risk catching HBV infection who are or may be unprotected. Th groups include:

1. Persons with occupational risk. Health care public safety workers who are exposed to blood blood products or who may get accidental needlesti should be vaccinated.
2. Clients and staff of institutions for the developm tally disabled. The special behavorial and medi problems of these persons make this a high-risk setti Risk in institutions is related to contact with blood also with bites and contact with skin lesions and ot body fluids that contain HBV. Clients and staff group and foster homes where a carrier is known to present should also be vaccinated.
3. Hemodialysis patients. Although the hepatitis B v cine is less effective in these patients, it should still offered to all hemodialysis patients. Higher do and/or special preparations are required for these p sons.
4. Homosexually active men.

*(PLEASE READ OTHER SIDE)*

. Users of unlawful injectable drugs. Sharing needles is an extremely high-risk activity for transmitting hepatitis B.

. Recipients of certain blood products. Persons such as hemophiliacs who receive special products to help their blood clot are at high risk of infection.

. Household and sexual contacts of HBV carriers. When HBV carriers are identified, household and sexual contacts should be offered vaccine.

Adoptees from countries with high rates of HBV infection. Families with orphans or unaccompanied minors from such countries should have the child checked for HBV carriage, and, if positive, family members should be vaccinated.

Other contacts of HBV carriers. Vaccine use should be considered in classroom and other day settings where deinstitutionalized developmentally disabled HBV carriers behave aggressively or have special medical problems that may expose contacts to their blood or body secretions. Teachers and aides have been shown to be at significant risk in these settings. Other persons who have casual contact with carriers at schools and offices are at little risk of catching HBV infection and vaccine is not recommended for them.

Special populations from areas with high rates of hepatitis B. These groups include Alaskan natives, native Pacific islanders, immigrants and refugees from eastern Asia and sub-Saharan Africa, and their U.S. born children.

Inmates of long-term correctional facilities. The risk of inmates catching HBV infection may be due to use of unlawful injectable drugs and male homosexual practices.

Heterosexuals who come in for treatment of other newly acquired sexually transmitted diseases who have histories of sexual activity with multiple sexual partners in the past 6 months.

Persons who plan to travel to areas outside the United States that have high rates of hepatitis B infection, stay in these areas for more than 6 months, and have close contact with the local population; and, persons traveling for shorter durations who may have contact with blood from or sexual contact with local persons in areas where HBV infection is common. Persons traveling abroad who will perform medical procedures in areas where HBV infection is common are at very high risk.

## ADDITIONAL VACCINEES:

Hepatitis B vaccine is also recommended as part of the therapy used to prevent hepatitis B infection *after* exposure to HBV. Postexposure use of hepatitis B vaccine is recommended for the following persons: (1) infants born to mothers who have a positive blood test for hepatitis B surface antigen (HBsAg); (2) persons having accidents involving HBsAg-positive blood where there is entry through the skin or a mucous membrane; (3) infants less than 12 months old whose mother or primary caregiver has HBV infection; and, (4) persons having sexual contact with someone who has a positive blood test for HBsAg. The hepatitis B vaccine series should be started at the same time as other therapy, primarily, treatment with hepatitis B immune globulin (HBIG).

## POSSIBLE SIDE EFFECTS FROM THE VACCINE:

The most common side effect is soreness at the site of injection. Illnesses, such as neurologic reactions, have been reported after vaccine is given, but hepatitis B vaccine is not believed to be the cause of these illnesses. As with any drug or vaccine, there is a rare possibility that allergic or more serious reactions or even death could occur. No deaths, however, have been reported in persons who have received this vaccine. Giving hepatitis B vaccine to persons who are already immune or to carriers will not increase the risk of side effects.

## PREGNANCY:

No information is available about the safety of the vaccine for unborn babies; however, because the vaccine contains only particles that do not cause hepatitis B infection, there should be no risk. In contrast, if a pregnant woman gets a hepatitis B infection, this may cause severe disease in the mother and chronic infection in the newborn baby. Therefore, pregnant women who are otherwise eligible can be given hepatitis B vaccine.

## QUESTIONS:

If you have any questions about hepatitis B or hepatitis B vaccine, please ask us now or call your doctor or health department before you sign this form.

## REACTIONS:

If the person who received the vaccine gets sick and visits a doctor, hospital, or clinic during the 4 weeks after receiving the vaccine, please report it to:

## HEPATITIS B IMMUNIZATION CONSENT/REFUSAL FORM

Please check one:

( ) **YES, I WANT TO RECEIVE HEPATITIS B VACCINE.** I have read the information given to me about Hepatitis B and Hepatitis B vaccine and I have had a chance to ask questions which were answered to my satisfaction.

I wish to participate in the vaccination program. I understand this includes 3 injections at prescribed intervals over a six month period. I, further understand that as with all treatment, there is no guarantee that I will become immune to Hepatitis B or that I will not experience an adverse side effect as a result of the vaccination.

| Birth Date | Home telephone | Work Telephone | Chart # |
|---|---|---|---|
| _____ | _____ | _____ | _____ |

| | Date Given | Lot # | Administered by | Next dose due |
|---|---|---|---|---|
| 1st dose | | | | |
| 2nd dose | | | | |
| 3rd dose | | | | |

( ) **NO, I DO NOT NEED TO RECEIVE HEPATITIS B VACCINE.**
Because of prior infection or vaccination, I do not wish to participate in the Hepatitis B vaccination program.

( ) **NO, I DO NOT WANT TO RECEIVE HEPATITIS B VACCINE.**
I understand that due to my occupational exposure to blood and other potentially infectious materials, I may be at risk of acquiring Hepatitis B virus (HBV) infection.

I have been given the opportunity to be vaccinated with Hepatitis B vaccine at no charge to myself.

However, I decline Hepatitis B vaccination at this time.

I understand that by declining this vaccine. I continue to be at risk of acquiring Hepatitis B, a serious disease.

If in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccine series at no charge to me.

Name _____ Street address _____ Date _____

Signature _____ City _____ State _____ Zip _____

SSN # _____ Telephone # _____

(PLEASE READ OTHER SIDE)

## AUTHORIZATION FOR HEPATITIS B VACCINATION

The Disease

Hepatitis B is a virus that is transmitted by blood and body fluids. People most often become infected with Hepatitis B virus (HBV) through unprotected sexual intercourse with an infected partner or by sharing needles with an infected person. Health care workers or Emergency responders may come in direct contact with blood and body fluids and may be at risk for exposure to HBV. Hepatitis B is characterized by fever, loss of appetite, nausea, abdominal pain, fatigue, and juandice. Sequelae of Hepatitis B disease might include cirrhosis, liver cancer, or death. In addition, you may become a chronic carrier and be a source of infection to others.

The Vaccine

Immunization with these vaccines can prevent acute Hepatitis B infection and can also reduce sickness and chance of death from the long term complications of HBV infection. According to OSHA regulation 29 CFR 1910.1030 (Occupational Exposure to Bloodborne Pathogens), employees are eligible to receive the Hepatitis B vaccination series. Several safe and effective vaccines against HBV use the non-infectious portion of the virus and are produced in the laboratory from common baker's yeast cells. It is not made from blood or blood products. The vaccine cannot transmit HBV or HIV. The vaccine series consists of 3 doses of vaccine given according to the following schedule:

| | |
|---|---|
| 1st dose: | at elected date |
| 2nd dose: | 1 month later |
| 3rd dose: | 6 months after the 1st dose |

Over 90% of healthy people who receive the full course of immunization will develop protective immunity. The duration of this immunity is unknown, but a check for immunity is advised 5 years after vaccination. People who are immune from natural infection do not require vaccination.

### SIDE EFFECTS

Hepatitis B vaccine is usually well tolerated. Local soreness at injection site was the most frequent reaction. Low grade fever lasting 48 hours, malaise, fatigue, headache, nausea, muscle soreness, joint pain (limited to a few days after vaccination), and rash have been reported. Very rarely have cases of neurological reaction, including Guillaine - Barre, been reported.

### QUESTIONS

1) Have you had an Hepatitis B injection? YES_____ NO_____

2) Are you sick now with something more serious than a cold? YES_____ NO_____

3) Do you think you are pregnant? YES _____ NO_____

4) Do you have serious allergies to yeast or bread molds? YES_____ NO_____

5) Are you allergic to Thimerisol? (commonly used in contact lens solution) YES_____ NO_____

Should you have any question about Hepatitis B vaccine, we encourage you to ask us at the time of vaccination. You may also wish to consult with your own personal physician.

**TED LOPATKIEWICZ**
**OFFICE OF GOVERNMENT & PUBLIC AFFAIRS**
**NATIONAL TRANSPORTATION SAFETY BOARD**

## AIRCRAFT ACCIDENT INVESTIGATION AND THE MEDIA

I think to understand the Safety Board's philosophy on releasing information to the public, we must begin with several realities on which we all agree.

First, we live in an open society.

Second, we depend on our free press to provide us with information addressing all facets of our lives -- our physical and financial health, our politics, our community.

Third, press interest in aviation accidents is not going to go away just because some might wish that it would.

We are a public agency, funded by the public. Many of you represent private interests, but we at the Safety Board are civil servants. Except for those areas in which we are shielded from public scrutiny by the law, it is our responsibility, and our policy, to let the public know what we are doing.

You may ask, does the public care? The first morning after we arrived at the Sioux City accident, we held a press briefing basically announcing that we had arrived and the investigation was beginning. There were 36 television cameras there, and untold radio and print reporters. You will find a dozen cameras at a typical major accident, and although they seem to be a dying breed, some of the nation's major media outlets still have full time transportation reporters who go to every major accident.

Sioux City was different from most other accidents only in scope. Every accident raises questions of public safety and, yes, probably morbid fascination. At the Safety Board, we go out of our way to address the former, and we go out of our way to avoid pandering to the latter. If you don't believe me on that, ask that segment of the Los Angeles press corps that is still complaining about not being allowed into the LAX collision scene until after the victims had been extricated.

As you know, the Board is not a regulatory or law enforcement agency. Our final product is the safety recommendation, which carries weight only if we are perceived to be impartial and credible. That means being open, and it means releasing information that might reflect unfavorably on a government agency, a private company or even an individual.

Nothing would destroy that credibility more than a close-to-the-vest information policy that made us look like we were protecting someone. That is why when we send a Go-Team to an accident, the team includes a Board Member, who acts as principal spokesperson for the investigation, and either me or one of my colleagues, who deals with the news media and makes arrangements for press briefings and press access to the accident site. We are there so that the investigators can do their jobs unimpeded by our public information responsibilities.

And for those of you who are new to this and might be confused about jurisdiction, earlier today you heard that the Safety Board is responsible for running the investigations, not the Department of Transportation or the FAA. Likewise, it is the NTSB that briefs the press, not DOT or the FAA. No parties are allowed to release information to the public about the progress of the investigation while we're on scene. Occasionally, they will conduct briefings but they are required to stick to ancillary matters, such as an airline releasing passenger lists, or a local police authority providing rescue personnel for interviews.

At a major accident, the investigators conduct a progress meeting every evening to exchange new information learned that day with all of the parties, and the parties agree about what information is factual and what is not. Based on that meeting, the Board Member briefs the press that night on the progress of the investigation. By getting the information out that same night, we minimize selective leaking of information, or worse still, misinformation.

You notice that I said minimize. It is impossible to prevent leaking, but what is there to leak if we've just released the information an hour after the progress meeting? If this information were leaked in a news vacuum, then it would take on the weight of authenticity.

And, realistically, with so many participants privy to the results of the investigation, it would be virtually impossible to forego or withhold the disclosure of important factual information for any appreciable time.

I would ask those who think we shouldn't brief the press: Who should put the information out? The airline? The aircraft manufacturer? And please don't say nobody should put the information out. There is no more fertile breeding ground for rumor than an absence of fact.

What, then, is factual information worthy of release? It is information that does not require analysis. It is a fact that eyewitnesses told us there was smoke coming out of an engine, it is not necessarily a fact that there was smoke coming out of that engine. The pilot's total hours, the plane's recent mechanical writeups, the weather, are all facts. Whether or not they have any bearing on the ultimate cause won't be known for a long time, but we are not going to analyze those facts on scene.

We do confirm the obvious. If the aircraft's tail is found a mile from the main wreckage, we will confirm an in-flight breakup, but will not speculate on what could have caused it.

We do not release names of passengers, crewmembers or air traffic controllers while on scene.

Information gathered from ATC communications is factual and releasable. The actual tapes and transcripts are released by the FAA when our ATC group chairman tells us he or she is satisfied with the accuracy of the transcript. This can take 10 days or several months, depending on when the FAA gets us the transcript.

Flight data and cockpit voice recorder information initially is withheld but may be characterized broadly. For example, we might be able to say that the crew was discussing a control problem before the accident, or that there was no discussion of a problem at all. The actual CVR tape is never released by us. And the law calls for pertinent portions of the transcript to be released on the first day of a public hearing, or, if there is no hearing, when a majority of the factual reports are ready. In any case, the release occurs months after the accident.

Do we release all factual information we gather while on scene? Of course not; there are hundreds or thousands of bits of data that could not possibly be released in the context of our press briefings. While we do not analyze the information, we have to exercise some editorial judgment. Sometimes, if we cannot provide the proper context for a fact, we decline to release it at our briefings.

For example, if the pilot's records contain information on, let's say, his or her participation in a company-sponsored alcohol rehabilitation program, we will not release that while on-scene. There are, first of all, privacy considerations, but also we have a responsibility not to mislead the public. In the usually frenetic atmosphere of the early days of an investigation, it would be irresponsible of us to put out such information out of context. This information will probably be released eventually in our factual reports, not so that it is buried under tons of information, but so it is revealed in context with other pertinent information, like results of the post-accident alcohol/drug test. That way, the public can make an informed judgment of its significance.

Are we managing the news? It's a hard question, but as long as we are controlling the release of information, we want to do it responsibly.

After we leave the scene of the accident, there are several more opportunities for the release of information. If a public hearing is held, the factual reports will be released the first day. If no hearing is held, they will he placed in the docket several months after the accident. A final report is discussed and voted upon in public session by the Board in Washington.

That's how major accidents are handled. The vast majority of the Board's aviation investigations are done by one investigator from a regional office. The policy on release of information is the same but on a much smaller scale. The investigator him- or herself handles all dealings with the press until the factual report has been mailed to Washington. The Public Affairs Office takes it from there.

Finally, the public can get all factual reports, determinations of cause and safety recommendations on all accidents from all modes at one location -- the Public Inquiries Section in the Safety Board's headquarters building.

Our policy has been evolving over our 27-year history, although what I've explained has been our way of doing business in my 8 years at the Board.

This Symposium is your opportunity to comment on our policy and make recommendations to improve it. I urge you to participate in the news media panel tomorrow morning, and in the recommendation session on Thursday.

## CHARLOTTE CASEY
## DIRECTOR OF GOVERNMENT AND PUBLIC AFFAIRS
## NATIONAL TRANSPORTATION SAFETY BOARD

# POLITICAL REALITIES OF ACCIDENT INVESTIGATIONS

My topic today -- the political realities of accident investigations -- is in some ways quite easy. In fact, I probably could just tell everyone in the audience to recall the remarks just completed and merely substitute the word "elected or political representative" each time the media, the press or the public was mentioned.

The simple truth of the matter is that elected and political representatives -- at all levels of government -- have a pressing and even acute interest in finding out about Safety Board accident investigations and their results. However, while this interest matches that of the media, it also can go beyond in importance, if not scope.

As Thomas Jefferson on March 31,1809 wrote:

> "The care of human life and happiness, and not their destruction, is the first and only legitimate object of good government."

Major aviation accidents obviously have a direct impact on constituents and a community. The ultimate questions in lawmakers' minds are: what went wrong; why did it go wrong; and, how do we prevent it from happening again? The chain of interest starts locally.

At an accident scene, local political leaders view themselves as a conduit for assuring that emergency medical services are provided and that the accident scene, pending arrival of the NTSB investigators, has been made secure. And, city representatives are at times parties to Safety Board investigations.

A community's emergency medical services, firefighting and police capabilities serve as a measure of a local government's effectiveness and the provision of those services is frequently discussed in the Safety Board's final report for all to see. Our accident investigation process -- from start to finish -- therefore is of interest to local political leaders since the final report is seen as an objective assessment of their effectiveness in providing emergency services.

An ongoing assessment and accountability of aviation safety also goes on at a state level as well. We often think of the Federal government as the repository for aviation regulations and legislation, but legislatures are also becoming more and more involved in aviation safety oversight. For example, there have been state hearings to discuss the regulation of general aviation and related safety issues at particular airports. Efforts have gone so far in one state as to consider a hearing at which the feasibility of creating a separate state pilot licensing system -- one that would supplement the Federal Aviation Administration prerogative. Clearly, this is but one illustration of the strong desire of elected government officials to ensure local aviation safety.

In reality, Governors, Senators, U.S. Representatives and other lawmakers are properly exercising their role as "watchdogs" over those charged with protecting the public's safety. Unlike the media, which is the needed messenger of information for the public and political system, elected officials are the sole instrument for any important changes needed in the system of protecting the public.

These political realities quite naturally fit into the Safety Board's mission.

As an independent Federal agency, the Board has no regulatory authority. It does not have the resources to launch massive safety education campaigns on our own, nor can we contract with others to undertake such work. Our mandate is clearly to investigate aviation and other accidents, determine their cause, and develop safety recommendations to prevent recurrences. We believe it is through the public, government and political arenas that we can maximize the adoption of our safety recommendations.

Therefore, we work very closely with all lawmakers at every level and, in particular, with the U.S. Congress. It is no revelation to this audience that Congress exerts a great deal of power over aviation safety. Aside from passing laws, it controls the budgets of aviation agencies and, through that process, directly impacts and targets the areas where aviation safety dollars are spent. A sentence can be inserted in a committee report, a piece of legislation can be introduced, or a hearing called in order to require agencies to address a new or old safety problems or to alter the course of action an agency is pursuing a goal.

The Safety Board is often called upon in this process to lend its impartial and credible expertise in aviation safety. Last year, we testified at 17 Congressional hearings and our accident investigations or safety studies were the foundation of our

presentations. The testimony in each instance was as factual and authoritative as the reports adopted by the Safety Board.

Hundreds of requests for aviation safety data and accident investigation briefings are received from Congress yearly. Copies of aviation accident public dockets are routinely provided to "the Hill" when they are opened, as are final Safety Board accident reports.

By disseminating this public and factual material, the Safety Board makes its case for aviation safety recommendations and broadens the impact we have as a non-regulatory agency.

Much of the success the Safety Board enjoys in enhancing safety comes through our relationships with the transportation-oriented Congressional committees, and we have a reputation for being accessible, forthright and technically accurate. We have found that the more we can share objective and credible information with political and elected officials, the better we are in fostering aviation safety.

In conclusion, the political realities of an accident investigation are simple -- all elected representatives want and need to know what is going on and how to prevent an accident from happening again. They are the people's representatives for ensuring, as Thomas Jefferson said, "the care of human life."

We at the Safety Board are, in turn, their creation and their day-to-day representatives, acting as an independent and impartial body of competent technical, scientific and other skilled professionals that makes sure aviation safety happens to the fullest extent possible.

## CAPTAIN PAUL MCCARTHY
## CHAIRMAN, ACCIDENT INVESTIGATION BOARD
## AIR LINE PILOTS ASSOCIATION

Thank you for the opportunity to comment on behalf of the Air Line Pilots Association. As you are probably aware, ALPA represents over 42,000 pilots at 36 domestic airlines.

Our members are involved with both major "Go Team" and field office investigations when they relate to an ALPA-represented carrier. Our response is two fold. Attorneys will be asked to represent the surviving crew for obvious reasons. Pilot volunteers and technical staff will attempt to participate in the investigative process.

The sole purpose for participation in the investigative process is to insure that all that can be learned from an event is learned and subsequently used to improve the air transport system. Unfortunately, past experience indicates that field office investigations frequently fail to uncover valuable safety information from the investigation of air carrier accidents and incidents.

It seems reasonably clear that many if not most of the problems we have identified can be traced, finally, to a lack of resources available to the NTSB. In a perfect world we could conduct a full go-team investigation with extensive follow-up and a formal report for each accident or serious incident involving an aircraft used in scheduled air transportation.

Since such funding will never be available, some consideration must be given to the way in which NTSB assets are allocated. Initially there are two decisions to be made. First, which events should be investigated. Second, what level of investigative effort is appropriate for the selected events.

For standardization, the events under consideration should conform to the definitions recommended to ICAO at AIG 92 for accidents or serious incidents. While accidents can be objectively defined to a degree under the existing regulations, serious incidents require a much more subjective evaluation. In either case, the preliminary decision on the level of response must be made without the benefit of much factual investigation.

Frequently, some initial evaluation of causal factors in advance of the actual investigation may also influence the decision on what level of response is required. I make this distinction because of our perception that two bench marks are used to decide upon the appropriate level of response. Clearly, significant loss of life and the attendant public interest will require a high level of response.

Less clear is the decision that a significant air safety issue is involved which would warrant the same high level response. While rare, this does and should occur. Again, however, it requires some prejudgment of causal factors which will, to a degree, control the subsequent investigation.

Where neither public interest or significant safety issues are initially apparent, the investigation will typically be conducted by a field office. The first task of the assigned investigator at an air carrier event should be to evaluate the need for an augmented investigative effort and report accordingly. Of course, this will be an ongoing obligation.

During the course of the investigation, unfortunately, we have observed that such evaluation is seldom undertaken in the investigation of regional airline accidents or major airline serious incidents. We believe that this shortcoming has resulted in missed opportunities to learn valuable safety lessons.

In previous meetings with NTSB, we have pointed out several areas where we believe field office investigations are deficient and ways in which they might be improved. It is important to stress that our observations are limited to events involving aircraft used in scheduled air transportation.

Our observations concerning field office investigation procedures vary widely. It is clear that there is very little standardization between offices concerning the method of conducting the investigation. While some offices typically work well, many others, at best appear to be disorganized.

The Board, by regulation, requires parties to adhere to standards of performance in major investigations. Some equivalent standards of performance should be required for all field office investigators when dealing with an air carrier event.

A primary issue is adherence to the party system for investigation. Frequently it is necessary for our investigators to make several calls to "higher authority" to

even gain access to the investigation. We have the distinct impression that our role in an investigation has not been adequately pointed out to field investigators, who may seldom have had to become involved with an air carrier event. If, as we believe, the party system is an effective means to insure a complete investigation, then the NTSB must insure that its investigators at all levels understand and appreciate the role of ALL parties to an air carrier investigation.

This concern is amplified by the fact that a serious air carrier incident is frequently investigated and closed within six hours of the event. Seldom, if ever, are follow-on activities undertaken. For an event involving a highly complex aircraft operating in typically high density airspace, being operated by a professional airline crew, a "quick look" is never adequate.

If an event is worth investigating, it is worth investigating properly. A half-day investigation without follow-up is not proper. The response of how much time is available to the investigator simply won't do. If the investigator could wait for party involvement, then the time spent might yield some useful information, instead of simply generating a data point for some statistical analysis.

It has been suggested that ALPA adopt a reactive posture in this area. Specifically, resort to the same "higher authority" when a field office investigation is seen to be lacking. If the field office investigators were properly briefed to a set of procedures applicable to air carrier investigation, appeal to such authority would be of some use. Under the present unstandardized system, the investigation, such as it is, has often times been concluded before parties are even notified. As you know, reopening an investigation is far more difficult than requesting that an ongoing investigation be expanded.

Finally, there is the matter of interface between the FAA, the operator, the pilots and the NTSB. For an investigation conducted by NTSB Washington using the party system, the ground rules are known, they are followed and they work. All too often an NTSB field office investigator, FAA FSDO inspector and a local company chief pilot will attempt to deal with an event crew in an inappropriate manner. These individuals are not aware of the ground rules or, if they are, they choose not to follow them.

This action seriously impacts the ability of the investigator to fully understand the circumstances surrounding the crew action. Further, issues of basic fairness seem to be involved when emergency revocation is threatened unless a crew submits

to an interview which can be used against them without representation. This is a current fact pattern which has come up in at least two recent investigations.

The field office investigators must be fully briefed in this area and encouraged to assume effective control of the process.

As with everything else, some standardization must be brought to the process. Individual investigators must be required to alter their customary protocols when dealing with an air carrier event. They must be encouraged to take the time to build an effective investigative team composed of all interested parties.

They must be required to adhere to the ground rules concerning crew interviews.

They must be instructed in the need to constantly re-evaluate the level of investigation required without reference to preconceived notions of causal factors. In other words, they must resist the temptation to take a "quick look" and investigate to confirm that first impression. They must be required to adhere to standardized procedures for the field investigation of an air carrier event, the necessary follow-up investigation and the preparation of the report and recommendations. There must be some internal oversight in these areas to insure that an effective product is being produced.

Finally, the requirement of timelines must be reinforced. Adequate time must be invested at all phases to insure a proper investigation. The release of the report and recommendations must be timely, along the lines of the product of a major investigation.

Clearly, the workload of the field investigators makes these objectives at best difficult. Without a set of requirements, the Board cannot know, much less prove to Congress, that it is failing to carry out its mandate due to lack of resources to effectively investigate all air carrier accidents and serious incidents.

To sum up in pilotese, you must develop an effective checklist for field office investigations of air carrier events and require your investigators to use it to argue for sufficient funding to do the job right.

**JOHN D. RAWSON**
**MANAGER, ACCIDENT INVESTIGATION DIVISION**
**FEDERAL AVIATION ADMINISTRATION**

# REDUCTION OF MAJOR REGIONAL OFFICE DELEGATED "MAJOR" INVESTIGATIONS

The term "Delegated Major Investigations" is somewhat confusing and begs for definition. First, if there is a "major" accident or incident it seems there should be a "major" effort to investigate. When the NTSB selects a regional person as the investigator-in-charge (IIC), there is a perception that the field-led team will expend less effort either because NTSB has decided that accident or incident merits less or that the expertise required is less. In other words, there is less priority or importance assigned.

To ensure a more thorough investigation NTSB specialists in Washington are sometimes dispatched to the scene to cover areas such as systems, powerplants, etc., to assist the regional IIC. This creates problems for the Office of Accident Investigation (AAI) in the following ways:

- The rule of thumb for us is to always dispatch the FAA-IIC from AAI when the NTSB-IIC is sent from Washington NTSB Headquarters. In cases where an accident or incident is delegated to a regional NTSB-IIC, we must justify, sometimes with difficulty, dispatching an FAA-IIC from AAI. If that cannot be accomplished, we must request IIC coverage by Flight Standards personnel near the site of the occurrence. Quite frankly, our experience has been that we cannot expect the expenditure of time and effort to compare with having our own AAI investigators at the scene. There are many reasons for this, but primarily Flight Standards inspectors have more work than they can accomplish without the added requirement to investigate accidents. The same is true when trying to enlist engineers and pilots from aircraft and engine certification regions. I dare say that NTSB regional investigators also have an abundance of work covering the numerous accidents which occur in their assigned regions.

- In other words, NTSB and FAA headquarters should expend more effort to be certain that we devote the manpower and logistical support to every major accident or incident investigation.

- In many cases we have realized that facts and circumstances discovered during the initial on-scene investigation prompt us to wish we had dispatched a go-team from Washington.

- The term major delegated accident can apply to FAR Parts 121, 135, 133, and 91 or other operations. Let's be honest - many of the investigations receive more attention and support based on the number of fatalities, location, importance of the people killed or injured, and degree of media, congress and public interest. There is not much the NTSB or FAA can do about this. What we can and should do is investigate every accident or incident to the maximum extent possible knowing that any one case can be of tremendous importance in preventing future accidents with loss of life or property and satisfying our mutual mandates of improving safety in aviation.

**Conduct More On-Scene General Aviation Accident Investigations**

Another specific area which urgently needs to be addressed is the relatively few on-scene field investigations by NTSB. Several years ago both the NTSB and FAA only went to the scene in about 18 percent of the accidents (not necessarily the same 18 percent). Today the FAA visits the scene in over 80 percent of the accidents while the NTSB still only visits the scene in about 18 percent of the cases.

Both the NTSB and FAA should go to the scene in 100 percent of the fatal accidents and strive to be present in 100 percent of all accidents. We believe that we must visit the scene to properly discharge our responsibilities under the FAA Act of 1958. We strongly believe that the NTSB must be present to carry out their mandates for it often turns out that the probable cause results in the need for immediate FAA action to prevent a similar occurrence. In fact, at least 90 percent of all the NTSB recommendations for corrective action are directed to the FAA. Over the years the FAA has accepted delegated accident investigations. This has been deemed necessary due to the large number of strategically located Flight Standards field office personnel and the relatively small number of NTSB regional

investigators. The resulting FAA delegated investigations have drawn criticism due to:

- NTSB stating that FAA investigations were poorly conducted and poorly reported.

- FAA separate but parallel investigators accomplished FAA needs but failed to gather sufficient data for NTSB to determine probable cause.

- Some FAA inspector/investigator supplied factual data was in a format not conducive to the preparation of the NTSB Accident Report Form 6120.4.

**Improve NTSB/FAA Field Office Interaction**

There is a need to improve interaction between NTSB and FAA field offices where both have the same geographical coverage. At present there is a good rapport between some offices which has resulted in improved and more thorough investigations. In other cases there has been a minimum of communication with a lack of exchanging factual information except for the basics. This often produces two separate reports with each attempting to satisfy their respective needs--NTSB for probable cause, and FAA to provide data to update the airmen records, aircraft records, and move quickly to take steps to remedy a compromise of safety. Partly due to this lack of interaction, it is now necessary for NTSB and FAA personnel to meet frequently in Washington to discuss differences in numbers and classification of accidents for statistical purposes. Much of this could be eliminated if closer liaison and interaction could be achieved at the field level.

Any follow-on activity such as teardown inspections, special studies, interviews, or any factual information derived should be shared with FAA.

**More Distribution of NTSB Preliminary and Final Accident Reports to FAA Field Offices**

FAA field offices need to receive copies of both the Preliminary Report (6120.19), Final Report 6120.4, and the Pilot Operator Report 6120.1/2. In addition to providing FAA with the official reports concerning the accident, it also allows the

FAA to bring any errors or additional facts to the attention of NTSB in a timely manner enabling changes to be made if warranted. This close liaison will result in FAA supplying NTSB with any factual information concerning airman flight and medical records, aircraft records, and surveillance information to enhance the NTSB reports.

## B. BRUCE BICKHAUS
## SAFETY/TRAINING COORDINATOR
## ALLIED PILOTS ASSOCIATION

It is indeed a pleasure to be asked by the NTSB for my comments regarding Regional Office Delegated "Major" Investigations. Let me first say that my background in aircraft accident investigation began in the Air Force in 1972 when I attended the Air Force Accident Investigation School at the University of Southern California. During my Air Force career, I was the Investigating Officer on four fighter-type accidents.

After leaving the Air Force, I was hired by Braniff Airways and lasted there about two years before being furloughed, followed shortly thereafter by the airline's bankruptcy. While waiting for the airline to recover, I was employed by Aerospace Management Services International (AMSI), a subsidiary of the United States Aviation Insurance Group (USAIG). Our job was to investigate aircraft accidents on behalf of USAIG's insureds. I investigated in the neighborhood of 300 general aviation accidents over a five-year period.

Although we were investigating on behalf of Lycoming, Bendix, Piper Aircraft, and other insureds of USAIG, after ten years the NTSB determined that we were somehow connected to an insurance company and invoked the regulation which states: "...no party to a field investigation designated under the regulation shall be represented by any person who also represents claimants or insurers."

About this time American Airlines was growing, and the Allied Pilots Association was hunting for someone who was out of work and knew a little about aviation safety. I fit both parts pretty well -- I was out of work and knew very little about aviation safety. I did believe, however, that I knew quite a bit about aircraft accident investigations. Wrong! My experience was primarily limited to investigating small single-engine airplane accidents. Although I did not have to determine cause, the NTSB determined that most of these accidents were the result of pilot error.

My first exposure to a major aircraft accident occurred when our DC-10 aborted a takeoff and continued off the end of runway 35R at DFW. The captain was injured and taken to the hospital with back injuries resulting from the collapse of the nose gear. The first officer and engineer were relatively uninjured. A

hardware problem in the braking system was determined to be a major factor in the failure of the aircraft to stop on the runway. The crew was exonerated for a couple of reasons: Number one was because a thorough investigation uncovered the braking anomaly; and number two, because there was an FAA inspector riding jumpseat who testified that the crew performed admirably.

This brings me to my first point -- that of determining cause. Everyone wants to know the cause of the accident. I've struggled with this concept in my own mind because without a cause, it is difficult to make meaningful recommendations. When I investigated for the Air Force, we had the same problem: Come up with a cause -- because. On the very first accident I was assigned to out of accident investigation school, the colonel leading the investigation had never been on an accident investigation before; nor had any of the rest of us. To make a long story short, we could not determine why this highly experienced pilot lost control of his airplane in the final turn to landing. Concerned that the general at Ninth Air Force would not take kindly to that, the colonel told the Pilot Officer to proceed to the nearest grocery store and buy a chicken. He would then scorch the heck out of it, and throw it in the wreckage site. We would now have a cause for the accident. A cause -- because. Obviously our officer and gentleman upbringing got in the way of that plan, and it was sorrowfully dispensed with. By the way, we did skillfully determine that the cause of the accident was "pilot error."

After landing at a northeastern airport, American was cleared to the end of the runway and across the inside runway. Clearance was then given to taxi back up the parallel taxiway to the ramp. Landing after American, another air carrier turned off at mid-field and was given a clearance to cross the inside runway. Failing to stop at the intersection, the other carrier ran into the side of the American jet. Tower personnel were busy doing what they do and wham-o!, two airplanes stuck together. The NTSB determined the cause of this accident to be a failure of the see-and-avoid concept. If that was so, why was there a failure to see and avoid? At our urging -- not the NTSB's -- we asked that a nighttime visibility study be conducted using two aircraft to determine what the pilots could see from their respective airplanes. Other factors in this accident were poorly analyzed as well, but I'll not go into them at this time. The point is: the on-site investigation was shallow, and no meaningful recommendations resulted from it.

Another issue that came out of the same accident was the insensitivity of the IIC to the crew members involved. The accident occurred around 2100 hours. Following the evacuation and other related activities, the crew was taken by Port

Authority personnel to a holding area and told to wait there for the arrival of the NTSB, and to expect to be drug-tested. In the meantime, paramedics were called to examine the crew, and the American captain was diagnosed with a probable concussion. (Due to the sideways load of the collision, the captain hit his head on the window frame). When the IIC arrived on scene, he briefly talked to the crew. The captain pointed out to him that he had a severe headache and asked if they could be released. Perhaps due to a miscommunication, the NTSB Investigator left everyone with the impression that drug and alcohol testing had to be accomplished first. At 0230 some 5 1/2 hours following the accident, drug and alcohol testing was finally accomplished. The crew had not been allowed to go the bathroom or have anything to eat or drink since the accident.

It is my opinion that the NTSB Investigator, knowing the condition of the crew and the rules regarding alcohol and drug testing, should have advised the crew to get medical attention and return for drug testing at a later time. By the way, at 0500 following the drug and alcohol testing, the crew did go to the hospital emergency room where the captain was diagnosed with a concussion.

The crew was instructed to remain in the local area until an interview could be conducted later. The next afternoon -- approximately 18 hours after the accident -- the captain was feeling so bad that he went to a friend's local AME, who also diagnosed his condition as a probable concussion. That night, 26 hours after the accident, members of the APA Accident Investigation Committee and the pilot's chief pilot met with the crew for the first time. At this meeting, a decision was made to send the captain on the first available flight home to Atlanta where he could get proper medical attention. The following morning, I informed the Operations Group Chairman that the chief pilot had told the captain to go home. The messenger was "shot." From that time on, the pilot and the APA were falsely accused of not cooperating with the NTSB. In fact, remarks were made that even ALPA didn't hide out their USAir crew that long. APA and the Company made it perfectly clear to the NTSB that the decision as to when the captain was ready to testify would be left entirely up to his physician and the captain himself.

This is not to criticize one particular investigator, or to pick apart one particular accident, but to point out that there is always time to get things done. The health of a particular person should always come before scurrying to get the job done.

Regardless of whether it's a delegated field investigation, or a full-blown go-team investigation, if groups are assigned to the accident, then it's very important that progress meetings be held during the on-site portion. At the three delegated field investigations I have been involved with, these meetings were generally sporadic.

The Allied Pilots Association understands that the IIC has full control over the accident and who will be permitted party status. The APA recommends that for delegated "major" field investigations, the same guidelines be followed as would be used for a go-team accident. Specifically, if individuals from our organization are assigned to more than one group, then we would like the option of assigning a coordinator.

A few general areas I would like to see improved upon:

- I'm not sure that judging a pilot's performance in a large aircraft is the same as managing a baseball team without ever having played in the majors. It would seem appropriate for the investigators who investigate a major accident to be type-rated and remain current on at least a narrowbody and/or a widebody aircraft.

- More coordination is needed with the parties on delegated "major" field investigations, especially after the on-site portion is completed.

- A better understanding of the union's role in the accident investigation. A pilot has a couple of things going for him -- his piloting skills and his judgement abilities. It's the union's secondary role to see that these qualities are not unfairly used in the causal determination of the accident.

- Change the way the final reports are worded, i.e., instead of saying the pilot "failed to accomplish," use a more positive and constructive slant.

- When required, find a way that other group participants can listen to the CVR and preserve its confidentiality.

- Consider the fact that some investigative teams are so determined to interview the crew at the onset of the investigation that some questions tend to be irrelevant and misleading. It might be better to let the investigation process proceed before a detailed interview takes place.

- I believe that allowing the parties to contribute to the analysis phase of the investigation would produce a better report with possibly fewer reconsiderations.

- The Sunshine Meetings should be participatory. In the one sunshine meeting that I was privileged to attend, I sat there in total frustration, being unable to correct or comment on what I thought were erroneous statements made by the staff.

Because this seminar is designed to critique the manner in which the NTSB conducts its business, this paper has a definite negative slant. I must add, therefore, that in my experience, the positives far outweigh the negatives.

**JOHN GOGLIA**
**FLIGHT SAFETY COORDINATOR**
**ASSOCIATION OF MACHINISTS**
**AND INTERNATIONAL AEROSPACE WORKERS**

Good afternoon - It is my pleasure to be on this program of the National Transportation Safety Board and to have the opportunity to comment on behalf of the IAMAW.

I am sure most of you are aware that the IAMAW represents in excess of 100,000 air carrier employees as well as most of the production workers in our nation's aircraft manufacturing industries.

As part of our structure, we operate an Accident Investigating Committee to participate in incidents/accidents involving IAMAW represented carriers.

We participate, as do the other interest groups, in this process of investigation to insure that all facets of the investigation receive a thorough "look" and to help insure that any appropriate actions are followed up. As I am sure you know, these investigations often reveal shortcomings that are not the primary cause of the accident but should be addressed. We try to impress on airline management to make any changes so noted.

Today I have been asked to comment on the regional personnel who are required to investigate air carrier accidents.

Recently I handled an incident involving a 727 that experienced a landing gear problem, and, after flying around for some time, landed with one main gear stuck in the retracted position. This aircraft sustained damage to the flaps and a wing tip. There were a few injuries associated with the evacuation, but none were serious. Even before this aircraft had landed, the airline and other similarly interested organizations like the IAMAW started the process of preparing in the event of a problem.

As part of this preparation, we conduct a very quick review of a number of items including the maintenance history of that particular aircraft. As soon as it is clear that the National Transportation Safety Board intends to investigate, the appropriate "Industry Go Team" is dispatched. The point that I am making is that

to industry it really does not matter if the NTSB treats this as an accident or an incident, the response team is made up of the same members, just fewer in number.

On the government side (NTSB), notification is made at the time of the incident and the decision is made whether to send the "Go Team" or to send regional personnel. There is a pretty well known set of criteria to determine whether a situation is termed an incident or an accident.

Having decided these issues all the interest groups gather at the site, and, since we are talking about an event handled by a regional person, that is who the parties gather around - and who gathers?

- The same players that would have gathered if it was a "Go Team" response.
- The same very highly experienced person.
- The same "very well versed in the rules" person.
- The same "highly politically aware" person.

Given this scenario, it is no wonder that some would criticize regional investigations for, with rare exception, the Indians have more experience collectively than does the Chief, and those Indians are not bashful in making themselves heard or seen. However, before one criticizes these regional folks, we should look at what is required of them. Most regional people spend their careers investigating general aviation and business aircraft accidents. I am told that this accounts for approximately ten percent of all general aviation crashes. Whatever that number is, the remaining crashes are investigated by the FAA . . . and I believe that they should remain very quiet when the subject of NTSB deficiencies comes up . . . something about glass houses and stones comes to mind here.

We have an event occur within a region and "whammo" the regional person has a "Major" (read that) complex aircraft investigation using procedures that he/she has learned, but has not been dealing with on a regular basis, and with little, if any, practical experience. On top of that, he/she has a "team" that has worked these issues often and are ready to "jump on" his/her every word or deed.

God help him/her if he/she treats any party member different than what they expect. I do not think any of the industry folks here would willingly trade places with him/her.

Today these regional people may have an additional factor to plug into this problem. That factor is the Clinton Administration's goal of personnel and budgetary reductions occurring across the government. It is likely that the NTSB will have less of both to work with. This will probably result in more, not less, accidents/incidents being handled by field investigators.

Given these new budget realities it may be possible to make this situation a little better simply by including regional personnel in major investigations whenever they occur in their region. Additionally the more exposure they have to both the industry participants and the technical staff in DC the more comfortable the regional people will become in using the wealth of talent that is available to them.

Another plus that may occur from the changes forced by the new budget realities is a real effort to impose a set of performance standards on field office investigations so meaningful standardization occurs for all. Right now the perception is that only the parties must adhere to standards of performance. I find it very frustrating to receive a call from my team members stating that they have been denied party status due to some lack of understanding by regional personnel which I then must start up the ladder to get resolved. Such basic process questions should be resolved long before we show up at the site.

All of what I have mentioned so far could be called communications issues. Doesn't it seem strange that in an industry that is on the cutting edge of technology, we are having so many problems talking to each other? A little human factors research here might pay some real dividends.

I would also like to mention some crystal ball stuff that we need to pay attention to. Today the air transportation system is undergoing some major changes and ones that will impact the accident investigations in subtle but meaningful ways. I'm sure that most of you are aware that the air carriers contract out a number of tasks to third party providers through the FAR 145 repair station process; however, there is a growing feeling that the amount of services provided will increase substantially over the next few years. On top of that the number of non-U S holders of FAR 145 authority has grown and will continue to grow at a very rapid rate. Since the rules governing non-U. S. 145 repair stations allow the work records to be

kept in their native language, I can see some future investigation spending considerable time and effort just trying to determine the actual work that was performed on a given aircraft or component. When these changes to FAR 145 were first proposed, the NTSB was opposed to them, but since the FAA has adopted the changes, the NTSB now must expend scarce rescores in order to prepare for the expected impact of these changes.

## CAPTAIN W. J. MORAN
## STAFF V.P., SAFETY AND ENGINEERING
## TRANS WORLD AIRLINES

Good afternoon. My name is Wally Moran and I am the Staff V.P. - Flight Safety and Engineering for Trans World Airlines. My title includes the position of Senior Accident Investigator for TWA. In this capacity, I have worked with the National Transportation Safety Board on major investigations as well as several regional investigations.

It is a great privilege for me to represent the airline industry on this panel. I agreed to participate on this panel, not because I was upset about the interface I have had with regional investigations, but because I and my colleagues in the industry believe just a few changes could make the process much more productive. It is our hope that all will benefit from a greater understanding of each other's problems with the goal of this panel being a smoother, more accurate investigation process, and ultimately an improved safety record for our industry.

I view my role on this panel as twofold. One is to serve as a conduit through which our industry group can express our collective views, and the other is to be attentive to the critical comments addressed to the airlines. I fully expect that this forum will provide for a two way exchange, and I will take your constructive criticisms and proposed solutions back to our ATA Safety committee for consideration and eventual action by the individual airlines.

In preparing to participate on this panel, I canvassed a large number of the U.S. air carriers to solicit their comments on the subject of Airline Investigations conducted by the regional offices. The views I express here are a compilation of my colleagues comments and represent the views of our industry in general.

It is agreed that the areas most in need of serious attention at the regional level are:

1. Standardization of field investigations.

2. Communication during regional investigations.

3. Prompt analysis of components and release of airline equipment.

**Standardization of Field Investigations**

A primary concern shared by all in the industry is that there is a great deal of inconsistency in field investigations between the regions as well as between individual IICs. To emphasize this point, I quote the response of an airline representative to my inquiry on this matter: "Every field office investigation I have ever participated in, probably 20 or so, has been inconsistently directed. The Field Investigators are accustomed to operating independently without technical group organization and normal party participation. It seems rules and procedures are different for each Field Investigator."

We recognize that Regional Investigators spend most of their time conducting independent investigations and are quite accustomed to this style. Although an independent style may be best in the General Aviation Arena, we believe it imperative that the Regional Investigators understand that a more organized, structured and standardized approach to air carrier accident investigations is needed.

Another aspect of standardization and consistency which we would like to address is the inconsistent treatment a given incident will receive from various regions. What one region will treat as a major incident may receive only passing interest from another region. Although we recognize that no two incidents and accidents are the same and that a certain amount of flexibility must exist in order to get the job done, we must stress to the Board that the lack of consistency, which is the most common complaint among the carriers, causes problems between the regional offices and the carriers, detracts from the quality of the investigations, and ultimately jeopardizes safety.

In that regard, we ask the Board to develop and issue more formal guidelines to all regions regarding the conduct of investigations and the procedures to be followed when working with an air carrier. The airline industry, through the ATA Safety Committee, would be happy to participate in the development of these guidelines.

**Communications During Regional Investigations**

It is agreed that the second area of concern is communication, which includes the sharing of information during the investigation and the coordination of the findings. By way of example, one of our members has stated that he has never received a copy of a Field Investigation Report without having to go through

headquarters to obtain it. Another member has commented, that the field reports he has received have often contained technical errors. This point goes hand in hand with our earlier discussion regarding standardization.

The Regional Offices must be made aware of the multitude of interested parties involved in an airline incident as opposed to a general aviation accident. The IICs need to incorporate the successful techniques that are used in a "major go team event" which consists of the party system, progress meetings, review of field notes and a technical review. Our experience is that IICs bring the "one man band" G/A techniques to an airline problem, which, in our opinion, is not conducive to a thorough, accurate and productive investigation.

The airlines have a vast wealth of knowledge and resources available to aid in an investigation. We believe that these resources are not utilized because often it is not known that they exist. We believe that through greater use of the party system and its associated interchanges, the airlines' expertise will be brought to the task.

Further, and more importantly, through the use of this party system, factors that resulted in the mishap will be known sooner, allowing the parties to initiate the corrective action process earlier than they may have otherwise.

We ask the Board to develop a consistent set of guidelines that ensures party participation as well as group review. This would provide the Regional Office access to the expertise of the airlines as well as the other parties, plus it would ensure that the final product would be technically correct.

We would also ask the Board to encourage a greater interchange of information between the regional offices and the airlines. There is a multitude of training opportunities the industry could make available.

We are continuously conducting training programs for flight crews, maintenance technicians, and others. We would invite the Regional offices to contact the airlines in their regions with respect to participation in these training programs. Such an interchange would serve to increase the knowledge level of the IICs as it relates to the airlines' equipment and provide them with a greater awareness of the resources available. Once again, the airline industry, through the ATA Safety Committee, would be happy to coordinate such requests.

**Prompt Analysis of Components and Release of Airline Equipment**

Although we do not wish to short cut an investigation, it is critical for us to get our equipment released and back in service as soon as possible. In today's environment, we simply do not have extra aircraft and parts. This means that we may be canceling revenue flights for every hour our aircraft is tied up.

This philosophy also applies to our parts, such as FDR and CVRs. It is often the case that a subject component is sent to the laboratory in Washington, D.C. for an analysis where it seems to remain longer than is necessary. Although it is undisputed that an analysis is important to an investigation, the component should only be sent to Washington if there is a reasonable assurance that it will not remain there for months before it is examined. A recent example is a case involving a hydraulic pump where five months passed before it was examined. In addition, to further perpetuate the problem, the Regional Offices are sometimes directed by the Washington staff to send subject components to the DCA laboratory even when the IICs may request a local analysis.

If the Washington laboratory is unable to timely examine the subject component, the IICs should be allowed to consider alternative procedures. Often the airline or manufacturer can do the job much quicker.

We ask the Board to review their procedures in this area and grant the Regional IICs greater authority to exercise their judgement so as to accelerate this process. Again, we request the Regions to meet with their airlines to learn what facilities and resources are available, should the need arise. This is not only an economic issue to the airlines, it is a safety issue, especially when it may involve sub-standard components, which should be identified and replaced.

Ladies and Gentlemen, these are the three elements that the airlines encourage you to work on. We the member airlines of ATA stand ready to work with you on these issues.

**TERALD R. LAMB**
**MANAGER, CERTIFICATION AND INSTALLATION ENGINEERING**
**COLLINS AVIONICS**

Industry and government agencies involved in the aviation business have common goals. These goals include providing safe, reliable, and modern air transportation to individuals and the general public. The NTSB is an important part of this equation. Their function is one of evaluating technical facts concerning incidents and accidents to understand the cause(s) and providing information back to the government, industry, and the public to reduce the probability of repeated safety problems occurring.

The NTSB has generally done a good job in their role of completing and documenting accident investigations. One must keep the positive aspects of the situation in mind while evaluating constructive comments on weak areas. It is with this in mind that the following comments are made.

**Communication**

In the complex society we live in today, it is very important to provide information in the level of detail needed by the user. It is too easy today to miss the user entirely or to provide so much data that the critical items cannot be understood. This ability to communicate appropriately is crucial to all of us.

In terms of accident investigations, it would seem imperative that we all know who the players are and what the status of an investigation is. It is suggested that a centralized function which tracks data and provides specific data to those who need the information would aid this activity.

-- Ensure that all telephones at the NTSB are answered or forwarded to a central information area. Today it is not uncommon to have to "catch" someone in the office.

-- Work with the FAA to consolidate a listing of failure reports, incident investigations, and accident investigations. This listing should include items like:

- Summary of details, e.g. aircraft type, owner, location, date and short comment on the incident or accident.

- Responsible FAA and/or NTSB investigator.

- Contact information, e.g. name, telephone number, FAX number, and address.

- Listing of industry contacts.

**Recommendation:** Add a centralized failure reporting, incident investigation, and accident investigation information function to track status and provide interface information within and outside the government.

**Investigation Techniques**

The techniques used by investigators vary considerably within the NTSB. Some investigators address the specific investigation appropriately while others seem to drift off into other areas. This creates considerable concern since our common goal is to determine the "real" cause of an accident and take action as required to prevent reoccurrence of similar accidents.

Most manufacturers are concerned that their products provide the maximum level of safety that is economically possible. As such, our company, and most of the others we deal with, place accident investigation as the highest priority activity. This involves providing resources in locations and on the schedules necessary to optimize the NTSB investigation activities. It is, therefore, a real concern to us as to how investigations are handled. There are a number of areas that could be improved both in terms of efficiency and determining the causes of an accident:

A. Timely notification of the companies needed to participate in an investigation.

   The sooner we know we are involved, the more likely we can ensure that the correct resources are in place when and where needed.

**Recommendation:** Maintain a listing of major manufacturer contacts and ensure that each investigator makes these contacts as soon as possible after an accident occurs.

B. Scenarios

One of the common approaches of an investigation is to generate probable scenarios of circumstances that may have led to an incident or accident. The idea then is to collect facts to validate one or more of these scenarios to the point where a probable cause can be established. All too many times the scenario generation moves out of the probable occurrence category resulting in premature or inaccurate conclusions being reached. The progression of this approach leads to emotional conclusions allowing facts to be misinterpreted, misapplied or biased to support a scenario that cannot be justified on a technical basis. At times, scenario generation continues excessively extending the investigation needlessly.

The concern then is how to keep from straying too far from the practical causes in the investigation. It is suggested that there might be a couple of ways to help this situation.

The first is to provide training to the investigator to establish a way to use the factual evidence to limit the time spent on dead end and unrealistic scenarios. This training could also address methodologies to use to keep from making premature conclusions before the evidence confirms what the real cause is. A second aspect that may be effective is to have periodic reviews of progress by knowledgeable, unbiased individuals inside and outside the NTSB to critique the progress and direction of the investigation.

**Recommendation:** Establish criteria, reviews, processes, and similar approaches to determine the applicability and direction of a specific investigation.

C. Establishing Charter

Many of the investigations that get off track do not seem to have adequate charters or task definitions in place to limit the extent of a particular investigation. The investigator seems to have authority to continually expand the scope of an investigation even though the new areas may have no relevant relationship to the incident or accident that occurred. Typically, this can occur when the impression that quality, operation, or performance deficiencies of other aircraft systems not involved in the original investigation are present. The effect on aircraft safety is not evident. An appropriate approach would be to have the management of the investigating organization approve and limit the extent and possibly the time duration of an investigation. If it is obvious that the investigation needs to be expanded, a new scope could be approved after appropriate justification is presented. The intent is not to unnecessarily limit an investigation, but only to ensure that some level of review is in place to address that there is an appropriate need for the new investigation direction and that it is accepted and understood by all participants.

**Recommendation:** Establish NTSB management review to define limits, and provide approval of a proposed investigation scope and schedule.

Maximum information to establish the possible cause(s) of an accident and to determine as many factors as possible, is directly related to how the evidence is retrieved, handled, and shipped after the accident occurs. In terms of avionics equipment, considerable information has been lost by incorrect handling and evaluation of the evidence. Following are some examples of problems that have occurred:

-- New technology components can be susceptible to static discharges. Appropriate shipping containers and proper handling of these units are necessary to ensure retrieval of the information that is to be stored in the components.

-- Equipment has been damaged in shipping by inappropriate packaging. It then becomes difficult to sort out the accident damage vs. shipping damage.

-- Units have been tested on field test sets and by individuals who are not intimately familiar with the design. Valuable data may be lost or altered when incorrectly retrieved or during testing. The best place to conduct these tests is usually in the original manufacturers' laboratories.

-- Critical mechanical functions of equipment have been destroyed by incorrectly opening the dust covers, removal of cases, and operating of the unit without knowledge of its design factors.

There are many more specific examples that can be cited. The problem really is one of educating those people handling evidence on how to handle, transport, and evaluate it. Appropriate procedures may be desirable to ensure consistency and standardization through the NTSB.

Since the pieces of an aircraft that have been in an accident are legal evidence, specific instructions on handling, evaluating, and shipping procedures need to be clear, and the participants in the investigation need to understand the investigation requirements.

**Recommendation:** Use information from the Safety Institute (Oklahoma City) and from airframe and equipment manufacturers to train and provide procedures for NTSB investigators to address handling, testing, shipping, control, etc. of accident evidence to ensure that maximum information on the accident cause(s) are obtained.

## NTSB Technical Expertise

As with any organization, the NTSB is made up of individuals with differing investigation techniques, technical expertise, and personalities. Many of the investigators are competent and capable individuals; some aren't. In an area as critical as air safety, there should be as much attention as possible put on evaluation of an individual's performance and providing ways of ensuring that reasonable standards are met by all of the investigators.

Industry can help in this process if a way can be found to provide appropriate inputs on individual performance and attitude.

**Recommendation:** Develop a process to evaluate individual performance, upgrade technical expertise of investigators, and provide appropriate reviews of individuals and the projects they have participated in.

## Accident Reports

There has been an indication that once the accident report is in final draft form, it is extremely difficult to modify the report even if substantial information and factual data is presented which shows errors in the report data and/or conclusions. It is realized that the FAA approach of responding to comments during rulemaking is not appropriate. However, there needs to be a vehicle of allowing input into the report with adequate response and/or justification by the NTSB. This is particularly important when the accident cause(s) is not well identified and biased conclusions could occur. This comment also addresses implications in the report that may lead the reader to a conclusion backed by factual data.

A suggestion might be to have a review cycle where other NTSB investigators, manufacturers, operators, and other affected organizations make comments. These comments could be reviewed with responses required either in terms of modifying the accident reports and/or factually justifying why the comment isn't applicable or correct. Also, at any time in the accident report approval cycle, or even after it is published in final form, there should be a procedure to review inputs and revise the report as necessary to make it correct.

**Recommendation:** NTSB establish a procedure that provides for review and revision of an accident report at any time that factual data and appropriate comments are presented that show that the report is inaccurate or presents incorrect or improper conclusions.

**NTSB and FAA Relationships**

Industry, the NTSB, and the FAA are all concerned that safe air travel is provided to the traveling public. As such, we all need to realize this is a serious responsibility for everyone involved. Each of us can be part of the solution or we can be part of the problem. The adversarial relationship that occurs on occasion between the NTSB and FAA reduces public confidence in not only the NTSB and the FAA, but also to those of us in the commercial sector of aviation. Public criticism by any one of the groups is not appropriate.

Many of us feel that using the media by one agency to apply pressure to the other is not only inappropriate, but it is counterproductive to improving safety in the fleet. It is with the above comments in mind that it is suggested that senior management in the FAA and the NTSB join together to find solutions to disagreements, misunderstandings, and differences of opinions concerning NTSB recommendations and the associated FAA actions.

## FIDEL GONZALES
## MASTER EXECUTIVE COUNCIL SAFETY CHAIRPERSON
## ASSOCIATION OF FLIGHT ATTENDANTS, AFL-CIO

Thank you for this opportunity to present the views of the Association of Flight Attendants concerning major aircraft accident investigations. AFA is the largest flight attendant union in the United States, representing 33,000 flight attendants at 21 carriers. Over the years, AFA has participated in more aircraft accident investigations than we wish to remember.

At the outset we wish to say that when it comes to major accident investigation, the system works. The NTSB has shown independence, insight, and leadership in finding the causes of major accidents and in making recommendations to prevent recurring tragedies.

The following recommendations are therefore made with the hopes of improving a system that already works well. Many of our recommendations will relate to survival factors, the team we are most involved with.

Party Notification.--The NTSB's philosophy that people who need to know about the accident will find out about it is true, and it is probably too much of a burden to ask the NTSB to develop a contact list when it discovers an accident. However, interested groups need to know whether the Board is conducting a full investigation, who is heading up the investigation, what hotel the Board will be at, when the organization meeting will be, and whether the group will be allowed to participate in the investigation. Obviously, with the go-teams en route to the accident and much of the information still being developed, this information is difficult for the Board to disseminate to the groups. However, the groups need to know and often have to resort to calling public information officers or Board staff at home, sometimes at night while they are obviously busy packing. We would urge that the Board consider using an electronic bulletin board to immediately disseminate some of this information after an accident, so that industry parties with modems can dial in and immediately find out the information that is available.

Survival Factors Team.--AFA believes that the typical survival factors team is appropriate to determine survival factors. AFA applauds the FAA's recent use of its cabin safety specialists on the survival factors team. These specialists bring a broad understanding of cabin safety regulations and design to the job, and we hope the

NTSB will encourage the FAA to continue making these appointments. In addition, we would urge the NTSB not to place any artificial limits on the number of persons on the survival factors team. In some crashes there are hundreds of survivors who could be interviewed. A large survival factors team can get to those survivors before they leave the hospitals or leave town, while their memories are fresh.

Survivor Interviews.--Survivor interviews generally take a narrative approach, with follow-up questions generally focusing on obvious areas that were missed in the narrative (e.g. could you describe the people who were sitting near you) and on areas that are emerging as relevant to either the accident cause (e.g. describe the de-icing) or survival factors (e.g. describe the condition of the door you left through). While this approach generally works and should, it can suffer from a too early guess as to what the relevant survival factors are going to be, and from fatigue-induced failure to remember all of the obvious questions. We would therefore urge all members of the Survival Factors team to regularly consult the list of subjects covered in the survival factors outline throughout the investigation, and perhaps the NTSB should even develop a list of about 20-30 sample follow-up questions. These questions may be obvious (were the overhead bins full on your flight; what was your brace position; did you pay attention to the flight attendant briefing before takeoff; was there any debris in the aisle; what did you see after you left the plane and looked back at it) but sometimes the obvious gets forgotten after three days with little sleep and dozens of interviews. Interviews of passengers should also go to the accident sequence of events; hence the survival factors group must be trained and motivated to ask questions like, "What was the first thing that brought your attention to something unusual?," etc.

In discussing survivor interviews, it is important to note that the Board's staff has always shown tremendous personal sensitivity to surviving passengers and cabin crew. We especially commend the way the Board has handled the human side of accident investigation.

Flight Attendant Interviews.--We believe that the Board has been very good about informing flight attendants that they have a right to union representation when they arrive before we do, and about giving flight attendants sufficient time to prepare themselves for the interviews. However, we believe that the Board is sometimes a little too enthusiastic when it comes to "selling" flight attendants on the benefits of tape-recording interviews. There are down-sides to transcripts of tape-recorded interviews, if only because they lack the clean organization of an interview summary, particularly when the transcript is put in the public record. Because of

these downsides, other parties involved in accidents often choose not to be tape-recorded. Perhaps one solution might be to offer the flight attendant the option of being taped, but only for the purposes of a summary account being immediately written, using the tape where necessary, with the tape then returned to the flight attendant.

Wreckage Examination.--Over the years, it appears that flight attendants have been less involved in wreckage examination. We believe that this is a mistake since flight attendants can very readily identify cabin items that are out of place or damaged after an accident, and where there has been major damage, they can put together clues of what has happened from very small pieces of the interior. They also know the precise amount and location of all emergency equipment on the aircraft.

For persons involved in wreckage examination, appropriate personal protective equipment should be worn to prevent injury or illness from exposure to hazardous materials or bloodborne pathogens. It would be helpful if the NTSB had such gear available for their own staff as well as parties that participate in this phase of the investigation. In the event that one or more parties needed gear, the wreckage examination process might be facilitated if a sufficient amount of approved protective gear were available.

Videotaping of the Wreckage.--The aircraft cabin undergoes a great deal of change during and after the evacuation, e.g. from fire, weather, rescue operations, and the removal of personal belongings. It can therefore be difficult for the NTSB to determine the condition of evacuation systems and the interior during the evacuation sequence. We would recommend that airports be encouraged to have equipment available to film the evacuation if possible, and to film the exits and the interior as soon as possible after the crash. In any event, the first party to arrive should do as much filming of the aircraft as possible to help achieve the most complete documentation.

Weighing Baggage and Cargo.--It might be useful for the Board to weigh all the baggage and cargo on an aircraft after the accident, to determine its actual weight, especially where an aircraft had difficulty in performance as in some icing accidents.

Modeling of the Evacuation.--The survival factors team generally interviews the hospitalized survivors in detail on how they evacuated, and others are asked this

by questionnaire. From this, a general description of how the passengers evacuated can be made, and sometimes a precise description of how many left by each exit can be made. We would like to raise the question of whether more complex analysis should be taken, using computer models, to simulate the entire evacuation, including where passengers came into conflict with each other or for some other reason changed direction inside the aircraft. The fact is that aircraft manufacturers pass the 90 second evacuation test by managing passenger flow in a way that produces the most efficient movement of passengers possible toward a limited number of exits. But the actual movement of the passengers in a crash may be much less efficient, and it is important to understand precisely why so that necessary changes can be made. Further refinement of existing computer models which attempt to model the real-time movement of passengers could theoretically, when the variables are altered to include what we know about the passenger and flight attendant movements in a particular accident, give us a better way of visualizing the interior evacuation process.

If it is possible to model evacuations, the Board should also consider doing this every time an aircraft undergoes an emergency evacuation, not just where the injuries or damage define the event of an accident. This is because an evacuation in an incident can sometimes tell us as much about passenger behavior and movement as an evacuation in an accident.

Interviews of all passengers and crew evacuees in an incident may point out factors, such as those relating to cabin configuration and seat placement that may slow down the evacuation, or in some cases, enhance it. There is valuable empirical data in spontaneous emergency evacuations that is being lost only because no fatalities or serious injuries occurred. Why should the NTSB not interview crew and passengers who participated in an emergency evacuation incident when factors that hindered the evacuation might be identified and corrected in the fleet, rather than waiting until a future accident occurs with fatalities and injuries, some of which might have been prevented if there had been earlier evacuation incident investigations.

Airlines are currently required to report to the NTSB if they have had an emergency evacuation. The Board could take a more proactive approach by directing field staff to investigate emergency evacuation incidents by at least interviewing the crew and passengers involved.

Accounts of an evacuation incident on United Flight 752 on September 29, 1993, indicated that there were problems in getting passengers to use the B757 exit door 2R. In several mini-evacuation demonstrations conducted for the B757 configuration with passenger seats adjacent to exit door 2R, questions were raised about this configuration and the problems it could cause during an evacuation with passengers. This incident does merit investigation, especially in light of ongoing concerns about the particular cabin configuration, so that crew and passengers can be interviewed in detail about their observations and behavior during the evacuation. Much could be learned over time from Safety Board investigations of this and other evacuation incidents that could identify not only problem factors that were a hindrance, but positive factors that enhanced evacuation safety and speed.

Party Recommendations.--Parties are asked to make safety recommendations to the Board at several stages of the process, and some of these may ultimately be adopted by the Board. We believe that the Board staff should give the parties verbal feedback on the recommendations early in the process, so that the parties can supplement their arguments if they feel it is necessary. As it stands now, the only feedback a party gets about its recommendation may be finding out at the very end of the process whether it has been included in the final report.

NTSB Hearing.--We commend the Board for exploring cabin safety issues at the public hearings, and urge the Board to continue doing so.

NTSB Recommendations.--We believe that the NTSB should avoid the use of non-quantifiable words like "expedite" or "improve" in its recommendations, since it is difficult to objectively judge whether the FAA has complied with the recommendation. Instead, the Board should specify a precise time-frame for action, or the precise improvement needed. In addition, where the FAA does not comply with a recommendation, the NTSB should make a report to the relevant subcommittees and committees in Congress so that they can review the situation if necessary. After all, all the effort of a major accident investigation is only worthwhile if the Board's recommendations are given a fair objective hearing by the FAA, with appropriate Congressional oversight.

We commend the Board for its special studies, which attempt to draw lessons on a single topic from a range of relevant accidents. One area that the Board might now consider for a special study is evacuation. The last NTSB evacuation study was conducted in 1974 (Special Study of Safety Aspects of Emergency Evacuation, NTSB-AAS-74-3). Such a study would be of great benefit to the FAA and other

aviation authorities and some of the advisory committees they have organized to examine emergency evacuation issues.

In conclusion, we would like to again applaud the Board and its staff, past and present, for the important and difficult work they have done. In particular we would like to applaud the talented and dedicated men and women of the NTSB survival factors staff, whose work over the years has helped lead to dozens of life-saving cabin safety improvements.

**H. KEITH HAGY**
**MANAGER, ENGINEERING AND ACCIDENT INVESTIGATION**
**AIR LINE PILOTS ASSOCIATION**

Good afternoon ladies and gentlemen. Like the previous speakers, I want to take this opportunity to thank the NTSB for sponsoring this symposium and for inviting me to participate. First of all let me state that the current process in place for investigating major aircraft accidents has been very effective. The concept of organizing an industry meeting such as this to critique and recommend improvements to that process is commendable.

Currently the Air Line Pilots Association (ALPA) represents over 42,000 professional pilots flying for 36 U.S. airlines. These pilots operate approximately 30 different aircraft types used in both FAR Part 135 and FAR Part 121 operation. Clearly, to adequately represent those pilots ALPA must take an active role in aviation safety. The backbone of the safety effort is the more than 600 pilot safety volunteers who make up the various air safety and technical committees which work with all facets of the aviation industry. In order to support this safety effort ALPA relies heavily on the end product of an NTSB investigation, which are the safety recommendations issued. ALPA then uses those safety recommendations to support our aviation safety goals and efforts. Those efforts may include working with the FAA, aircraft manufacturers, airport authorities and perhaps Congress in order to improve aviation safety. Unfortunately, we have encountered difficulties in responding to NTSB safety recommendations.

One area of difficulty which has been a topic of discussion between ALPA and the Safety Board for the last two years is the Board's necessity to determine a "probable cause" to an accident. At the conclusion of some recent accident investigations we have seen improvement in this area. The NTSB appears to be making an effort to focus the probable cause statement on the more broad base of issues which influenced the accident sequence. However, there is still room for improvement and this forum presents an opportunity to revisit this topic.

Any accident is the culmination of many factors or an unfortunate chain of events which lead to a catastrophic result. In our opinion, the probable cause statement, which typically identifies a single cause, reduces the effectiveness of many of the safety recommendations issued. At the conclusion of an accident investigation the Safety Board will issue many findings and contributing factors

regarding an accident sequence but only one probable cause. In our experience there have been many times when the recommendations issued appeared to have no direct relationship to the probable cause of the accident. An excellent example of this was the Detroit runway collision of two Northwest Airlines aircraft on December 3, 1990. The NTSB determined the probable cause of the accident to be:

> ". . . lack of proper crew coordination, including a virtual reversal of roles by the DC-9 pilots, which led to their failure to stop taxiing their airplane and alert the ground controller of their positional uncertainty in a timely manner before and after intruding onto the active runway."

Of the 18 safety recommendations issued by the NTSB as a result of the investigation of this accident, only 1 was related to the probable cause statement. The other 17 where directed at air traffic control procedures, airport taxi guidance and signage, DC9 tail cone escape door maintenance, and emergency evacuation training.

There are many in the aviation industry that are reluctant to respond to, or implement, a Safety Board recommendation because it did not have a direct bearing on the cause of the accident.

During the course of an investigation the effort to develop a single probable cause may be the source of friction between the various parties to the investigation and the Safety Board staff. Everybody understands that the public, and litigation attorneys, associate the "probable cause" of the accident to blame for the accident. As a result, one party may feel that they are receiving too much of the focus while other factors may have been an influence in the accident as well.

The Safety Board has stated that they have had a high percentage of recommendations which have been accepted. This is true and is a measure of the Safety Board's success and effectiveness, but there have been some safety recommendations in which the FAA and industry have been reluctant to adopt and implement. In some of these cases this reluctance was because the subject of the recommendation was not perceived to be linked to the cause of an accident.

In discussions with the Safety Board on this issue the Board has taken the position that a probable cause statement is necessary in order to focus attention or emphasize a particular set of safety recommendations. ALPA disagrees and believes that the Safety Board would be more effective by doing away with the

probable cause statement as used to identify a singular cause and adopting a form which identifies the multiple factors which resulted in the accident. By adopting a causal statement which identifies all the factors involved, the Safety Board will be able to link the recommendations issued more directly to the factors which influenced the accident sequence. In one particular case the Board has already moved in this direction. Following the investigation of the accident involving TWA 843 at JFK the Safety Board adopted a probable cause which listed all the factors they believed resulted in the accident sequence chronologically as they related to the accident.

As I stated, the Safety Board recommendations are used by ALPA in our work with industry to support our air safety goals and policies. It is important that the Safety Board address all safety issues raised during an investigation, not just those associated with the accident sequence. This is why ALPA will continue to encourage the Safety Board to explore issues further when we feel that they have not been adequately addressed even though this may cause some friction.

In some investigations where the factors which originated the accident sequence become known, the Safety Board at times tends to focus in that area only. In those instances ALPA has had to encourage the Safety Board to go further to determine "why" those factors occurred. In addition, there have been occurrences where safety concerns had been identified by ALPA during an investigation but the Safety Board was initially reluctant to explore those issues because they were not related to the accident sequence. This is particularly true of NTSB Field Office investigations.

It appears that the Safety Board is reluctant to explore issues identified during an investigation in greater detail or follow-up on additional issues because of a lack of resources. In past instances the Board's staff has had to respond to an artificial time line which required them to conclude an investigation and publish a report before all the issues had been resolved. In other cases, the Board lacked the manpower resources required to do the work because of existing workload or priorities.

The inability to investigate serious incidents is an excellent example of how this lack of resources has limited possible improvements in aviation safety. In recent years the Board has made improvement in this area but there have been instances in which ALPA has been notified of a significant incident which may have been related to a past accident and, because of sheer luck or exceptional skill, did

not result in another accident. In those cases, ALPA immediately contacted the NTSB headquarters and passed along the appropriate details only to have them delegate the investigation to the NTSB regional office, the FAA or not follow-up at all. In these cases little or no safety value was gained from the incident because the Board did not have the resources available to respond. The Safety Board must be provided with the resources necessary to accomplish their mission and the Board must be more willing to commit those resources to investigate serious incidents before they become accidents.

There have been times in some accident investigations where ALPA has had difficulty fulfilling our role in the investigative process. As I mentioned previously, ALPA has an obligation to represent the safety interests and concerns of our 42,000 members. In the case of an accident in which there is a surviving crew, ALPA has an additional obligation to represent the interests of the surviving pilots before the FAA in possible certificate action proceedings.

FAA order 8020.11A describes the FAA procedures and responsibilities for aircraft accident and incident notification, investigation, and reporting. Per this order, one of the responsibilities of the FAA in an accident investigation is to:

> "b. Promulgate and enforce the Federal Aviation Regulations for certificating civil aircraft airworthiness, for certificating airmen and air carriers for competency, and for certifying airports used by air carriers utilizing aircraft with more than 30 passenger seats for compliance with certain safety standards."

Further, this order states:

> "When an investigation reveals actual or suspected deficiencies related to the competency of an FAA-certificated airmen, air carrier, commercial operator, airport. or air agency, FAA will undertake corrective actions in accordance with the latest edition of order 2150.3, Compliance and Enforcement Program."

There is a need to have the FAA participate in an accident investigation because the FAA brings additional expertise to the investigation in the areas of air traffic control and regulatory compliance and oversight. In addition, the FAA needs to determine the level of their own responsibility in the accident sequence in order to institute changes to improve aviation safety. But, because the FAA also brings to

the investigation the threat of enforcement action against the pilots, operator, manufacturer or airport authority, their involvement can obstruct an investigation. This threat of enforcement action is a hindrance to the free and open exchange of information necessary to improve the aviation system.

During the process of participating as a party to a major accident investigation, all parties participate actively in nearly every phase of the investigation. You have the field phase, component tear downs, review of factual reports, and a public hearing. Unfortunately, after the technical review or public hearing has been completed and party submissions have been made, the Board's rules do not allow for more participation by the parties. So as the Safety Board staff prepares its analysis and drafts the final report there is no active participation by the parties other than the party submission. ALPA views this area as a weakness in the investigative process.

The Board's rules make provisions for the designation of "parties" to the investigation. Part of the rationale in utilizing those provisions is so that the Board may take advantage of the expertise available to assist them during the investigation. It seems contradictory to only use that expertise during a portion of the investigation.

There have been many cases where ALPA has walked away from the technical review thinking that the issues and concerns raised at the review had been adequately addressed and everybody was in agreement, only to discover a few months later upon reviewing the final report that they had not. In those instances ALPA had discovered factual errors in the Board's final report which resulted in erroneous findings and conclusions. At that point, the only way to resolve those issues and correct the factual errors and erroneous findings is to file a "Petition for Reconsideration."

ALPA believes the Board's rules and investigative procedures must be revised to make provisions for the participation of the various parties during the analysis portion of the accident investigation. In addition, each of the parties should be given the opportunity to review and comment on the complete draft final report prior to the conclusion of the investigation. These changes will result in a better, more comprehensive work product and fewer petitions for reconsideration.

One additional area I would like to touch on involves a common difficulty experienced by many of the pilots we represent flying for regional air carriers. One

benefit to the "party" system in accident investigation is that each party brings a unique area of expertise to the investigation which, when combined with the other parties, covers all facets of the industry. This "party" participation approach to accident investigation, the bringing together of industry experts, has contributed to the success and quality of the investigative process here in the U.S. To eliminate one party from participating would limit the quality of the investigation. Yet in nearly every investigation in which ALPA has participated that involved a regional air carrier we were unable to keep the same group of pilots involved throughout the investigation because the airline involved refused to take the pilots off schedule or allow trip swaps. In some cases the airline involved required that some of the pilots on site pick up previously unscheduled trips. ALPA understands that many of the regional air carriers don't have the luxury of a large pilot base like the major air carriers. However, there have been times where ALPA has found itself at a disadvantage because we are one party whose representatives during the investigation are employees of one of the other parties and there have been times when the airline involved sought to eliminate ALPA participation, especially when pilot training, scheduling, or flight operations had been identified as a factor in the accident. Perhaps the Board's rules could be modified in some way to make provisions for the complete participation by all parties during the entire investigation.

Members of Congress also recognize this as a problem which has prevented the complete participation during an investigation of ALPA pilots flying for regional airlines. A 1993 report submitted by Mr. Mineta from the Committee on Public Works and Transportation which accompanied the NTSB appropriations bill stated:

> "Finally, the NTSB's accident investigation procedures provide for the input of certain designated parties so recurrences of accidents can be prevented. The designated parties are intended to provide valuable technical expertise to the Board and a balanced perspective of the accident. It is the committee's understanding that some air carriers, particularly regional carriers, have been reluctant to release pilots to participate in such investigations. Employees who serve in accident investigations are performing a valuable public service; accident prevention. Employers are urged to make employees available to participate in such accident investigation."

As I was preparing for this meeting I took the opportunity to review the report of the 1983 Springfield Symposium which was the last meeting of this type held. As

I reviewed that material I was surprised to discover that a lot of the items and recommendations I've addressed today were discussed in the same context at the Springfield Symposium, 11 years ago. With that thought in mind I'll make one additional recommendation. I would propose that an industry advisory committee or task force be established to review the recommendations made during this symposium and work with the Safety Board to identify ways those recommendations can be implemented.

There must be a way for industry to work with the Board in a cooperative manner to follow-up and implement these recommendations where possible or we may find ourselves 11 years from now saying the same things again.

## CAPTAIN JOE OYLER
## CHAIRMAN, ACCIDENT INVESTIGATION SUBCOMMITTEE
## ALLIED PILOTS ASSOCIATION

I would like to thank the Board for the opportunity to offer constructive comments and criticism to the Board on the accident investigation process. Since it's been over ten years without one of these critique symposiums, I guess my first constructive comment would be that ten years is too long and would recommend this forum take place at least every three years. With the continued expansion of both the Air Transport System and technological advances, it is vital that the NTSB present itself periodically for review. Just as the industry is checked and critiqued through various regulatory agencies, I commend the Board for this informal introspection by those directly involved with Safety and Accident Investigation.

Having been Party Coordinator on several recent occasions and having just finished a "Go-Team" accident investigation, I have both positive and negative thoughts concerning the staff and investigative procedures. The positives are easy to talk about. Professional, knowledgeable, dedicated, responsive -- all the characteristics that can, on average, describe the NTSB involved in these investigations. The procedures and the resources available to the NTSB and its conduct of business make it the premier accident investigation body in the world. As with all successful operations, there is room for improvement. That is the purpose for these proceedings.

Before offering constructive criticism to the NTSB itself, I must be critical of the aviation community, in general. When an accident occurs, time and again everyone becomes an instant expert, the all-knowing, all-seeing Carnacs of the aviation industry. Opinions flow like water, from industry leaders down to the proverbial butter cutter. Deniability of cause reigns. The airline says it couldn't have been our procedures. The manufacturer says it couldn't have been our airplane, the engine folks say it couldn't have been our engines. The rivet maker says it couldn't have been our rivets. The consensus quickly develops that, guess what, the pilot must have messed up. Having said that, let me possibly surprise you by saying that most of the time -- that's another pilot's reaction also. Two major variables in any flying situation are the weather and the pilot. Human nature being what it is, pointing a finger at a person is infinitely more satisfying than pointing at a condition. Being a pilot, it sounds like I'm defending pilots, and to a certain extent, I am. But my point is this: Before the investigation even begins, the pilot error

perception exists. We can't control what the public thinks, but we in the industry should surely control our own preconceptions and avoid careless speculations that poison objectivity.

Now, to the NTSB itself. As the "Go-Team" and NTSB staff members arrive at the scene, they are confronted with the flow of conjecture from many sources. In the first hours before the IIC can officially organize the investigation and gain control, it is my opinion that immeasurable damage to objectivity can be done by rampant speculation. As the "Factual Data Gathering" field phase begins, various speculations start to take on a truth of their own. With preconceptions in place, I feel some of the "facts" can become insignificant or overlooked altogether. Without getting into the specifics of our last investigation, at the end of the second full day of a printout of the Flight Data Recorder, traces were being copied and passed around. To my shock and surprise, the printout also contained the time synchronized overlay of the Cockpit Voice Recorder transcript. Speculations refueled, damage done. A few words were changed so it could be said that it was not "THE" exact CVR transcript. To this day, I don't know if that was Hoyle. Inquiries were made and shoulders were shrugged.

The point of the above observation is that with objectivity now biased by speculation, it seems it would be possible for the Group leaders to knowingly or unknowingly steer their "facts" towards their preconceived conclusions. Is this not individual analysis? If analysis does not begin until the analysis phase, then all Group leaders must gather and report all facts always, without bias, without preconceptions. If this is unrealistic to ask of anyone, then it seems to me analysis should be structured into the investigative process at the end of the field phase and again as part of the technical review. Discussing and arguing over facts early on in an investigation seemingly could remove any bias and preconceptions and would help ensure all the facts are in play on a level field.

Digressing slightly, if the quality of the whole investigation depends directly on the quality of the parts, then provisions should be instituted between the Parties to both share and provide information to each other. As facts are gathered and developed, questions arise concerning procedures, equipment, training, etc., from the company, the unions, and/or the manufacturers. If the primary reason for participating in an investigation is to seek the causes to prevent recurrence, then answers should be provided to each other through the Coordinators or the IIC. Stonewalling for proprietary or liability concerns can only hinder the search for the causes of the accident. Without subpoena or deposition powers, Parties to the

investigation are stymied in pursuing information to forward to the Group leaders and the IIC. Without cooperation, the Parties must rely completely on the Group leaders to follow leads which, as noted before, can be influenced by preconceptions, speculations, etc. Unreturned phone calls from manufacturers and statements from the NTSB that it isn't the NTSB mandate to answer a Party's questions are ridiculous in the search for the truth.

Another area I feel needs discussion is the tremendous technical and operational advances that have been made in recent years and the corresponding experience and expertise level of the NTSB staff. With nothing personal towards the staff intended, please let me explain. My concerns are that these operational pressures and technological advances in the industry today are outrunning the capabilities of the staff to remain technologically and operationally current. The everyday environment of glass cockpits, FMS, CAT III autolands, reduce separations, land/hold short, fly-by-wire, control laws, sidestick controllers, closely spaced parallel approaches, TCAS, FLIR, HUD, and the forthcoming GPS, data-link, and 300 RVR takeoffs to name a few, strains the imagination. To ask the staff to understand and comprehend this environment is grossly unfair! This same staff then has to make recommendations to the Board based on this unfamiliarity. How can judgements be reached when comprehension is limited? I would like the working groups of this symposium to discuss this problem and see if there is an answer. How do we get the pilot members of the NTSB staff familiarized with this environment so that they will comprehend our problems? It certainly takes a lot more than their qualifying on an A-340, B-777, or an MD-11 (listed alphabetically). How can they become more involved? Conversely, should a pool of pilots, mixed airline, mixed equipment, and operationally line current be available to the Board for unbiased technical and operational assistance?

In summation, in any investigation, we all have to be fair to the process, avoiding preconceptions and speculations. If the pilot has erred, the process will find it. If an area of equipment has failed, the process will find it. If a procedure has failed, the process will find it. Let us not rush to judgement before the facts are in. Let us not be biased by preconceptions or a lack of knowledge. Let us, as members of a Party to the Investigation, work together to advance the technology of the investigation. Finally, let us find a way to help the NTSB attain the highest levels of comprehension and experience so that they may truly understand the facts as we mutually work towards the determination of the causes of an accident.

**JOHN A. FEIL**
**MANAGING DIRECTOR, SAFETY AND ENVIRONMENT**
**AMERICAN AIRLINES**

First I would like to say that I am pleased to be here and equally pleased to have been selected as a panelist for this symposium. As most of you who know me, are aware, I am not at all shy when it comes to criticism, particularly as it relates to the NTSB and the investigation process. With that said, believe me - I have no chip on my shoulder.

For the most part, the Safety Board and its staff have served the industry quite well in the identification and correction of shortcomings. This process has made the industry and aviation safer. Theirs is not an easy chore, particularly when they have to put up with the likes of me and some of my crusty counterparts who sit in the audience today. My objective, therefore, is to highlight a few of the more salient shortcomings that exist today in the NTSB accident/incident investigation and reporting process.

**Accident Investigation Response Standard**

Presently, when an accident, incident, or safety related mishap occurs there is no guideline or standard that prescribes the level of investigation or the investigative agency that will respond -- i.e. a Washington "Go Team" or a Regional Field team. Both extremes have been experienced -- Regional teams have responded to hull loss accidents with multiple fatalities and Washington "Go Teams" have responded to accidents having less significance. Within American Airlines some examples are:

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| DC-10 - DFW - Abort and Overrun--Hull Loss | Regional |
| DC-10 - DFW - Landing Excursion--Hull Loss | Go Team |
| CASA 212 - MAZ - Hull Loss--Multiple Fatalities | Regional |
| S-80/B737 - EWR - Taxi way Incursion-Collision--Major | Regional |
| SAAB 340 - LA. - Engine overspeed damage--Minor | Go Team |

These are but a few of a long list of industry mishaps where the level of investigation appears to have been selected by the old fishbowl method, politically motivated, or a conception that the level of qualification at the Regional level was insufficient to handle the particular mishap.

Air carrier accident response plans and response plans at the Regions and Major Investigation section need to be formulated to a reasonable set of standards that will allow for improved utilization of resources.

While there can always be exceptions, we believe a set of standards could be established categorizing accidents by degree of severity, numbers of fatalities, and or potential loss of life that would delineate the level of response to the accident -- either "GO Team" or Regional.

**Communications**

The second point, and probably the most significant, is the lack of effective communications during the field phases of the investigation. While lapses in communications occur in other areas, from our experience, it appears most prevalent in the operations group area. Some examples:

- Prior to the witness interview process the group chairman is required to brief the group on the process to be taken - this is particularly important when the operations and human performance groups are combined. When the parties and the witnesses are unaware and a change of venue, from operational to philosophical questions, takes place it can and has caused disruption of the process which could result in inhibited or guarded witness responses. A ready solution is to conduct the two groups as separate entities. More important, however, is that all parties be briefed on what their responsibilities are and what to anticipate.

- Example No. 2.-- A requirement for documenting field notes is contained in the NTSB Investigators Handbook. It also requires that when sworn testimony is taken, the services of a court reporter be utilized. It does not, however, require documentation of testimony provided during witness interviews. Individual note taking by the group chairman and party members reflect that individual's interpretation of what was said and generally each set

of notes are not included in the field report. During a recent board hearing a group chairman was noted referring to his personal notes which did not reflect agreement by all of the party members. To assure proper documentation of witness interviews the investigators handbook should be amplified to specify one of the following:

1. Use a court reporter for all witness testimony -- include in the field report.

2. Tape record and transcribe the recorded information -- include in the field report.

3. Require the testimony be summarized by the group and all within the group be required to read, agree, and sign -- include in the field report.

**Coordination And Sharing Of Information**

When the field phase of an investigation is complete, party participants should have a comfortable feeling that all aspects of the mishap have been reviewed and information shared with other groups. Thus, at the subsequent forums in the NTSB investigation process (Public Hearing-Technical Review-Sunshine Meeting) there should be no surprises or hidden agenda that has not been reviewed, as required, using the party process. In far too many investigations, however, misuse of the party system has resulted in serious inconsistencies. For example:

- Convening additional groups such as the "Performance, Human Performance, Survival Factors Groups" when the field phase is about to conclude. This denies pertinent factual information from being shared with the other groups which could influence or be cause for further investigation. In one recent investigation the "Performance Group" activity had not started until after the field phase had concluded and was still active until well after the Technical Review was completed.

- Another is the tendency for the NTSB staff to formulate preconceived conclusions based on preliminary information, thus shortcutting the investigative effort and the failure to uncover or evaluate all factual data. In the same recent accident the field effort was secured and several weeks later reopened for additional interviews using the "staff conducted deposition" format. Following this three-day exercise there was no effort to convene a "Group Meeting" to review the testimony or even discuss what was learned and determine the next step in the process of validating testimony into factual information. Instead, as soon as the last deposition was taken, the group returned to Washington on the next available flight. Incidentally, the transcripts of the depositions were not available to the NTSB or the Parties until well after the technical review was completed. Thus, another example of reliance on personal notes for use during the analysis process.

**Accident Report Development**

Consider that the decision makers in our business are the ones who ultimately must decide to act, or not act, in terms of committing resources for prevention. They rarely participate in the investigation; thus, all they will ever know about the accident is what they learn by reading the report. If the report does not adequately establish the facts, and does not logically support the conclusions, what do you expect them to do about it? Nothing! I am all for prevention, but I am not going to react to an obviously flawed and poorly substantiated report and I dare say neither will anyone else.

At a recent Sunshine Meeting the Board deliberated for over six hours on a report's content and the fact that the conclusions were not substantiated in the report. As a result, the Board rewrote many of the conclusions, discarded some others, and rewrote the "Probable Cause." They then handed the entire package back to the staff with instructions to rewrite the report to substantiate the conclusions and the Probable Cause that they had just edited. Now I ask you "what came first the chicken or the egg?"

The best investigation in the world never prevented a single accident. Until we tell someone in the authority chain what happened -- and he or she agrees with us and does something about it -- believe me -- nothing good will happen. The

mechanism for achieving that is called the accident report and here I believe the NTSB staff has some work to do.

**The "Probable Cause"**

The important point here is that the prescription of "Probable Cause" tends to distort the whole balance of an investigation and the investigation report, to the extent that it encourages the media, the public, attorneys, and the involved parties to attach connotations of blame. If the NTSB is sincere about maximizing the accident prevention results from any of its investigations -- action should be taken to change the rule that requires "Probable Cause"determination. In my view, and in the view of many others, the NTSB should refrain from any determination of cause and leave that issue to the judicial process which may follow the investigation.

There is a ton of information already written by people such as Jerry Lederer, C.O. Miller and others, including a number of NSTB counterparts from other nations where action has been taken to eliminate the "Probable Cause." I charge the NTSB to avail themselves of these documents and take action.

Ladies and Gentlemen this concludes my remarks -- hopefully they will be taken as constructive criticism that will someday enhance the cause of accident prevention.

**BRYAN P. COWIN**
**MANAGER, FLIGHT SAFETY**
**AVRO INTERNATIONAL AEROSPACE**
**(A DIVISION OF BRITISH AEROSPACE REGIONAL AIRCRAFT LTD.)**

I would first of all like to thank the National Transportation Safety Board for not only organizing this Industry Symposium but also in permitting me the opportunity to take an active part in these proceedings.

Although my career in aviation spans some 31 years and has encompassed many varying fields, (Maintenance, Aircrew, Flight Testing and Sales) I am a relative newcomer to accident investigation so it is with great trepidation that I appear before such a learned audience here today.

I have during the last 3 years though, been well and truly initiated into accident investigation in environments as diverse as the jungle and swamps of Indonesia, paddy fields of Mongolia, and the cold damp windswept airfields of England but as yet, not in the USA. My comments today therefore are based on the observations of company colleagues who have had dealings with the NTSB in the past.

At this point I must emphasize to anyone who reads between the lines and then perceives an opportunity to gain a PR advantage against AVRO International and the BAe146/RJ aircraft that this experience has been acquired during investigations involving 7 different aircraft types.

So much for me, now let us now concentrate on the matter in hand.

The subject I offer for discussion today concerns the process behind the preparation of the final accident report.

Under 49 CFR 831.14. any person, agency, company or association whose employees, functions, activities or products were involved in the accident under investigation may submit to the NTSB, prior to its consideration of probable cause, written recommendations drawn from the evidence produced during the course of the investigation as to the probable findings, conclusions and safety recommendations.

My question is do we really believe that this is in the best interests of all? Dare I suggest that the present system can bias itself in favor of an interested party with vast resources capable of submitting a well presented report over a smaller organization with limited resources, not to mention the mountains of additional paperwork that need to be sifted through by the Investigator in Charge. After all, apart from an organization wishing to play down areas in which they may feel themselves to be vulnerable in, it is most probable that apart from minor points, most of the participants would come to the same conclusions.

In making these comments I am not questioning the integrity of the NTSB investigator and his ability to assess all submissions, I am just merely asking should not the NTSB be allowed to compile their report free from influence and hindrance and then implement the spirit of ICAO Annex 13, para 6.11 which contains the recommendation that the State conducting the investigation should send a copy of the draft final report to all States that participated in the investigation, inviting their comments.

Many of you will possibly think that I am taking too simplistic a view and overlooking the procedures that exist in the USA for public hearings, boards of inquiry etc. but sometimes it is advantageous to stand back and look at it in a different perspective.

Two investigating authorities that follow the ICAO recommendation and allow all parties that have participated in the investigation to review the final accident report at a draft state are the UK AAIB and the Australian BASI, although only the AAIB in my experience permit their conclusions and recommendations to be scrutinized prior to publication. This has a two way advantage in that the accuracy and fairness of the report is ensured and that the manufacturer/operator/pilot is saved from taking legal action against the investigating authority to uphold their reputations should they have been wrongly incriminated.

For example, our company has recently been copied with a draft report into an incident involving one of our aircraft and found it to contain basic errors which had been derived in all good faith from an out of date system description. Had this not been detected before the report was published, it could have lead to an embarrassing situation for all parties concerned.

Returning to the USA procedures and the encouragement for all interested parties to submit their version of the report. Following on from my previous comments, this may also prove difficult for participating organizations who because of either staffing levels, cost or pure logistics are unable to have a representative on each of the working groups. I would question whether this system could place that organization at a psychological disadvantage against the large organizations who can saturate the investigation with personnel. This in turn surely encourages an over manning level in the field investigation.

In summary, I would have thought that it is within everyone's interest that the final report is correct in every sense. I do not advocate taking away any of the responsibility for compilation of the report from the investigating authority. I only want the chance to comment on the draft of the final report to ensure that the facts it contains are correct and that all findings/recommendations are appropriate.

Ladies and Gentlemen, as I have stated in my opening address, I have not yet been involved in an accident investigation in the USA so my comments here today are offered as discussion points and not as a direct criticism of the members of the National Transportation Safety Board or their procedures. They do an excellent job in what can be very difficult circumstances to ensure that air transport remains one of the safest forms of mass transportation.

**DAVID F. THOMAS**
**DIRECTOR OF ACCIDENT INVESTIGATION**
**FEDERAL AVIATION ADMINISTRATION**

At the outset I want to acknowledge the National Transportation Safety Board for convening this symposium and for openly soliciting feedback, criticism, and recommendations on how the Board does its business. The hardest thing an organization can do is to invite public criticism, but the Safety Board has done this very thing three times--Downingtown in 1973, Springfield in 1983, and now this symposium. I applaud the Board for its openness and willingness to grow because I know from past experience that it will take positive actions to address each of the recommendations we formulate at this forum. The FAA and the Safety Board have a very healthy working relationship, and I would characterize it as effective in every major area. I look at this symposium not only as an opportunity to offer the Safety Board positive feedback but also as a means to improve how the FAA participates with the NTSB and industry in the accident investigation process. I am reminded however that the Safety Board, through the party system method of accident investigation, ultimately uses and manages industry resources to develop conclusions, probable cause, and corrective actions. Consequently, recommendations to the Safety Board are in part recommendations to ourselves if we are truly honest, and open participants in the accident investigation. So when we ask the Board to take an initiative, we must also be prepared to follow the Board in the same spirit of cooperation and dedication.

## Communications and Coordination

An almost universal theme of industry representatives at the Springfield Symposium was that of communications and coordination between the Safety Board and parties during an accident investigation. There is always a serious effort to facilitate communications and coordination during the onsite phase of any investigation and, in virtually every instance, the communication is excellent. However, once the onsite activities end and the investigation moves away from the direct supervision of the Board IIC (and the influence of the party coordinators), coordination, communications, and cooperation can fall off significantly. During the follow on activities of individual groups, we find that individual initiatives by the various group chairmen are common and that the Board group chairman or specialist was working with a manufacturer or operator without informing the FAA representative on the group. Conversely, it is not uncommon for the NTSB group

chairman to show up at or contact an FAA office to develop additional data without having party representatives present to observe how the information is developed or the context within it was presented to the Board investigator. I believe that when the Safety Board gets criticized for faulty analysis of data in an accident report, more often than not it is a result of selective development of an issue by an investigator who, intentionally or not, failed to use all available technical resources to establish the record. The Board has an obligation to address all the facts related to an issue--even those which do not support the Board's hypothesis.

**Human Performance Investigations**

Human factors and human performance are critical elements in most accident investigations and were the subject of 10 recommendations to the Board following the Springfield Symposium in 1983. I applaud the efforts of the Board in this area. However, recently I have observed an alarming trend whereby the Board is conducting human performance investigations with a single NTSB specialist rather than through the established party system. It is routine to have an NTSB human performance specialist appear on site on the second or third day of an investigation and to attach him/herself to the operations group. What follows is a series of human performance activities that pretty much are at the discretion of the NTSB human performance specialist. There may be some group activity but only with the operations group members. After the onsite investigation ends, the NTSB human performance specialist assesses the scope of the human performance investigation and completes the factual report. For the most part it does not appear that the human performance specialist has direction from the IIC nor is there significant party interaction. Finally, there is very little party input to the structure of the human performance investigation. This type of operation first of all defeats the party-to-the-investigation concept and, secondly, makes it very difficult for a party to place an appropriate person on the human performance investigation--since no formal group is ever established. Generally, the first knowledge the party has of the context of this human performance investigation record is when the factual report is sent to the party coordinator. My recommendation is that the Safety Board align the human performance investigation program with the party concept.

**Safety Recommendations**

The FAA has a very serious interest in the NTSB safety recommendation program--we are the recipient of about 140 per year. As I reviewed the proceedings of the Springfield Symposium, I noted that the great number of participants commented on the Board's process by which recommendations are developed after an accident or safety study. In all cases, the 1983 participants called for more thorough research in developing the issue, an honest effort to consult with the parties (especially the manufacturer, operator, or the FAA) on the facts and circumstances supporting the recommendation, and, finally, the parties asked the Board for some kind of advance notice about a recommendation early in the development cycle so they could do their own analysis of the issue and initiate corrective action.

Safety recommendation development comes, for the most part, after the onsite activities end. Consequently, it is often the individual Safety Board investigator who develops the facts, logic, and the expected outcome of the recommendation without consultation from the manufacturer or operator who has the most expertise. Sometimes I believe that the Board is most guilty of selective issue development in the recommendations area because of how, ultimately, safety recommendations are developed. There is no party consultation and, secondly, after the individual NTSB investigator has an idea that he or she has decided warrants a corrective action, it appears the investigator sets out to validate the recommendation rather than to establish the issue openly. The Board has the obligation to ensure that both sides of the questions are documented and addressed before adopting a recommendation.

The bottom line on safety recommendations is accountability. The FAA, manufacturers, and operators are absolutely accountable for addressing the issues identified in NTSB safety recommendations, and we take this responsibility seriously. The Safety Board should not only focus on this accountability but also ensure the parties have been consulted and that the Board's conclusions are accurate. Finally, put some accountability into the followup process.

I believe that often recommendations that have been properly addressed by a party are kept open longer than necessary not because the safety issue was not addressed but because an individual Board specialist--the initial author of the recommendation--is not satisfied. I ask the Board to look closer at the propriety of alternate corrective actions--a service bulletin versus an airworthiness directive for example--when you review our response. Manufacturers, operators, and the FAA

have a lot of staff and dollars devoted to addressing NTSB safety recommendations. We will address the safety issue properly because we have more at stake than the Board. We just ask that the Safety Board evaluate corrective actions objectively and in a timely manner.

**Post Accident Drug Testing**

Occasionally the Board will ask the FAA for drug tests of air traffic controllers following an accident or incident where ATC action may have been involved. The Board, in these cases, asks for the controller to give both blood and urine for the tests. When the Board does ask that an individual controller be tested, the understanding between our agencies is that the FAA passes the request to submit to drug testing to the controller in question and that controller will make the decision to submit to the Board or to decline. The problem arises when the controller agrees. Because it is a Board activity, the Board has the responsibility to identify the collection agency, arrange the test, and maintain chain of custody on the sample. In almost every case the request is made in Washington, D.C., for controllers someplace else, and the Board does not have any mechanism in place to conduct the test. The result is lost time and confusion at the start of an investigation. I ask the Board to establish procedures that will facilitate this program.

**NTSB Data Systems**

The Safety Board maintains the official Government statistics for all aviation accidents. It has been my experience, however, that neither the Part 121/135 nor the Part 91 accident statistics for recent years are available in a format that can be used for analysis or reference in a timely manner. Additionally, final accident briefs which include a determination of probable cause are not available for more than a year after the accident occurs. The Board and industry could do the best job in the world investigating accidents but, if the information is not available for years, much of the present value is lost immediately.

It has been discussed in other panels, but I also want to add my endorsement to the suggestion that the Board stop using field IICs for field major investigations. It is our experience that a major investigation is best managed by a Washington NTSB IIC. And, finally, I urge the Board to be more aggressive in participating in foreign investigations.

Again, I applaud the Safety Board for conducting this symposium. The Board is the most effective and professional accident investigation organization in the world, and it is through these introspective efforts that it can continue to grow.

**CHARLES CUTFIELD**
**PRINCIPAL ENGINEER, ACCIDENT & INCIDENT INVESTIGATION**
**GE AIRCRAFT ENGINES**

# OBSERVATIONS ON WASHINGTON "GO-TEAM" MAJOR INVESTIGATIONS

## INTRODUCTION

Mr. Chairman, distinguished Board members, ladies and gentlemen, my fellow accident investigators. It is a great pleasure for me to be here and to address you as the representative of a propulsion manufacturer.

I would like to thank the National Transportation Safety Board (NTSB) for the opportunity to be in this distinguished company and to provide a critique on the subject of Major Accident Investigation Go-Teams. GE Aircraft Engines (GEAE) is proud to be associated with the work of the members of the National Transportation Safety Board and all the governments, agencies, and companies represented here today. We would have liked to have contributed recommendations to all of the panels, and we hope the NTSB will review the text of the paper presented to address the comments that I do not raise orally here on this panel.

### Background

I have had the opportunity to work with the NTSB on Major and Field investigations, both in the US and abroad, some of which were of short and some of which were of long duration. I therefore consider my view is a fairly objective one.

GEAE manufactures gas turbines for marine propulsion, pipelines, offshore oil and gas platforms, and military and commercial aviation. We also manufacture the CFM International line of medium-size turbofans in conjunction with SNECMA of France, and more recently, the smaller CFE738 engine with Allied Signal as our partner. At GEAE the engineers working on investigation of commercial engine accidents are on the staff of the Chief Engineer, under the Director of Flight Safety. We have nine trained accident investigators among a staff of sixteen in the Flight Safety office. Five of these work full time on investigations. We can draw on the other investigators as necessary.

The Flight Safety Office investigates significant aviation events involving large commercial transports, commuters, corporate jets and helicopters powered by GEAE or CFMI engines. Our primary interest is in helping establish the cause of an event and the circumstances that led to the situation, regardless of whether the powerplant is a factor. A secondary role, which is a safety responsibility internal to GEAE and comes after the investigation, is to recommend engineering disposition regarding the continued serviceability of engine hardware. We also establish the requirements for component inspections, based upon the exposure of the parts to the particular circumstances of the event, to determine their suitability for future use.

Because of our position in the GE Aircraft Engines organization we can command other resources within the General Electric Company in the form of manpower (from Metallurgy, Design, Manufacturing and Quality) and facilities (Disassembly, Inspection and Laboratory Services) not only in Aircraft Engines but also at the GE Corporate Research facility. It is our trained investigators, our knowledge of the product, and its operational history that we bring to an investigation, and which contribute to the understanding of an accident or incident. It is from this perspective that we offer both critique and compliments for the NTSB system and its staff.

In preparing my thoughts for this discussion I reviewed some of the recommendations from the NTSB's 1983 symposium. Although some of the issues I shall raise today are new, a few of the problems of ten years ago are still with us today. I hope that my comments today will raise new issues as well as reiterate the pleas of 1983.

One of the satisfying aspects of working on an investigation for the NTSB is that the actions generally follow a structured procedure that is reasonably well known and documented. We would like to contribute to the continued success of the NTSB's investigations and perhaps help improve the procedures.

**NTSB Procedures**

For some time now the Safety Board has accepted that involvement of manufacturers' expertise in an investigation is beneficial to the understanding of an accident, and consideration is given to our submissions in the Board's determination of findings and probable cause. We think this is a good approach and we thank the NTSB for the opportunity not only to participate fully and permit us to express our

opinions, but also to have the opportunity to present those opinions for consideration of the probable cause of an investigation.

The Federal Aviation Administration (FAA) is the only Party with the established right to participate in an investigation, and they of course may run their own parallel investigation. We have found however that on occasion an FAA participant in one of the groups may have a particular interest due to pending regulatory changes, which has influenced their objectivity. The FAA may be interested in establishing the Part Number on a component, while we are interested in the material deposit that was wiped away to reveal the part identification. The NTSB has often been helpful in maintaining the focus on the event under investigation and declined to be drawn into research programs.

The FAA Engine and Propeller Directorate requires a close communication regarding the propulsion manufacturer's business. This parallel responsibility, to the FAA, can lead to problems when we cannot discuss and explain information we are privy to during an investigation because of the NTSB's rules on information release. We recommend some discussion between the NTSB and the FAA Engine and Propeller Directorate so that this does not put the investigators from the engine manufacturer in a difficult position.

**Methods**

The NTSB's experience of conducting investigations has resulted in a structured approach that works well. The Party system produces a high quality investigation that allows many differing opinions to be discussed and evaluated. A major investigation is well run and well staffed despite the NTSB's relatively small size because the Parties function as an auxiliary to the NTSB: the Parties know how the event will be investigated, what Groups will be formed, and can assign manpower to assist as required by the NTSB. By going to Washington and meeting with the NTSB staff, or by attending one of the accident investigation courses where the process is discussed, operators and manufacturers have the opportunity to become acquainted with these procedures, and even with NTSB investigators, before an investigation ever occurs.

**NTSB Authority**

We believe the NTSB should firmly defend their federal mandate to investigate aviation accidents and incidents without State, Local or judicial

intervention. The NTSB must firmly resist judicial attempts that seek to cripple the authority of the Safety Board to investigate as they see fit. It is in the interest of possible litigants, and particularly plaintiffs, to have all the facts revealed. This is best served by having the most skilled experts and best equipment available to carry out the NTSB's investigation, since the facts of the investigation are available in the Public Record. Investigations worldwide, in which an open approach has not been followed, or in which the judiciary has not recognized the value of the Party system or the manufacturer's participation, have led to loss of confidence in the findings or reinterpretation of information by other experts. The NTSB should be firm and strong in enforcing its own jurisdiction so as to minimize, within the bounds of applicable law, interference in the Board's congressional mandate by other governmental institutions.

**Hardware Investigations**

When a major accident of high visibility occurs, perhaps involving fatalities or significant damage, and the investigation identifies the propulsion system as a possible cause factor, examination of the hardware needs to proceed as expeditiously and as comprehensively as possible. All of the parties on the Powerplants Group, especially those with technical expertise are invited to participate in the process. The opinions of all Parties should be respected and a Systems or Metallurgical analysis team of qualified experts from participating Parties, headed by a competent NTSB engineer or metallurgist, needs to establish and agree upon a statement of work or "workscope". The agreed workscope must then be carried out completely. It is this aspect of the NTSB process that requires improvement. It is our view, based on our experience, that the NTSB approach has been to sometimes take custody of hardware for immediate shipment to its laboratories in Washington, which is neither the most cost effective nor the most technically desirable method for conducting material analysis.

If the hardware is an engine component part, the workscope can be carried out most expeditiously and correctly in the manufacturer's facilities. The manufacturer's facilities are the most efficient because of the availability of dedicated inspection, measurement and test facilities and experts to assist the investigation. Often the factory equipment, tooling and fixtures are one-of-a kind, with dedicated design, software and instrumentation features unique to that part. For instance the interpretation of data stored in FADEC non-volatile memory requires a complete understanding of the software and how the messages are set, to correctly interpret the sequence of events. In other cases, the physical size,

complexity or configuration of the hardware creates obstacles that may hinder the expeditious analysis of the component at the NTSB's facilities.

As a manufacturer, we understand that some suspicion of prejudice or self-interest may arise concerning this recommendation for in-factory Party evaluation. However, we feel strongly that with careful supervision by the NTSB and under NTSB guidelines, these objections are greatly outweighed by the clear technical benefits of in-factory evaluation.

**Recovery Efforts**

In 1993 we participated in the investigation of the cause of an inflight loss of a propeller from a turboprop aircraft (the aircraft diverted and landed without further incident). The propeller and part of the shaft fell into Lake Erie. Examination of the remaining part of the propeller shaft did not reveal any cause for the shaft fracture. Later, after a major underwater search, we recovered the propeller from Lake Erie and the NTSB took custody of it. The NTSB, with the participation of the Parties, established a workscope and conducted a thorough evaluation of the recovered part. However not all the laboratory tasks were completed and no new evidence was revealed. Much later when we were able to complete the workscope, it revealed a material inclusion in the recovered part of the shaft. In the meantime a major analysis and test program, including an instrumented flight test, had been undertaken, searching for a non-existent design fault. With earlier knowledge of this material flaw, a fast response in the form of a proper field program could have been carried out to protect the fleet.

We would therefore recommend most strongly to the Board that considerable effort be expended in recovery of important hardware and structures and that all the available knowledge be gleaned from examination of the pieces, under a protocol established by a workscope agreed to by all the participating Parties. All the steps of the agreed workscope should be completed in an expeditious manner under the authority of the NTSB.

**Impounding of Hardware**

On occasion we have had spirited discussions with the Board staff because we did not understand where the focus of the Board's interest lay in an event. Last year we participated in the investigation of a commuter aircraft incident in which the aircraft landed with one engine shut down because of a propeller gearbox internal

failure. There were no injuries and the aircraft had only minor damage. The gearbox was removed and taken to an overhaul facility for disassembly. The NTSB then decided to take the components to Washington for investigation. Moreover, they also took into custody other gearboxes in the facility which were there undergoing unrelated maintenance. These units were from a different operator not involved in the incident under investigation. We think this is an area where the rules need to be better defined. The NTSB has the authority to impound any part of an aircraft involved in an accident, and any parts or records of an operator that pertain to that accident. The NTSB also has the right to investigate any aspect of aviation within its jurisdiction that it considers necessary. However, it should be clear to everyone, and the NTSB should state why they have impounded parts. An avenue of recourse needs to be established for appeal when it prejudices an unrelated airline's operation.

**Categorizing the Level of Importance**

The NTSB should set up and publish a procedure for assigning categories to investigations with a gradation of severity or importance, for example from 1 to 4. In this way it could be predetermined that the NTSB resolve to delegate Category 1 events to the manufacturers -- minor investigations, involving no loss of life, with no major safety concerns, and of no political importance, requiring little supervision or oversight -- to carry out and report the results. Important but uncontentious work could be performed using the NTSB's limited resources more efficiently, freeing the NTSB staff to concentrate on the major cases. Category 4 events would then be well understood as presenting a safety threat to the fleet, being politically sensitive or having litigation potential. The NTSB should analyze these events with full Party participation.

**Delegation of Work**

The NTSB has sometimes applied the same stringent policy of taking the hardware to Washington for laboratory investigation in relatively unimportant incidents. In one investigation the NTSB kept the Parties at arm's length, without fully involving them in the workscope discussion. In cases where there are no injured parties and there is little likelihood of litigation, this philosophy precludes the advice and contribution of the Party experts and drags out the investigation process. If the public image of the NTSB is not in question and the workscope can be agreed upon, the parts should be provided to the manufacturer and the disassembly or investigation should be delegated by the IIC to the company to

rapidly complete the workscope and document it. Of course, disassembly of engines or component assemblies should commence only by arrangement with the NTSB for supervision and surveillance. Using the manufacturer's resources and expertise is the surest, fastest and most efficient way of establishing the factual information.

**Disassembly and Investigation Facilities**

This is an area in which the manufacturers can significantly assist the NTSB. No one is more intimately familiar with all aspects of a component than the manufacturer who designed it, produced it, and provides the product support, maintenance and shop instructions for it. The manufacturers have the understanding of the processes, procedures, and inspections that went into making a part. A significant reduction in the time taken to evaluate whether a part failed can be realized by employing the knowledge of the people who deal on a daily basis with the parts and the materials from which they are made. This fact is well known to the NTSB.

The manufacturers invest heavily in new technologies to advance the state of the art. The NTSB certainly cannot be expected to keep abreast of all of these developments and the many different design configurations. New designs, new techniques and new instruments are constantly being developed to manufacture, inspect, and investigate parts. The manufacturer has the responsibility for component design and the means through Service Bulletins and design change documents to design and release corrective action to protect the fleet if it is required. All action should be directed towards swift understanding of the problem and execution of corrective action.

When we accept the responsibility to investigate parts in the factory, very special precautions are devoted to hardware which is part of a government agency investigation. We impose special procedures to ensure that control over the security and protection of the parts remains with the NTSB or other government agency.

**Use of Technology**

The experience and specialized knowledge of the manufacturer are vital to the investigation in those occurrences where new phenomena are encountered in the course of the investigation. The NTSB specialists cannot possibly be aware of all of the recently discovered problems in a particular field. Nor does the NTSB have the

capability to go on and research a phenomenon that newly emerges as a puzzle during an investigation. Often comparison with records of other hardware in the fleet is required to gain understanding, in such instances where the technology is pushing the state of the art.

**Summary**

The following actions are recommended:

1. The NTSB should generate and with the Parties to the investigation, agree upon a procedural step-by-step workscope to evaluate a part or system, and then adhere to the plan and execute the full workscope. If they decide that they do not wish to devote their resources to conclude the full workscope, they should without delay turn the hardware over to the manufacturer to complete it.

2. If an occurrence being investigated is not a prominent accident and the NTSB public image is not in question, if no significant liability is involved and the laboratory workscope can be agreed upon, the parts should be expeditiously released to the manufacturer. The IIC should delegate the disassembly or component investigation to the manufacturer to complete the workscope and document the results.

3. When liberated parts are lost, a vigorous effort should be made to find and recover important hardware and structures. All the available knowledge should be gleaned from examination of the pieces, under the investigation sequence established by a workscope agreed to by all those Parties to the investigation who choose to participate in that work.

4. The NTSB should be firm and strong in enforcing its own jurisdiction in order to minimize, within the bounds of applicable law, interference by other governmental institutions with the NTSB's congressional mandate to investigate and protect the public interest.

5. The NTSB should make clear the rules under which it operates when probing into safety issues so that it is understood why parts are impounded for examination.

6. The NTSB should set up and publish a procedure to categorize investigations on a scale of relative importance and set corresponding guidelines so the Parties know what to expect. For example, those criteria that justify impounding hardware for return to Washington.

7. The NTSB should discuss with the FAA the means of communication by which the Engine Directorate can discuss ongoing investigations with the propulsion manufacturer in order for the FAA to better understand technical issues without the concern of the manufacturer's representative on the team releasing privileged information from the accident site.

## CAPTAIN JAMES M. STURGIS
## DIRECTOR OF FLIGHT OPERATIONS
## AMERICAN EAGLE REGIONAL AIRLINE SYSTEM

Good Afternoon. As the Director of Flight Operations for the American Eagle Regional Airline System, I have various flight operations responsibilities for over 270 aircraft and half a million flight operations a year. Thankfully, the system works well. Once in a while however, as the expression goes, "A wheel comes off the wagon." Such was the case last month over Louisiana. The following critiques are a result of the recent Saab 340B incident on the evening of Tuesday, February 1, at False River, Louisiana.

The NTSB reacted quickly from the South Central Regional Office. An investigator arrived on the scene approximately ten hours after the incident. The investigator in charge (IIC) from the NTSB's Major Investigations Division headed up the investigation. He arrived late in the afternoon on February 2; his flight from Washington having been delayed due to mechanical problems.

After the IIC toured the aircraft and incident site, an organizational meeting was scheduled for the evening. Investigative groups where formed, and the following day's plan of action was formulated.

The field phase of the investigation was supervised by the IIC for seven days. After the IIC departed to Washington, the Board systems and powerplant/propeller group chairmen remained on site for several days.

The aircraft was released to the operator on the eleventh day, four days after the IIC had completed his on-site investigation and only after considerable telephone negotiation. Two days later the aircraft was ferried to its maintenance base for return to service.

There were aspects of the investigative process in which we see a need for improvement.

**ISSUE:**

The digital flight data recorder (DFDR), cockpit voice recorder (CVR), and flight data acquisition unit (FDAU) were removed from the aircraft the morning of February 2; however, they were not shipped to the NTSB lab until the evening of February 3. Both the DFDR and CVR provided important information that was critical to verifying the cause of the incident. However, the investigation was "delayed" two days until data was provided to the investigation team.

**Recommendation:** The DFDR and CVR should have been forwarded to the NTSB immediately after being removed from the aircraft. If the NTSB is unable to ship the recorders on a timely basis, other parties to the investigation, in particular the operator who specializes in air transportation, should be consulted on arranging for expedited shipment.

Three weeks subsequent to the incident, and removal of the Flight Data Acquisition Unit (FDAU), the FDAU has not yet been forwarded to the manufacturer for readout and analysis. The FDAU should have been forwarded to the manufacturer ASAP as it can provide important information during that portion of the flight, after the loss of both main busses, when the DFDR was not recording. Had the DFDR or CVR analysis been inconclusive, such additional information may have been required during the initial phases of the investigation by the IIC.

**ISSUE:**

DFDR data was provided to the NTSB personnel for a pre-viewing. Following the viewing by NTSB personnel, other parties to the investigation were allowed to look at the data; however, they were not allowed to receive copies of the data for an additional 24 hours. What possible benefit to safety can be found in such procedures?

**Recommendation:** If investigators from the parties have true "party" status, they should have full access to the data as soon as it is available. Full access will result in better investigations conducted on a timely basis.

**ISSUE:**

A complete readout of the DFDR data has not yet been provided to the parties, three weeks subsequent to the DFDR removal and two and one half weeks subsequent to the preliminary readout.

**Recommendation:** Following the preliminary readout, the NTSB should provide a complete DFDR readout on paper and on diskette to operators and other parties to the investigation who request the data. This will allow a thorough analysis of the data on a timely basis.

**ISSUE:**

Investigative party photographs of the cockpit were not allowed until the Systems Group had completed their documentation. The FAA had taken photographs shortly after the accident; however, all other parties were delayed over a day before they could take their photographs. These parties have requested copies of the photographs taken by NTSB personnel.

**Recommendation:** With NTSB supervision, all parties should be provided an opportunity to photograph wreckage (cockpit) or be provided copies of the NTSB's photographs during the field phase of the investigation.

**NOTE**: As an operator, we have requested copies of these photographs in a subsequent memo to the IIC.

**ISSUE:**

Operations Group Notes are not always consistent and can vary considerably from the interview.

**Recommendation:** Crewmember interviews should be conducted with a court reporter present or at least, a recording of the interviews be made, to be transcribed at a later date.

**NOTE:** As an operator we have requested copies of the recorded interview and offered to pay for the transcription.

**ISSUE:**

Receipts for aircraft components, records, etc. have at times not been received on a timely basis. Also, many components are removed on a "shotgun" basis i.e., they do not necessarily contribute to the investigation. The aircraft wreckage release for the Saab 340 was not issued when the aircraft was turned over to the certificated operator.

**Recommendation:** NTSB personnel should ensure investigators are aware of aircraft component costs and need for receipts. NTSB personnel should consider to what extent they require aircraft components, especially the avionics and on-board computers (black boxes). An aircraft wreckage release should be issued as soon as possible to mitigate high out of service costs borne by the operator.

**ISSUE:**

The NTSB has a history of forming quasi groups which allow them to pursue certain aspects of an investigation. However, until the group is officially formed (if ever), other parties to the investigation do not have representation on the group. A recent example was the formation of a quasi survival factors group headed by Hank Hughes to interview passengers on the aircraft. Since the group was not officially formed, personnel from the operator were unable to participate in the interviews of their passengers.

**Recommendation:** If the subject matter is important enough to investigate, allow parties to participate. The formation of a "group" may not be necessary. Participation by all parties desiring access is. If a

questionnaire or survey form is used in lieu of interviews, parties should be provided copies, and participate in the development of those questionnaires.

All this goes to say, if the "parties" concept is to function at all, some limitations will have to come down. Some carrier "parties" may not be willing, or able, to add to the quality of an investigation. Others, on the other hand may be able to bring substantial resources to bear which will enhance the role of the NTSB as final authority in incident/accident investigations.

Again, we thank you for the opportunity to meet with you and share these thoughts.

**STEVEN R. LUND**
**SENIOR PRINCIPAL STAFF ENGINEER FLIGHT OPERATIONS**
**DOUGLAS AIRCRAFT COMPANY**

First, on behalf of the Douglas Aircraft Company, I would like to thank the Safety Board for inviting us to participate in these very useful and constructive discussions. As a participant in both the Dowingtown and Springfield Conferences, Douglas is keenly aware of the usefulness of these proceedings, both to the industry and the NTSB.

Our comments on the Washington "GO-TEAM" Major investigations are in three areas:

- CVR/FDR data,
- Incident investigations, and
- NTSB specialist's training.

## CVR/FDR Data

Douglas recommends that the party coordinators be given the opportunity to listen to the cockpit voice recorder (CVR) as soon as possible while still on the scene of a major investigation. In addition, the data from the flight recorder, either in tabular or time history plot form, should also be made available on an expedited basis. This was done by the NTSB IIC on a major MD-80 accident in Detroit and it proved to be very helpful in directing the inquiry. Douglas believes that all party coordinators are acutely aware of their responsibility for CVR/FDR security. As a practical matter, if the IIC has a single copy of a CVR magnetic tape and can play it in a controlled environment for a select group of party coordinators who require the information to guide their investigative activities, the security issue would be much less of a problem than having many copies of a transcript available. The IIC in another accident in Sioux City, Iowa provided the FDR data to Douglas and other party coordinators, who upon simply constructing hand plots of the data, were able to better understand the sequence of events leading up to the accident. Similarly, during the on-scene investigation of an MD-80 accident in Stockholm, the Swedish authorities provided digital flight data recorder plots to the Douglas coordinator within 48 hours of the accident. This facilitated a formal presentation of the

sequence of events in the accident which was provided to all parties during that evening's investigation briefing. This, coupled with other factual information provided a focus to the inquiry very early on in the proceedings.

**NTSB Incident Investigations**

Douglas has long recognized the value of thoroughly analyzing operational incidents. We have had a successful formal incident review process in place for the past quarter of a century. The obvious positive outcome of this process is: if one can prevent incidents, several links in the chain are removed which may inevitably lead to a future accident under the same circumstances. So, Douglas is eager to provide the Safety Board technical assistance in their investigation of incidents that present a potential for aviation safety improvements. Having said that though, we would strongly recommend that the Board follow the same procedural requirements for incidents as they do for accidents. Particularly in the area of the technical review of factual reports. Douglas recommends that all factual reports, whether generated by a Washington "GO-TEAM" or a field investigator, be reviewed by all parties for technical accuracy before going forward to the Board for probable cause(s) determination. Depending on the complexity of the issues involved, the Board may wish to conduct a formal technical review meeting with all parties for a "speak now or forever hold your peace" session, before the staff formulates the analysis and findings.

**NTSB Specialist Training**

Douglas recommends the Safety Board make an overt effort to train their staff in the latest technology areas, such as: composite materials, digital avionics, new aircraft systems, aircraft performance, cockpit automation, etc. DAC believes this should be accomplished before, rather than during an inquiry. Douglas has many formal training programs for its customers in most of these areas and would be more than pleased to arrange for the Board's staff to attend at a nominal fee.

Thank you again for providing Douglas the opportunity to participate in these proceedings. I am looking forward to the working group sessions later to formalize these recommendations.

**JAMES T. MORN**
**DIRECTOR, OPERATIONS / FLIGHT TEST**
**AEROSPATIALE GENERAL AVIATION**

# CRITIQUE OF THE NTSB BY THE GENERAL AVIATION INDUSTRY

I have been privileged to work with various individuals from the NTSB in my over 25 years of service in the air transportation industry. I welcome this opportunity to evaluate the operations, methods, and management of NTSB investigations as they relate to the general aviation industry.

## Evaluation

One point causing considerable difficulties over the years occurs when an individual finds an anomaly during an investigation, makes comment of that anomaly in the report but then makes no attempt to preserve the evidence. A case in point would be stretched light bulb filaments. A number of years ago, a twin turbine engine aircraft experienced an in-flight break-up and a comment was made in the report of a warning light bulb that was thought to be on at the moment of impact. When a question about that warning light bulb came up later, the manufacturer was given a box full of light bulbs to search through for the light bulb described in the report. As that particular light bulb had not been properly tagged during the investigation, it was impossible to identify which one it was later. Any item that might be named as a finding or listed in the probable cause section of the report must be preserved.

It normally takes 9 months to a year to get a finished report from the NTSB. Manufacturers' representatives and accident investigators are required to submit a report in a more timely manner. If after the on-scene accident investigation the NTSB investigator has offered to send follow-up documentation required by the other investigators to complete their reports, it would be nice to get that documentation in a timely manner.

Occasionally, and only occasionally, I will get a copy of an NTSB report to which I was a party and discover that either my notes were all incorrect or two aircraft crashed on the same day in the same location! It is the practice of the Canadian Transportation Safety Board, and I believe a very good practice, to send

ALL parties to the investigation a draft copy of the report for comment. This may well reduce the number of requests the NTSB gets for a "change of probable cause."

The responsibility of malfunction and defect reporting is given to the owners of type certificates (TC's), STC's, TSO's, etc. Although there is some relief granted under section (d) (1) (iii) which states that the requirements of paragraph (a) (Reporting of Malfunction and Defects) do not apply to an owner of a TC who has already reported under the accident reporting provisions of Part 830 of the NTSB regulations, there still lies a legal and moral responsibility for the investigation of all mishaps by the TC holder. Why then are manufacturers made to feel like the NTSB is doing them a favor by allowing them on the accident site? Although the recommendation process of the NTSB is effective, it cannot compare with the speed with which a manufacturer's representative in conjunction with the appropriate Aircraft Certification Office can get a "fix" on the street. At the U.S. helicopter division of Aerospatiale (now American Eurocopter), there were several occasions when service bulletins were issued in conjunction with the FAA Rotorcraft Certification Office within 2 or 3 days of an investigation and subsequent ADs were sent in a telex fashion.

So as not to be totally negative, I would like to extend my personal thanks to Carol Floyd in the Data branch for the warm and immediate responses to recent requests by the chairman of SOCATA, our French parent company.

In conclusion, if we can increase our effective communication and standardize it across all field offices and aircraft manufacturers as well as properly preserve all evidence from an investigation, we can use the investigative process to produce a safe aircraft and a safe system for aircraft to fly in. If we can add speed to that system by having qualified people assist the NTSB, I think it goes without question that they should be welcomed to be a part of the investigative process.

**ROGER W. STALLKAMP**
**VICE PRESIDENT, FIELD INVESTIGATIONS**
**HARTZELL PROPELLER INC.**

Good morning -- it is my pleasure to be on the program at this important National Transportation Safety Board/Industry Symposium. On behalf of Hartzell, I would like to thank the NTSB staff for inviting me to participate.

Hartzell is a small manufacturer in terms of total employees, with limited resources for accident investigation. However, because we enjoy a majority market share on corporate turboprops and turboprop airliners, our product is found quite often at an accident site. We do consider accident investigation an important responsibility, but we cannot be physically present at all the crash sites -- nor should we have to be. The question then becomes "How can we best support the Board in an accident investigation?"

Hartzell does get initial accident information from various sources such as the FAA Duty Desk in a reasonably timely manner; however, these preliminary reports are sketchy at best. As a result, time is spent (1) trying to identify the IIC, (2) determining if our product is installed, (3) determining if the product is a potential factor, and (4) determining if you, the IIC, want it examined. This is a particularly difficult task when the FAA has been delegated to do the investigation. I have been in the propeller accident investigation business for about 15 years and have had the opportunity and pleasure to work with a great many of the NTSB Field Investigators. As a result, I do get good response from my calls and often will be contacted initially by the IIC. However, this is not the most efficient or reliable means of notification. The cliché of "no news is good news" is not particularly comforting in the accident investigation business.

Thus, my critique item for the Board -- I would solicit a more reliable and positive communication mechanism from the investigator when our product is considered a causal factory in the investigation. As I said, we may not be at the accident site -- and that is not the critical point in many cases -- but please give us the opportunity to examine the propeller with you, and not after it has been torn apart or otherwise disposed of.

**STEVEN J. BROWN**
**SENIOR VICE PRESIDENT**
**AIRCRAFT OWNERS AND PILOTS ASSOCIATION**

# CRITIQUE AND RECOMMENDATIONS FOR IMPROVED GENERAL AVIATION ACCIDENT INVESTIGATIONS

The Aircraft Owners and Pilots Association (AOPA) has worked closely over the years with the National Transportation Safety Board (NTSB) in the analysis of accidents and the subsequent prevention of future incidents. The association has participated in the investigation of major accidents, appeared at public hearings, and worked actively to distribute safety recommendations to its 325,000 members through its monthly magazine, safety publications, and Air Safety Foundation (ASF) programs.

Our presentation will focus on two key areas of concern. First, the need for higher quality field investigations and secondly, the need for better dissemination of educational information. We believe accident investigations can be improved by focusing more intensely on the "primary factors" involved in an accident. Now and in the future, these are largely human performance issues and involve pilot experience, in-flight decisions, human factors, and equipment design.

Frequently, field investigations are resource constrained and the quality of information on the pilot's background as well as flight performance is either not obtained or available in only limited form. In addition, the time frame in which investigations are completed often limits the amount of information that can be obtained and analyzed by investigators.

AOPA and its associated Air Safety Foundation review and distribute large quantities of safety information to the general aviation pilot population. Much of this material is from original analysis that is dependent on the quality of the data in NTSB accident records. We believe many aspects of the NTSB records and files could be improved. Among the areas of focus should be completeness of information, timely analysis, and user friendly access to information on evidence as well as safety recommendations.

General Aviation pilots are anxious to receive new accident prevention information that is customized and applicable to the specific flying they conduct. Both AOPA and ASF look forward to continued work with NTSB as well as FAA and a continuing decrease in the historically low accident rate.

**GREGORY ERIKSON**
**ACCIDENT INVESTIGATOR**
**EXPERIMENTAL AIRCRAFT ASSOCIATION**

EAA - the Experimental Aircraft Association - is a worldwide aviation membership organization. EAA brings together enthusiasts that enjoy participation in the exciting world of aviation. With over 135,000 members, EAA is a field-based, activity-oriented association. Through the 750 plus Chapters worldwide, fly-in activities of all sizes and written communication including Chapter newsletters and six national monthly publications, EAA members have a world of opportunity to participate in a variety of levels.

EAA was founded by Paul Poberezny in 1953 when a small group of aviation activists joined together to seek federal permission to build aircraft of their own design for their education and recreation. Eventually the growth of the movement and the individual responsibility created FAA policy that permitted the flight of these aircraft by individuals who had constructed the amateur-built aircraft and completed an appropriate flight test program. Today, through the growth of the movement and the activities and programs of the organization, EAA has become much more than a club of homebuilders. The organization represents the wide spectrum of individuals interested in aviation as a recreational outlet, from vintage production aircraft, to ultralights, to former military aircraft - the warbirds - to the plans and kit-built airplanes. The world of sport aviation indeed offers incredible variety.

Other presenters on this panel will certainly represent other segments of the general aviation community which are also common to many segments of sport aviation. While EAA has broadened in scope over the decades, this presentation will focus on homebuilt aircraft accident investigation. "Homebuilts" are made possible through FAA regulation and policy designating an "experimental - operating amateur-built certificate of airworthiness."

As an organization, EAA's contribution to aviation has been through advocacy of the principles of individual responsibility, self help and partnership. It is in light of those principles that the following critique to NTSB's handling of amateur-built aircraft accident investigation is offered.

The NTSB and FAA need to take amateur-built aircraft accidents more seriously. The NTSB delegates most amateur-built accidents to the FAA. Some NTSB offices almost always have the FAA do the investigation, even when multiple fatalities are involved. Other NTSB offices try to send an investigator out to every amateur-built accident. With only a few exceptions, none of the NTSB investigators have much knowledge of amateur-built aircraft, or any interest or knowledge in the sport aviation movement.

With the growing popularity of the "kit-built plane" and the decline of the availability of general aviation production plane, amateur-built aircraft are becoming an increasing percentage of the flyable general aviation fleet. They are being completed in increasing numbers every year. Amateur-built aircraft registrations with the FAA now count for one-tenth - over 16,000 - of the fixed wing, single-engine airplanes. For the most part, these aircraft are similar to most certified general aviation aircraft; however, a lot of them have a wider performance range. Many kits use newer types of construction techniques and materials. Many have different systems than traditional general aviation aircraft. Both the NTSB and FAA investigators need to become more knowledgeable about amateur-built aircraft.

There are two major opportunities for NTSB investigators to become more familiar with the information they require and the resources available to assist in their accident investigation of amateur-built aircraft. The first is to utilize the educational opportunity of the EAA Convention in Oshkosh, Wisconsin, and the second would be the structuring of a briefing course on sport aviation.

Though the NTSB has an exhibit present at the annual EAA Fly-In Convention, other than some of the aviation safety investigators (ASI) from the Chicago Field Office, the exhibit is staffed mostly by representatives from Washington, D.C. Most of these individuals are not involved in day-to-day investigations. The NTSB should use this exhibit as an opportunity to better educate the Board's field personnel by rotating its various field investigators to the EAA Convention.

To the uninformed, this event is thought of as the "EAA Airshow." However, the airshow is merely a few hours each day in a multi-faceted worldwide convention of EAA members and aviation enthusiasts. The Convention attracts more than 800,000 participants and during this seven-day event, Wittman Regional Airport plays host to thousands of aircraft. A major focus of the Convention is the opportunity to partake of more than 500 educational forums and workshops that

share the knowledge necessary to improve aviation safety, preserve aviation history and teach individual responsibility and participation in aviation activities.

The Convention is also one of the world's largest exposition of general aviation products and services. Through participation in the EAA Convention, NTSB field personnel could be exposed to the various manufacturers of aircraft kits and other products that would assist in their understanding during accident investigation. EAA volunteers would be willing to take these ASIs and introduce them to the kit manufacturers and point out the various aircraft and their types of construction. This could be the start of a learning process. Numerous other large EAA regional fly-ins could also provide a venue for increased awareness by the sport aviation community of the NTSB's activities, as well as an educational opportunity for the Board's staff and field personnel.

A second opportunity for Board and EAA partnership would be the establishment of a sport aviation "briefing course." EAA would be willing to set up a multi-day briefing session for NTSB and FAA investigators to familiarize them with the world of sport aviation at our facilities in Oshkosh, Wisconsin. Such a course would expose the field investigator to the EAA organization, its programs, activities and resources. Special briefings describing the EAA Technical Counselor and the soon-to-be-announced Flight Advisor Programs would be important segments of these sessions. With tours of our Air Adventure Museum, restoration and flight operation facilities, they would learn of various amateur-built aircraft, their construction methods, systems, and performance.

Within our resources, EAA stands ready to help the NTSB and FAA in any way the agencies deem useful in the investigations of amateur-built aircraft accidents. For example, EAA would be willing to prepare a list of kit suppliers and the name of a person at the company that can be contacted if the investigator-in-charge has some questions about construction, systems, performance, etc. EAA would also like to be notified by the NTSB when they issue any safety recommendations to the FAA, or when they are getting ready to issue any such recommendations, so we might provide the information to the aircraft operators through our various communication vehicles.

A final problem area we would like to highlight concerns the NTSB delegation of an investigation to the FAA. The FAA, quite often, has the same FAA inspector that signed off the aircraft in the first place when the builder completed the project assigned as the accident investigator. In these cases, there may be some

reluctance on the inspector's part to find anything wrong with the aircraft since he/she was the one that originally approved it for flight. This certainly appears to be a conflict of interest in the work assignment. Of course, the dichotomy is that if this scenario does not exist, there is a good possibility the FAA inspector assigned will not know anything about amateur-built aircraft and not take much of an interest in the investigation.

As you can see, EAA is eager to ensure a better understanding by the NTSB of the sport aviation community. We make available our resources to work with the Board in partnership in pursuit of our common goal of aviation safety. It is imperative that we work with government to ensure the privileges of flight freedom that we have gained over many decades of cooperation, education and responsibility. We appreciate the opportunity to present our recommendations to the Board through this symposium.

**ROBERT A. WHITE**
**ENGINEERING SUPERVISOR, PRODUCT SAFETY**
**CESSNA AIRCRAFT COMPANY**

Thank you for the opportunity to participate in the National Transportation Safety Board (NTSB) Symposium and to represent Cessna in the panel presentations. As I am sure that most of you are aware, the Cessna Aircraft Company is the largest manufacturer of general aviation aircraft ranging from single-engine pistons, dating back to the 1940's, through today's market of corporate twin-engine jet aircraft. In the course of business, Cessna Aircraft Company has manufactured and sold over 180,000 aircraft. As a result of the sheer numbers of aircraft, there are occasions when unfortunate and unplanned events occur to a low percentage of these aircraft. Although the majority of events are minor incidents, there are mishaps of more catastrophic proportion. This is why we are all here today.

In this country, as in other countries, we in the aviation industry are very fortunate to have a delegated independent agency responsible for investigating all of these events. For this reason, I want to compliment the National Transportation Safety Board and other countries' investigating teams for professional business practices in the interest of aviation safety. There are, however, some areas we, Cessna, and perhaps others, may misunderstand or misinterpret. Therefore, we solicit your review and clarification. Please help us help you.

Some of these areas of interest I want to address today. I am aware that all responsible government agencies manage their staffs to levels appropriate to conduct business. It is extremely important to have the National Transportation Safety Board, particularly today, be staffed to levels satisfactory to handle the complete and thorough investigations of all mishap events. In some cases, it is easy for an organization to submit to political, media and other high visibility criteria when attempting to conduct a neutral accident investigation. Yielding to these pressures may warrant greater attention to large airplane events than less visible general aviation mishaps. Thorough and complete investigations in every general aviation mishap is just as important and contributes to the same life saving results as the investigation of the larger airplane accidents.

As the largest general aviation manufacturer, Cessna Aircraft Company and all of its personnel are dedicated to supporting the thorough and complete

investigation process. Cessna has always considered it a privilege to be able to support all phases in the investigation process. We also believe that the best and most thorough investigation of a component or system is conducted by an organization most knowledgeable with the unit in question, that being the company of manufacture and/or its suppliers.

I am aware of considerations by government sources to use independent organizations to conduct investigations for component breakdown. Often these agencies can provide satisfactory results. But all too often, agencies whose primary business is component overhaul or maintenance of units in their original shape and form are not familiar with nor have the tools to conduct teardown and/or analysis of components that have been severely damaged during a mishap sequence.

For example, I was a participant in an investigation involving evaluation of avionics components taken to the manufacturer (under protection of the federal investigation) for examination and analysis and determination of preimpact conditions. This evaluation was very beneficial in that the manufacturer knew techniques and procedures to evaluate the components which were not common knowledge throughout the theater of operations. The laboratory yielded invaluable information relative to the unit condition prior to the aircraft mishap.

Another issue to question would be that of "party status" participation to the accident investigations conducted by the NTSB. Rule 49 CFR 831.9 states in part:

> "Parties to the field investigation shall be limited to persons, government agencies, companies and associations whose employees, functions, activities or products were involved in the accident or incident and who can provide suitable qualified personnel to actively assist in the investigation."

The rule as stated is a limiting rule; however, it is difficult to understand how this rule could exclude manufacturers of the aircraft from participating in any investigation. It would appear that personnel employed by the company of manufacture, trained in accident investigation, and knowledgeable of the product line (with access to all the detailed knowledge of the company's technical staff) would benefit investigations and should have access as a "party" to an investigation. Although it may appear that some aircraft, smaller than others, may be less complicated than other larger aircraft, they involve varied systems, generally including electrical systems, hydraulic or mechanical landing gear systems,

powerplant systems and avionics, of which individual NTSB Investigators In Charge may not be totally knowledgeable. As mentioned above, manufacturers, including Cessna, strongly support investigation and analysis of component parts by factory representatives, under government supervision, and would therefore recommend that manufacturer representation be considered an asset to all investigations.

I would now like to address the standardization of all the NTSB regional offices with the above mentioned considerations. In most cases, accident investigations are conducted in a standardized manner and "party status" for the manufacturer representative is awarded. However, there appears to be different views between regional areas relative to their consideration of manufacturer representation and/or party status. Some of these differences are minor and some significant. I would recommend the NTSB headquarters establish a firm, detailed and standardized policy for participation of parties to investigations applicable to all classes of airplanes.

Another area for consideration is party review of "draft" copies of reports. Other countries, such as Canada and some European countries, provide draft copies prior to final publishing of their reports. I would recommend said review of draft reports prior to publishing be considered by the NTSB as a means of technical quality control and support to the accuracy of the investigation process.

I would also like to address the area of Safety Recommendations. In many cases, safety recommendations "filter down" to action agencies identified in the recommendation long after the recommendations have been made. A better process would be to provide the action agency with a copy of safety recommendation at the time of issuance so that review and implementation would begin much earlier and thus, enhance safety in a more timely manner.

The area of premature identification of faulty suspect parts during investigations should also be addressed here. In some cases, aircraft parts or systems may

appear to be factors in a mishap during the early stages of investigations. Heavy media attention and pressure for early identification of factors in a mishap may cause investigation teams to announce these areas before thorough evaluation. In some cases, these early conclusions may be accurate, but in others they prove misleading. I would encourage all investigating agencies to refrain from submitting to these early identification pressures when conducting the investigation process.

Let me close this discussion by saying I think it is appropriate to compliment the National Transportation Safety Board on their professional conduct of the accident investigations process. I believe all involved are dedicated professionals interested in aviation safety. We have addressed a few subjects for consideration relative to general aviation mishap investigation that we either misunderstand, or needs clarification. Please help us so that we can help you get your job done in a more efficient manner.

**ROY G. FOX**
**CHIEF, PRODUCT SAFETY**
**BELL HELICOPTER TEXTRON, INC.**

I appreciate the opportunity to participate in this worthwhile meeting on behalf of the helicopter industry. It is very productive to sit down together, we the manufacturers, and our counterparts - the NTSB in a cooperative atmosphere without the extreme pressures of a disastrous accident, with the final purpose to find better ways to reduce the risk to anyone who flies in any type of air machine. The helicopter manufacturers and I applaud the NTSB for having this productive meeting.

Helicopter accidents accounted for 8.7 percent of the aircraft accidents in the United States for the latest period of 1982 through 1990. The helicopter manufacturers offer technical expertise that is seldom found anywhere else. Although the NTSB investigators are qualified, experienced, and professional in accident investigation techniques and management, a single investigator may not investigate the same model helicopter configuration more than once in his/her career. This is due to the relative rare frequency of accidents and the extremely large number of model configurations in the fleet. For example, Bell has produced and fielded 50 different configurations within our 10 commercial model series. We have produced about 10,500 civil helicopters since the original Model 47 was certificated in 1946. Within the Model 47 series alone, Bell produced 24 configurations. Other people have modified the 47 to new and unknown (to Bell) configurations. With all of this variety, it is difficult to nearly impossible for an NTSB investigator to know the basic configurations. Thus the need for the technical expertise of the manufacturer. The manufacturer's accident investigators are trained, experienced people who are familiar with the regulations and protocol involved in NTSB-conducted investigations. The manufacturer also has the accident history of the same helicopter configuration in the rest of the world, which can aid the investigators in understanding the accident sequence. Therefore, with the manufacturer involved in the accident investigation, the NTSB can operate from a worldwide knowledge base rather than the perhaps limited experience in the United States.

I have discussed this meeting and the common issues with the other major helicopter manufacturers of civil helicopters (Sikorsky, McDonnell Douglas Helicopter, Robinson Helicopter, and American Eurocopter). We all had the same

basic comments which I will note in a moment. Overall, we in the helicopter manufacturer world have had a very good experience in working with the NTSB investigators. There have been a few problems which have been due more to the individual personality or a unique situation in one region rather than a serious systemic problem. Likewise, we have had a very good working relationship with the NTSB lab personnel. The working atmosphere has been professional. We wish to keep this positive professional working relationship with NTSB.

However, there are some areas where NTSB/industry improvements are still possible and needed. Several of these are related to timeliness.

## 1. Notification of an Accident

If the manufacturer is not aware of the occurrence of an accident, it is impossible to respond in a timely manner with an accident investigator. We are aware that the IIC is very busy getting ready to leave for the accident site and does not want to be bothered with calling a manufacturer. But, there are other NTSB persons in the office that could be tasked with notification to the manufacturer. Bell and Eurocopters are fortunate with the NTSB Regional Office located nearby in Arlington, Texas. This allows the manufacturer's accident investigator to be on the same plane as the IIC in responding to the accident.

The FAA Transportation Safety Institute (TSI) Rotorcraft Accident Investigation Course is conducted at the Bell facility by the accident investigators from five helicopter manufacturers and two engine manufacturers. Several of you from NTSB and other investigating agencies from around the world have been to the course. The course underway this week includes investigators from the FAA, NTSB, Norway, United Kingdom, Canadian Transportation Safety Board, Saudi Arabia, and the U.S. Army. We helicopter manufacturers are finding more complete investigations, far better cooperation with IICs who have been to the course, and the IICs have a better understanding of the unique aspects of helicopter accident investigations. One of the course handouts is the attached pocket-sized card to aid in accident notification. On one side is the typical information that a manufacturer will want to know when he is notified of an accident. The other side has the names and phone numbers (most with a 24-hour number) of the accident investigation departments of the major helicopter manufacturers and helicopter engine manufacturers.

Notification of a helicopter accident outside of the United States is seriously lacking. For example, this month, a Bell representative in a country to the south of the USA notified our office on a Friday of a Bell helicopter accident occurring the previous day. I relayed that information to the NTSB in Washington as this was a US-registered helicopter. Four days later, the American Embassy reports this accident and it finally gets to the FAA duty desk, which called Bell at about 11:00PM on the fifth day since the accident occurred. This is not timely notification from the governments. Many times, the manufacturer hears of the accident and may provide the first notification to the NTSB. We manufacturers and the government accident helicopter manufacturers informally cooperate with each other on the initial accident notification especially on non-US accidents. A typical example would be a report of an unknown type of helicopter with four fatalities in some country. Each manufacturer will contact his different sources (primarily the company representative in that country or region). As soon as the type of helicopter involved can be determined, that manufacturer is phoned who then starts his accident investigation support. The rest of us head for the coffee machine.

## 2. Delayed Component Analysis

Both the NTSB and the helicopter manufacturers have the same basic purpose for investigating aircraft accidents, but the helicopter manufacturer has a far more urgent need to understand the specifics of a failed part. Until the failure and all related circumstances, maintenance, processes, and other factors are determined and understood, it is impossible to start working on an improved part of procedure which must then be relayed to every operator of a similar helicopter model around the world. Thus, the majority of the helicopter manufacturers offer the free use of their laboratory facilities to the NTSB or other investigating agencies. By bringing the accident components to the manufacturer's laboratory, the NTSB:

1. Retains custody of all accident parts.
2. Directs the investigation of the components.
3. Ensures qualified "party participation" is maintained.
4. Obtains experience from similar failures from around the world.
5. Has immediate access to the designers of the component.
6. Has expedited the identification of the problem and related factors.

At this point, the manufacturer can now determine the fix or inspection needed and expedite its release to each affected operator around the world. Conversely, if the failed part goes to the NTSB laboratory, it must compete with

other accident parts for a place in the laboratory schedule. This may take quite some time before the lab exam is done and the final NTSB report is published. After recommendations to the FAA and some time latter, a change may finally reach the fielded aircraft in the United States. Sometimes this process is very quick but many times it is not.

### 3. Public Use Aircraft Investigations

The helicopter manufacturers stand ready to assist in accident investigations of their respective model helicopters regardless of who is the IIC. Our problem is that we may not know who is doing the investigation of a "public use" aircraft. We would like to know the basic procedure that NTSB uses to determine which "public use" aircraft accident it will investigate in the field. For which specific agencies are the NTSB going to do investigations? An NTSB list of agencies for which they will be the IIC could be provided to the manufacturers. This list would allow us to better coordinate our timely assistance.

### 4. Limited Investigations

We are also concerned about the high number of "limited" investigations done by the NTSB. This is especially a problem in the "public use aircraft" area. Although the limited investigations certainly saves critical NTSB budget, it also provides sparse information and reduced access of the manufacturer to the wreckage. The information gained from minor accidents is sometime used in a major accident to explain the sequence or determine the malady within the fleet. Once the NTSB releases the wreckage, the manufacturer's ability to obtain information ceases.

### 5. Non-U.S. Investigations

It is an unusual situation if the NTSB goes on a helicopter accident that is outside of the United States. We manufacturers do go quite often. Under Annex 13 to the International Civil Aviation Organization, the accredited representative (i.e. NTSB) of the state of manufacture or design can participate in an accident investigation in a foreign country. The accident investigator of a manufacturer can also participate if he is designated by name as the advisor to the accredited representative. Bell has had excellent cooperation and assistance by NTSB in designating our investigators as advisors to the accredited representative, which has occurred as recent as three weeks ago. However, we helicopter manufacturers

would like to have a general NTSB procedure in place (if it is not already) to allow a manufacturer's phone request to the NTSB to get a specific accident investigator designated as a technical advisor to the accredited representative for a specific accident. A FAX of such message from the NTSB accredited representative to the state doing the investigating and a copy to the manufacturer would allow the immediate launch of the manufacturer investigator. The purpose of this comment is to have the preliminary manufacturer/NTSB coordination work done to allow the manufacturer's accident investigator to get on site as soon as possible and not be slowed down for a few days due to coordination difficulties. This pre-accident planning becomes especially important when travel is needed during holidays or non-working hours. Each manufacturer could furnish a list of their designated accident investigators to the NTSB to have as a reference file for whoever is on duty.

## 6. Destroyed Aircraft Continuing to Fly

Helicopters destroyed in accidents are like the legendary phoenix which rises again from ashes. I have brought some example accidents of destroyed aircraft that are out there flying today:

1. This 204B ten-place helicopter (Serial Number 2025) crashed in 1980 in Canada as C.FAHL. It burned and was destroyed. The aircraft data plate and assorted parts were registered as N204RH and later as N204SR. As of last November, the aircraft data plate has accumulated an additional 2,694 flight hours since the aircraft was destroyed. Do you think that aircraft is in the same configuration that was originally certificated?

2. This 204B (Serial Number 2065) crashed as NIWA in June 1983. It was destroyed and burned. The aircraft data plate was registered in 1986 as N204CR; crashing again in 1992 with substantial damage. At the time of the most recent accident, the aircraft data plate had log an additional 2,446 flight hours since being destroyed.

3. This 205A1 (Serial Number 30168) is a 15-place helicopter that crashed as XC-GOR in Mexico in 1977. The aircraft was destroyed. Amazingly, the data plate appears again as N401EH in 1978. The aircraft then went to Switzerland as HB-XFZ with about 4,128 flight hours on the data plate since the aircraft was destroyed.

In all three cases, the aircraft serial number remains the same but the registry number changes. Since the regulations only allow the type certificate holder to remanufacture or rebuild aircraft (Bell in these example cases), how can these aircraft be considered Bells when we did not rebuild them? If Bell had rebuilt these aircraft, each one would meet all of the certification requirements that it had met previously. How can you tell if these aircraft meet the original certification requirements as the original aircraft did before it was destroyed?

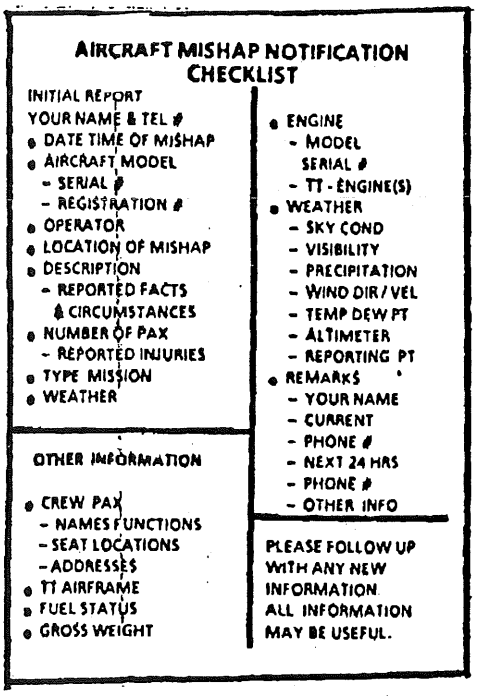
There are three problems in this aviation safety situation. FIRST, aircraft accidents are tracked by the country registry number which can and is changed with little effort. As an aircraft goes to another country registry, the registry number changes but the aircraft serial number always remains the same. Moving from country to country between accidents hides the previous aircraft damage and maintenance history which can increase the value of the helicopter. SECOND, the aircraft data plate is too non-destructible and survives to be installed on a collection of strange parts (sometimes military surplus, crash damage, or of other unknown origin). The data plate is part of the wreckage and is sold for scrap with appropriate log book and maintenance records. Please note that I am referring to "destroyed" aircraft; not to aircraft with substantial damage which are repairable. THIRD, there is no means to verify that the illegally remanufactured destroyed aircraft meet the certification requirement of the original fuselage. Dynamic components and the tail boom are appropriately replaceable items and are not the issue at hand. If the rebuilder mix-and-matches parts of various configurations, sometimes they are not adequate for the loading that will occur in service. Military aircraft are built for a different flight profile than civil aircraft. This causes the fatigue lives of the same component to be quiet different when used in a civil or military application.

This is a difficult situation in the safety world but it needs to be addressed. The accident investigation process is a key player. FIRST, the primary identifier of an aircraft should be the manufacturer's serial number - not the registry number. This should be done in every accident report and any aircraft transaction. This would allow the investigating agency of one country to find the accident history of the same aircraft in other countries. In some cases, this could be the key to understanding the present accident. SECOND, the aircraft data plate should be retired when an aircraft is considered "destroyed". That aircraft serial number should no longer exist on anything that flies. Part of this problem is that the data plate is owned by the owner and then the insurance company. It is recommended that this be changed such that the aircraft data plate is the property of the FAA and issued at the time of manufacture and installed on the airframe. If there is an

accident in which the aircraft is destroyed, the aircraft data plate should be removed by the NTSB and returned to the FAA where that aircraft serial number would no longer be eligible to be used under the Type Certificate. A notation should be made in the FAA records of transactions of that specific aircraft that it was destroyed. This would not change what is done to repair a substantially damaged aircraft. THIRD, the most critical issue is the unknown and unauthorized parts that may or may not work. Since the cost using new parts in the illegal remanufacturing of an helicopter would be exorbitant, military surplus parts, parts of questionable origin, and some appropriate used parts are attached to the data plate from a previously registered aircraft. If the conglomeration of parts has the original manufacturer's name on it, it has a far greater value than an experimental "Jones Helicopter." Helicopter manufacturers are not concerned that someone builds an experimental helicopter using his own engineering skills and parts from various manufacturer's models. He certainly has the right to build it, fly it, and to crash in it. The helicopter industry concern is when this person puts that machine into the stream of commerce by selling it and representing it as the original design of a helicopter manufacturer. Did this person go through the same certification process, flight testing, and expense as the original manufacturer? Has that person developed and maintains current manuals? Has that person provided continuing airworthiness support, technical representatives, and Safety Bulletins to correct problems found in the field? Do they provide accident investigation support? I think not.

In summary, the helicopter manufacturers have a good working relationship with the NTSB and want to continue in our common goal of reducing the risk to anyone who flies. There are areas of potential improvement as noted in which the helicopter industry would like to work with the NTSB and other agencies to improve helicopter safety even further.

# HELICOPTER A.I. CONTACTS



**AIRCRAFT MISHAP NOTIFICATION CHECKLIST**

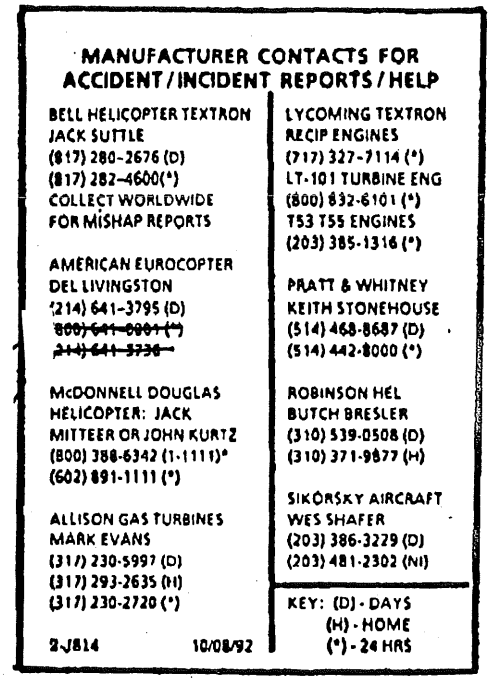
INITIAL REPORT
YOUR NAME & TEL #
- DATE TIME OF MISHAP
- AIRCRAFT MODEL
  - SERIAL #
  - REGISTRATION #
- OPERATOR
- LOCATION OF MISHAP
- DESCRIPTION
  - REPORTED FACTS & CIRCUMSTANCES
- NUMBER OF PAX
  - REPORTED INJURIES
- TYPE MISSION
- WEATHER

OTHER INFORMATION

- CREW PAX
  - NAMES FUNCTIONS
  - SEAT LOCATIONS
  - ADDRESSES
- TT AIRFRAME
- FUEL STATUS
- GROSS WEIGHT

- ENGINE
  - MODEL
  - SERIAL #
  - TT - ENGINE(S)
- WEATHER
  - SKY COND
  - VISIBILITY
  - PRECIPITATION
  - WIND DIR / VEL
  - TEMP DEW PT
  - ALTIMETER
  - REPORTING PT
- REMARKS
  - YOUR NAME
  - CURRENT
  - PHONE #
  - NEXT 24 HRS
  - PHONE #
  - OTHER INFO

PLEASE FOLLOW UP WITH ANY NEW INFORMATION. ALL INFORMATION MAY BE USEFUL.



**MANUFACTURER CONTACTS FOR ACCIDENT / INCIDENT REPORTS / HELP**

BELL HELICOPTER TEXTRON
JACK SUTTLE
(817) 280-2676 (D)
(817) 282-4600(*)
COLLECT WORLDWIDE
FOR MISHAP REPORTS

AMERICAN EUROCOPTER
DEL LIVINGSTON
(214) 641-3795 (D)
~~(800) 641-0001 (*)~~
~~(214) 641-3736~~

McDONNELL DOUGLAS
HELICOPTER: JACK
MITTEER OR JOHN KURTZ
(800) 388-6342 (1-1111)*
(602) 891-1111 (*)

ALLISON GAS TURBINES
MARK EVANS
(317) 230-5997 (D)
(317) 293-2635 (H)
(317) 230-2720 (*)

2-J814 10/08/92

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RECIP ENGINES
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LT-101 TURBINE ENG
(800) 832-6101 (*)
T53 T55 ENGINES
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PRATT & WHITNEY
KEITH STONEHOUSE
(514) 468-8687 (D)
(514) 442-8000 (*)

ROBINSON HEL
BUTCH BRESLER
(310) 539-0508 (D)
(310) 371-9877 (H)

SIKORSKY AIRCRAFT
WES SHAFER
(203) 386-3229 (D)
(203) 481-2302 (NI)

KEY: (D) - DAYS
(H) - HOME
(*) - 24 HRS

Note: American Eurocopter
Del Livingston Number
Change as follows:

(800) 873-0001(*)
(214) 641-0000 (*)

## DON SKIADOS
## COMMUNICATIONS DIRECTOR
## AIR LINE PILOTS ASSOCIATION

I would like to express my appreciation to the NTSB and to our panel moderator for the opportunity to address this symposium. As the union that represents the vast majority of the nation's airline pilots, ALPA is a party to most of the major aviation accident investigations conducted by the Board. We have seen firsthand the high quality work that this agency is capable of, and I view this symposium as yet another example of how government and the aviation industry can work together toward mutual goals that benefit everyone, not the least of whom is the traveling public.

In addition to its primary mission of determining the cause whenever there is an airline accident, the NTSB has the unenviable task of balancing the public's "right to know" against the legitimate need to exercise care in the timing and manner in which information pertinent to the accident is disseminated. This task is further complicated by the presence of the news media, acting as proxy for the public. In most cases reporters struggle very hard to do a good job but the end product rarely qualifies as an exemplary job of informing the public. I suspect that everyone in this room would have to admit at least occasional instances of dissatisfaction with the way accidents and accident investigations are reported.

The NTSB's methods for dealing with the press, evolved over the years and in some cases prescribed by statute, have generally been effective in balancing the conflicting interests. For example, the Air Line Pilots Association fully supports the Board's rule that prohibits parties to an investigation from commenting on the accident during the field phase of the investigation. This "gag rule" serves several purposes. It minimizes speculation by assuring that only concrete facts are disseminated to the press, and only by a Board spokesperson on site. When observed scrupulously, it avoids "guerrilla PR warfare" by parties that may be jockeying for position to preserve reputation or markets. And it takes the pressure off of the parties when they are approached by reporters by providing an ironclad excuse to avoid talking to the press at a time when it would serve no useful purpose.

We believe so strongly in this precept that if there were no gag rule, ALPA would petition the NTSB to impose one. Indeed, in most cases we voluntarily refrain from making detailed comments until long after the field investigation is

completed. We have found from experience that it is better to avoid premature statements and wait until there is enough information at hand to make informed, accurate comments. (Note that we distinguish here between commenting on the accident *per se*, as opposed to providing generic background information to educate a reporter, e.g., describing the function of flaps and slats.)

We also support the rule whereby only a transcript of the CVR is released, and of that, only those portions that are relevant to the investigation. Likewise, we support the statutory limitation that the CVR transcript cannot be released until a majority of the factual reports are completed. (For the record, ALPA played an instrumental role in devising the former, and vigorously lobbied Congress for the latter.) Although not all reporters welcome these restrictions, they go right to the heart of the conflict between the right to know versus legitimate interests such as privacy and the desire to avoid focusing on sensational tidbits that may or may not prove to be relevant to the cause of the accident.

While we are somewhat uncomfortable with the need to hold a news briefing every day at the accident site, we support the practice. We realize that the Board cannot stonewall the press, and a failure to hold briefings would increase pressure for reporters to dig up information from the parties and non-authoritative sources. Nevertheless, these briefings tend to fuel the *"cause du jour"* style of reporting by the press. The spokesperson should take nothing for granted and should take extraordinary measures to put all information into its proper context. Information that is preliminary or tentative should be clearly identified as such. The same is true for facts or lines of investigation that are peripheral to the main thrust of the investigation. Reporters also should be reminded daily that the NTSB will require up to a year to gather and analyze the data before it can agree on the cause of the accident, and there is absolutely zero probability that the press can short-cut this process to determine the cause in time for their next deadline.

With regard to handling the press at public hearings, we have few complaints to speak of. Facilities for the press are adequate and well organized. We do object to the practice of placing large graphics directly behind witnesses so that, for example, a testifying crewmember is framed in the background by a large photograph of the accident. As a service to reporters, the NTSB may wish to consider compiling a fact sheet as an additional handout. Basic information such as date, time, place of the accident, airline, aircraft model, names of crewmembers, fatality and injury counts, a brief description of the accident events and

circumstances, a paragraph describing the NTSB, etc., would be available on one sheet rather than having to constantly refer to numerous documents in the docket.

Sunshine hearings are a bit more problematic. It is frustrating to try to follow these proceedings without any documentation. Reporters (and the parties) try to glean meaning from cryptic comments such as "delete the word 'not' from line 14, page 77." It also can be misleading. The Board might deliberate at length over a particular passage, creating the impression that it is a major factor in the accident, whereas a reading of the final report would show that this was only a minor consideration. Reporters, not knowing any better, have elevated minor items to an unwarranted status in their stories because of this phenomenon. Given the strictures laid down by administrative procedures statutes and the undesirability of circulating draft documents among the audience, perhaps little can be done to alleviate this condition. However, this may be a more appropriate time for release of the factual reports when there is no public hearing, a point to which I shall return later.

Thus far I have described what generally can be considered an effective media relations structure at the NTSB. Why, then, is there widespread dissatisfaction among the parties, the NTSB, and even among journalists, over the way the news media reports on accidents?

Let me enumerate more fully some of the problems that complicate the process of gathering and reporting news of an accident.

Lack of Technical Expertise.--There is a general lack of technical expertise on aviation and accident investigation procedures. A very small group of reporters routinely report on all major accidents, attend the hearings, and have extensive experience in this area, but typically there is a much larger contingent of non-expert reporters also assigned to covering the story for local and national media. This manifests itself not only in simple factual errors, which are relatively easy for a diligent reporter to avoid, but more importantly, in which areas the reporter chooses to emphasize or downplay. An obscure technical detail that is incomprehensible to a layman may be ignored even though it holds the key to an accident, while more accessible but irrelevant details are played up simply because they are easier to grasp. Another manifestation is in the editing and headline writing process. When the airport tower tapes in Northwest 1482 were released, two New York newspapers ran the story. Although the contents of the two stories were quite similar, one was headlined "Tapes of Detroit Jet Crash Point to Controller Error,"

while the other carried the banner "Tapes Indicate That Pilot Error in Dense Fog Led to Detroit Crash." (Emphasis added.)

Competitive Pressures.--Competition and deadlines force reporters to file stories quickly and seek out exclusive journalistic *coups.* In its worst form this results in spectacles such as the New York news media's coverage of the USAir 5050 accident at La Guardia. Another example was the reporting of Northwest 255 in the midst of a circulation war between Detroit's two daily newspapers, which saw four consecutive days with four screaming headlines espousing four totally different theories on the cause of the accident. (It was this series of events that gave rise to the epithet *"cause du jour"* to describe such journalistic excesses.) Even in their more benign form these business imperatives result in a distortion of the public's perception of airline safety and the accident investigation process.

Journalistic Expectations.--There is an understandable but unrealistic expectation that the reporter will come back from the field investigation or the public hearing with a definitive story on *how* and *why* the accident occurred. This objective is thoroughly ingrained as part of the journalist's professional training and does not totally disappear even after extensive experience in reporting on accidents. Even the most experienced and scrupulous reporter will simply frame his reports with appropriate caveats, which generally are lost on the reader or viewer. Whatever is reported that day carries a lasting impression that it is the true accounting of the accident, even after the next ensuing *cause du jour* is published or broadcast.

Sensationalism.--The media has a tendency to focus on the sensational and controversial aspects of the investigation and/or hearing. Examples include reporters' fascination with items such as cockpit chatter from the CVR, the personalities of the crew (e.g., the Express accident at Hibbing), and blatantly preposterous stories such as reports that the Captain of USAir 5050 was acting "irrationally" prior to takeoff or that he had been seen in a bar the evening of the accident.

Let me point out that these are not just our own opinions. I refer you to an excellent article, "The Accidental Journalist" in the January 1990 edition of *Columbia Journalism Review.* It's by a working reporter named Chris Hanson, and it is a hard-hitting critique -- far more strongly stated than the brief synopsis I have just presented.

Many of these characteristics are inextricably tied to our traditions of a free press, so it is not desirable, let alone feasible, to try to manage the news to the point where these problems no longer exist. Nevertheless, ALPA feels that both the public interest and the accident investigation process are best served by maintaining a balance between the interests of the news media and the various participants to the investigation. In our view, a few judicious changes in rules and procedures could significantly improve that balance.

**Recommendations**

In addition to my previous comments, I would therefore offer the following recommendations:

1. The Board's timing of the release of the factual reports when there is no public hearing (as in the recent Hibbing accident) leaves a lot to be desired. When the factual reports are opened to the press, it creates a flurry of news activity that at best does little to shed light on the cause of the accident, and at worst, is frequently wrong or misleading. No analysis is presented and the press is given no guidance on the import or meaning of what they are looking at. There is no context into which to put the various bits of information buried throughout the reports. We recommend that in the absence of a public hearing, the factual reports not be released until the day of the sunshine hearing. (Note that this restriction would not apply to the parties to the investigation.)

2. As an administrative matter, we frequently find ourselves in the position of having to respond to reporters' calls after the NTSB issues a news release or opens an investigation docket to the press. Often the first notice we have of this event is the reporters' calls. Since ALPA is a party to most major accident investigations, we feel we deserve the courtesy of adequate prior notification so that we can make proper preparations to provide a timely response to reporters. We recommend that parties be given 48 hours notice prior to the public release of documents or statements by the NTSB for any accident to which they have party status.

3. For my third point I would like to echo some concerns of my staff colleague, Keith Hagy, who is presenting a paper elsewhere in this symposium. The Board's practice of ascribing a probable cause and contributing causes is a source of confusion for most reporters. The distinction is purely artificial and in many cases arbitrary. We all know that an aviation accident is the result of a chain of events and circumstances. Pull out any one of the links in that chain, and the accident does not occur. In the view of many experts it serves no accident investigation purpose to describe some of those links as "probable causes" and others as "contributing causes." From a public relations view it is worse than purposeless. Any factor labeled "probable cause" is accorded higher status in a news story than whatever may be listed under contributing causes. In broadcast reporting, the contributing causes may be stripped away entirely and only the probable cause is given. In the TWA 843 accident at JFK, the Board took a novel approach by issuing a "probable cause" statement that listed chronologically all of the factors they believed played a role in that accident. We recommend that the NTSB change its statement of cause to better reflect the many elements that play a role in any aviation accident, by listing chronologically all of the factors that played a role in the accident without any distinction between "probable" and "contributing" cause.

In conclusion, I would like to congratulate the Safety Board for holding this symposium. As director of communications for ALPA, I fully appreciate the benefits of face-to-face dialog. I look forward to more of this kind of communication, and I will gladly extend any help ALPA can provide toward achieving our mutual goals.

**DREW STEKETEE**
**SENIOR VICE PRESIDENT COMMUNICATIONS**
**AIRCRAFT OWNERS AND PILOTS ASSOCIATION**

I would propose to discuss the following observations of NTSB involvement with the media during accident investigation:

- The media has both an obligation to report the facts accurately and a business interest to move dramatic stories fast. In the rush to find available quotable sources quickly and to move conclusive information early, these pressures for accuracy, speed, and "news value" are at odds.

- All knowledgeable sources for information and expertise, including the NTSB, must seek new ways to help non-expert media avoid technical errors, oversimplifications, and biased story approaches or language. This is most critical to local media who only cover aviation when it literally "drops into their laps" with a nearby air crash.

- Technical errors hurt the profession of journalism as much as they misinform the public. Oversimplifications often create lasting misconceptions more than they help the public comprehend complex technical subjects.

- Frequent unintended bias or negative presumption in press coverage (a specific problem for general aviation) exacerbates uninformed public opinion or "Common Knowledge." Assumptions and presumptions--often ultimately not germane to the accident at hand--hurt aviation, especially general aviation.

- How can NTSB and others involved in responding to breaking accident news do better in helping the non-expert press fully and quickly understand the technical questions they pose? Can crisis communications be better organized to facilitate fast but accurate transfer and comprehension of facts and background information? How can we appropriately but effectively encourage conservatism

about anecdotal reports, eyewitness accounts, "instant experts," and fast judgments?

- It is not NTSB's responsibility to promote aviation's reputation as a safe mode of transportation. But NTSB can help aviation by helping promote accuracy, objectivity, and fairness in air crash coverage.

- As the primary focus of press attention early in the accident investigation process, NTSB may have some special opportunity to assist the media in pursuing accurate information and appropriate, knowledgeable sources.

- Some valuable resources already exist to help the press, including reference books such as the Aviation/Space Writers Association guide, "Air Accidents and the News Media," and our AOPA's AVIATION USA directory and reference book we've furnished annually to 1,250 U.S. newsrooms nationwide.

- Perhaps this seminar can revisit what can be done within NTSB's charter and guidelines, and by the entire community of experts, spokespeople, and sources, to facilitate better reporting, especially by the local, non-expert media.

**DON PHILLIPS**
**CORRESPONDENT**
**WASHINGTON POST**

Viewed selfishly, I have almost no problems with the Safety Board news operation. That, strangely enough, is the heart of my criticism.

Let me explain.

As a regular Safety Board reporter, I have learned how to play the proper game. I do not mean "game" in the negative sense. I mean that I have learned how to ask questions at briefings, what questions you cannot answer (or at least how to phrase the questions so you *can* answer), and how to interpret seemingly technical answers that give unmistakable clues.

I also have some institutional knowledge of the Safety Board and the subjects it covers. I know the players and have developed relationships of mutual trust.

If it were left to me, I would keep things just the way they are because it gives me and the few others who cover the Board a leg up on reporters who drop in on crashes with no knowledge and no desire to cover another one. You've seen the types, mostly TV "personalities" who we all love to loathe. It is no secret that they *are* idiots who have more concern for their hair than what's under it. They are filled with a burning desire for a good 15-second take that will wrap up the probable cause and still give them time to raise a knowing eyebrow on the air.

You don't like them any more than I do. And the briefing format is a delicious way to rub their noses in their stupidity. (Bob Hager and a small handful of local TV reporters and [mainly] cameramen are the exception.)

But I'm not sure you're well served by it. No matter how dumb they may be, they are the talking heads who will give the public its "news" of the crash. And leaving them to interpret a Safety Board briefing is like handing a loaded gun to a toddler. We see the results at every crash. Horrid misinformation.

Surely there is some way to help these people not make fools of themselves.

One possibility would be to cautiously be a little more interpretive at briefings. I understand that this is a minefield, and I understand the delicate relationships between the parties. But there may be a middle ground.

Another possibility would be a briefing-after-the-briefing with the public relations person-in-charge under the ground rules that it is for deep background only. No cameras, no quotes, not even any quotes from "sources." Just a briefing in which the pr-person begins with a phrase such as, "Here's the significant points Dr. Lauber just made...." That would also give the pr-person the chance to call the dogs off what seems to be the obvious cause-de-jour, or at least to add context.

I do not pretend to have answers, and it isn't really to my personal advantage to help you find them. But no one other than me, Hager and a handful of others are served well by leaving things the way they are.

ROBERT HAGER
NATIONAL CORRESPONDENT
NBC TV (WASHINGTON BUREAU)

# THE NEWS MEDIA

## The General Problem

It's a fact of life: in a major accident, public attention is keenly focused for three or four days. The time when viewers and readers are the most hungry for information, is the very time when the Safety Board is the most wary about premature disclosure. Conversely, when the docket is opened months later, the attention of the public has waned. Eight months to a year later, when the Board is at last ready to speak with authority, many viewers and readers have forgotten the accident in question. This is not the doing of reporters (they try to do the later stories, but find it tough getting an editor's attention), nor is it the doing of editors (over years of trial and error, they become excellent judges of public-interest), nor is it ideal (it makes both our jobs more difficult): BUT IT IS TRUE.

## An Appeal

In light of the intense interest in the first few days, please take extra care to make the facts public as soon as they are learned. For example, when engines are examined on scene and there's no immediate outward signs of problems, please let us know that much right away. Same, for other pieces of wreckage. When the FDR is read out and something important is disclosed, please let us know right away. When the CVR is played back and there's something crucial, please give us the gist, right away. Making factual information available is stated policy, and the evening briefings are generally informative, but - in the past - there has sometimes been a reluctance to disclose something crucial on grounds that more information needs to be developed to put the disclosure in context. This only leads to unnecessary delay in keeping the public informed.

## A Practical Problem

The nighttime briefing system couldn't be worse for the daily news media. For TV, it means reporters are left to "speculate" on the 6:30p evening network news when there are 30 million viewing (combined NBC, ABC, CBS) and leave the

daily "factual" lead to the morning news when there are only HALF as many viewing. For newspapers, often means reporters must write most of their story without facts and top it with a few lines from the briefing (even that is sometimes impossible if the accident is not in the eastern time zone). In recent years, some Board members have tried to accommodate reporters by "making themselves available" at midafternoon, but these sessions have usually not been substantiative. There ought to be a system to catch important facts developed during the day and make them available by midafternoon. Group leaders could be instructed to immediately pass on crucial information to the Board Member dealing with the press.

**Importance of Keeping Reporters Informed**

An absence of information leads to speculative stories which investigators complain misleads the public. When there are facts to deal with, stories are more apt to be accurate.

**A Balance**

Obviously, the Board needs to get its work done and it does that very, very well (best in the world). But scores of reporters whose accounts are viewed and read by millions and millions of people must also be taken into account in a timely fashion. The Board, supported by taxpayer's money, owes that to the public.

## AL BECKER
## MANAGING DIRECTOR-CORPORATE COMMUNICATIONS
## AMERICAN AIRLINES PRESENTATION

American appreciates the opportunity to participate in this National Transportation Safety Board Symposium. We believe that everyone involved in commercial aviation -- the NTSB, the airline industry, and most importantly, the traveling public -- benefits from this type of candid, constructive self-examination.

While we are pleased to be a part of this program, we frankly were somewhat surprised to receive an invitation. After all, when it comes to taking stock of performance and offering suggestions for improvement, American has never been reticent either with criticism or ideas. Our approach, when given the opportunity, has always been to participate fully in the debate and make a meaningful contribution to the constructive criticism. Such is the case today.

We want to say up front that, in general, the NTSB does a good job of responding to accidents and other aviation emergencies. Its people are dedicated, and its investigative procedures are widely recognized as sound and sensible. In many respects, the NTSB sets the standard for investigative integrity and know-how. It's one reason why the United States has one of the safest air transportation systems in the world.

But as good as the system is, it can be better. The convening of this symposium acknowledges that the NTSB agrees. The essence of this conference is that we can all learn from each other's experiences, from our shared knowledge, and from the viewpoints that each of us brings to the daily task of running the world's largest private and commercial aviation system. We congratulate the NTSB for fostering this process.

A fundamental reality for all of us is that the nature of the NTSB's work -- accident investigation -- is very difficult and demanding. We all plan and prepare for the worst. But when an accident occurs, it is still a very traumatic event. Every accident, every incident, is different -- different in detail, different in geography, different in magnitude.

Yet the media response is always instantaneous and overwhelming. We all have experienced the hordes of media who immediately swoop down on an accident

site, all with a thousand questions and a thirst for INSTANT answers. The big questions are how and why, and the media wants them answered NOW.

So, how do we cope with this? What's the proper and responsible approach? And -- what's in the public interest?

In addressing these issues, the NTSB must keep in mind that its fundamental mission is to advance the cause of safety by determining what went wrong and why. Everything said and done in the course of an accident investigation should take place within the framework of this mission. Unfortunately, this is not always the case.

Conversely, we can ask: what is the airline's role, or objective, in working with the news media during an accident investigation? We want to be cooperative, accessible, helpful and accurate. We do not want to stand in the way of the media doing its job. Yet, at the same time, we have a responsibility to our passengers, our employees and our shareholders-- as well as the general public -- to insure as best we can that information concerning the accident and activity swirling around it is not prematurely released, and that we utter not one word of speculation as to the cause of the accident. Such information and speculation immediately leads to damaging and inaccurate stories being blown out of proportion and sensationalized.

As we all know, accidents are extremely complex events that can take many months to investigate. These investigations are in good hands with the NTSB. But there are no instant answers, and the public interest is not served -- nor is the cause of safety advanced -- by speaking prematurely.

It is in this vein that we believe the NTSB can improve the process of working with the media. And we have several recommendations to make.

**Recommendation No. 1:** The NTSB public affairs people should meet with airline, airport and any other public relations people as soon as they arrive on site to coordinate.

NTSB staffers have a tendency to be overbearing in their "We're In Charge" attitude. No one questions the NTSB's authority -- all of us recognize that the agency is, in fact, in charge and will make the critical decisions about media access to the accident site and the course the investigation will take. But it would be

extremely helpful for the NTSB people to meet first with the other public relations people to find out what they know, who the local media are, what has been reported or not reported, etc. The NTSB can take that opportunity to lay out the ground rules, telling us where the command center will be, when news briefings will occur, who will conduct the briefings, and how the airline and airport can assist the process. Everyone would benefit from this more open and cooperative approach.

**Recommendation No. 2:** NTSB spokespersons should exercise more restraint in their public statements during the first day or two of the investigation.

As stated before, the media is voracious in its appetite for answers and information -- and correctly so. But the issues surrounding an accident invariably are complex. There are no instant answers. Most of what is said the first day is sheer conjecture and speculation, which can lead to gross inaccuracies in the media. There are enough pseudo-experts who will feed the media misleading or inaccurate information. **The NTSB should be mindful of the impact and consequences of its public statements. As the official investigative agency, its comments have an impact with the media and the general public that far exceeds those of anyone else. The NTSB therefore has a responsibility to measure its words carefully -- to make sure that it deals in facts, not conjecture. An NTSB misstatement, once written and broadcast across the country, can be almost impossible to correct.**

**Recommendation No. 3:** Re-Evaluate the need for Public Hearings.

This, again, goes back to the issue of the NTSB's fundamental mission. Is the cause of safety advanced by public hearings? Or, are public hearings nothing more than elaborate media events to provide a public forum for the NTSB and an assortment of so-called aviation "experts" and plaintiffs' attorneys? In no way does the substance or quality of the investigative process depend on public hearings. Working with the airlines, the aircraft and engine manufacturers, the airports and everyone else involved in aviation, the NTSB's technical experts can gather all the information they need -- and obtain access to all the facilities and records they require -- to conduct a complete and thorough investigation. All of this takes place quite apart from public hearings, which serve no other purpose than to produce headlines and remind the public that the NTSB exists and is working on the investigation. All interested parties have proper access to the NTSB investigative process without a public hearing. And all parties, including the general public, are

best served by publication of the NTSB's final findings. It is difficult to see how public hearings, which inevitably involve a great deal of emotion and speculation, advance either the investigative process or the larger goal of increased safety.

**Recommendation No. 4:** Avoid NTSB grandstanding at the accident site.

This comes under the heading of media events and publicity stunts. Perhaps the most graphic illustration was the Delta 191 accident at DFW several years ago when this NTSB investigator in charge -- replete in his NTSB jumpsuit and cap with appropriate logo -- held his news briefing in front of the smoldering remains of the aircraft. This sort of media stunt does nothing to promote safety or further the investigation. All it does is play to the emotions of a public already traumatized by the accident itself, and to the media's appetite for graphic details. No one is suggesting that we restrict the media's access to the accident site.

The media has a job to do, and within the bounds of propriety and responsible action, those of us in aviation should allow them to do their jobs. But scenes such as the one described above cross the bounds of propriety and good taste. There is a middle ground here, and the NTSB has a responsibility to itself, and to all of us in aviation, to help find it.

American sincerely believes that these recommendations make sense and would, if implemented, improve the overall investigative process. Again, we congratulate the NTSB for organizing this symposium, and for its willingness to subject itself to examination and critique. The views we express are offered in the spirit of constructive criticism -- and with the hope that from these and other suggestions will come an improved approach to the way the NTSB conducts its investigations.

**STEPHAN J. CORRIE**
**CHIEF, ACCIDENT INVESTIGATION AND PREVENTION SECTION**
**ICAO, MONTREAL**

# STATUS REPORT ON AMENDMENT 9 TO ANNEX 13

## INTRODUCTION

I have been asked to give you a report on the status of Amendment 9 to Annex 13 stemming from recommendations of the ICAO Accident Investigation (AIG) Divisional Meeting (1992), held in Montreal from 11 to 28 February 1992.

Since the divisional meeting States have been assessing the impact these recommendations will have vis-à-vis their own national regulations, policies and procedures. For instance, the European Civil Aviation Conference (ECAC), which represents thirty-two States in the European Region, have held several meetings to determine the position each State has taken on implementing the new Annex 13 Standards and Recommended Practices (SARPs). They have agreed already to implement many of the recommendations before the new edition of Annex 13 becomes applicable. No doubt the United States has made its assessment. Let me review briefly the results of the AIG/92 meeting and the status of the effort to finalize Amendment 9.

## AIG DIVISIONAL MEETING (1992)

From 11 to 28 February 1992 at the ICAO headquarters in Montreal, Quebec, investigators and safety experts from around the world concluded a three-week Accident Investigation (AIG) Divisional Meeting (1992). The meeting was attended by 207 participants from 64 Contracting States and 7 international organizations. It made 50 recommendations aimed at strengthening the accident investigation and prevention provisions in Annex 13, in Annex 6, and in ICAO guidance material. The meeting underscored the importance of cooperation between States.

The agenda item on Annex 13 was divided into 18 sub-items. Of the 50 recommendations that were made, 32 were related to Standards and Recommended Practices (SARPs) in Annex 13 and one related to flight recorders in Annex 6. The remaining 17 dealt with recommendations other than for SARPs

(non-SARPs) which are related to guidance material, resources and support mechanisms within ICAO.

**Status of the Amendment**

On 10 July 1992, the Air Navigation Commission conducted a preliminary review of the AIG/92 report and agreed to submit the proposals for amendment of Annex 13 and Annex 6 to States and selected international organizations for comment. State letter 92/55 of 21 August 1992, transmitted the proposals and requested that comments be received by 15 December 1992. By 4 February 1993, forty-four replies had been received from forty-one States and three international organizations. Of the forty-four replies received, 86 percent agreed (14 States agreed, 24 agreed with comments), while two States disagreed and six gave no indication of their position on the proposals.

On 13 May 1993, the Air Navigation Commission conducted its final review of the proposed amendments to Annex 13 and Annex 6 in response to comments received from States. In view of the fact that the Continuing Airworthiness Panel of the Commission decided not to define "State of Manufacture", the Secretariat had made a proposal for the Commission's consideration. However, it was decided that States should be consulted before the definition could be approved. This resulted in a significant delay of the amendment process. On 1 February 1994, forty-eight replies were received from forty-five States and three international organizations. The replies showed broad support for the proposed definition, but there were several suggested changes.

On 22 February 1994, the Air Navigation Commission reviewed the revised definition proposed by the Secretariat in light of comments from States and approved the following definition:

> "The State having jurisdiction over the organization responsible for the final assembly of the aircraft."

Immediately thereafter, the Commission approved its report to the Council of ICAO on Amendment 9 to Annex 13 and on the amendment to Annex 6. The President of the Commission is expected to present the Commission's report to the Council the week of 14 March 1994. In accordance with standard policy, shortly after adoption by the Council, States will receive by State letter the "green edition" of Amendment 9 along with the resolution of adoption and the note on the

notification of differences. International organizations who participated in AIG/92 will receive an information copy as will non-Contracting States. Contracting States will have until 25 July 1994, to file a disapproval with the whole or any part of the amendments and until 10 October 1994, in which to file differences. The date on which the new Annex 13 and the amendment to Annex 6 will become applicable is 10 November 1994.

**Nature and Scope of the Amendments**

The nature and scope of the Amendment 9 is as follows:

1. Changed title of Annex 13; introduced in Chapter 1 new and revised definitions of Causes, Investigation, Serious Incident, State of Design, State of Manufacture, and State of the Operator; and broadened applicability in Chapter 2;

2. Strengthened the provisions concerning:

   Responsibilities, rights and entitlements of the State of Design and the State of Manufacture;

   Notification of accidents and serious incidents;

   Use and readout of flight recorders;

   Autopsy examinations and co-ordination with judicial authorities;

   Disclosure of records and deletion of the related attachment;

   Responsibility of other States to provide information and their rights of participation;

   Participation of the operator;

   Entitlement of accredited representatives and a new specification concerning their obligations;

   Participation of States having suffered fatalities or serious injuries to its citizens;

ADREP Preliminary Report and the Accident/Incident Data Report;

Consultation, publication and dissemination of the Final Report;

3. Added new provisions concerning:

Notification and investigation of serious incidents;

Assistance by States nearest to an accident in international waters;

Separation of any judicial or administrative proceedings to apportion blame or liability from an Annex 13 investigation;

Organizational information;

Accident prevention measures;

4. Added a new sub-paragraph and changes to the format of the Final Report as contained in the Appendix to Annex 13;

5. Provided a list of examples of serious incidents as a new attachment D.

The nature and scope of the amendment in Annex 6 is:

Discontinue the use of engraving metal foil recorders by 1 January 1995.

## NON SARPS RECOMMENDATIONS

Regarding the remaining 17 non-SARPs, several actions have been taken by ICAO. For example:

Agenda Item 2, Flight Recorders.--Of the five recommendations made, two dealt with recording duration of flight recorders, use of flight recorders for monitoring flight operations and with technical specifications for new flight recorders. To handle these tasks, it was recommended that a group, or groups of experts be formed to study these various technical subjects and, where appropriate, develop further amendment proposals for Annex 6.

On 24 March 1993, the Air Navigation Commission established a Flight Recorder (FLIREC) Panel and selected States and international organizations were later invited to submit nominations for membership on the panel. On 1 February 1994, the Commission approved the following membership:

> Australia; Canada; China; France; Germany; Iran; Italy; Russian Federation; Spain; United Kingdom; United States; International Air Transport Association (IATA) and International Federation of Air Line Pilots' Association (IFALPA).

There were requests for observer status at the FLIREC Panel meetings from Poland, the International Business Aviation Council (IBAC), the International Coordinating Council of Aerospace Industries Associations (ICCAIA), the International Society of Air Safety Investigators (ISASI), and the Inter-State Aviation Committee (MAK), a co-ordinating body which provides certain technical support to States of the former Soviet Union in accordance with the Minsk Agreement of 30 December 1991. The Commission will decide on these requests before the first meeting of the Panel. It is anticipated that the first meeting will be held in the spring of next year.

Agenda Item 1.9, Cause(s) in the Final Report.--The meeting agreed that the formulation of causes statements in the final reports of accident investigations needed to be improved. Accordingly, it recommended that a group of accident investigation experts be established to review the Appendix of Annex 13 to propose improvements aimed at encouraging States to examine the deeper, systemic causes of accidents. This work will also encompass examining investigation methodology and updating the Manual of Aircraft Accident Investigation (Doc 6920).

On 9 December 1992 the Air Navigation Commission approved the formation of an Accident Investigation Methodology Study Group (AIMSG). On 12 November 1993 six States and two international organizations were invited to make available experts to participate in this work. So far, replies have been received from all but two States. We plan to complete this work sometime in 1995.

Agenda Item 3, Review of the Accident Data Reporting (ADREP) System.--The divisional meeting agreed that ADREP was extremely useful and consequently, efforts should be made to ensure that data collected is current, accurate, and widely disseminated. Eight recommendations for improving ADREP were made to include training of accident investigators in the coding of accident

data, reporting of safety recommendations within the ADREP system, reclassification of human factors codes and, with the assistance of experts, to enhance the capabilities of the ADREP system by providing on-line access to ADREP data for authorized users.

On 9 December 1992, the Air Navigation Commission approved of the formation of an Accident Data Reporting Study Group (ADREPSG). In November 1993, eight States were invited to make available experts to participate in the activity of the ADREPSG. So far, six replies have been received. It is planned that the work will be completed in 1995.

Agenda Item 7, The Role of Human Factors in Accident Investigation.--The meeting considered the role of human factors in accident investigation in identifying the systemic causes of accidents. It was agreed that examining human factors in accidents and incidents was important and that it was a multi-disciplinary endeavor which should not be separate from the normal investigation process. It was concluded that at some future date a recommended practice be included in Annex 13 requesting States to investigate human factors as an integral part of the overall investigation. The introduction of such an amendment would be considered after all of the ICAO guidance material became available. Most of the human factors material has been published in the form of ICAO Digests. We trust States will use this information and we welcome input on its adequacy so that it can be improved.

The future amendment proposed by the meeting was to read along the following lines:

> The State conducting the investigation should, subject to particular circumstances of the accident or serious incident, widen the scope of the investigation to include human factors issues relevant to the occurrence. Such issues should not be limited to the operational personnel directly involved in the occurrence, but should include managerial, organizational and systemic factors. Such investigation should be conducted in accordance with guidance material provided by ICAO.

However, whether or not this proposal will be incorporated into Annex 13 is uncertain. There is a requirement to maintain annexes as policy documents and to keep technical information in guidance material such as the investigation manual. There is a working paper on the subject entitled, "General Review of ICAO Annexes," under review by the Air Navigation Commission. An argument against

including the proposal is whether human factors should be emphasized over other fields of investigation by including a provision in Annex 13. If it is included, a precedent could be set which could result in the inclusion of many other areas thereby increasing the volume and complexity of the Annex with guidance material.

## CONCLUSIONS

By all accounts the AIG/92 was a very successful divisional meeting. Not only were numerous recommendations made, but most were not changed substantially in the round of comments by States or by the Air Navigation Commission. Moreover, most of the proposals resulted in raising many existing Recommended Practices to Standards. This achievement was a clear indication of the commonly held views of States, which participated in the process, on the need and nature of improvements and how these should be reflected in new Annex 13 provisions. It is believed that this achievement can correct to a large extent recurring investigation issues on such subjects as, the role of the Accredited Representatives and Advisers, the role of the Operator and the States of Design and Manufacture, the readout of flight recorders, the release of accident information and the formulation of the causes statements; issues that have been common to most States for many years.

The achievements of AIG/92, however, may not be fully realized until all States have implemented these new Annex 13 provisions. ICAO has no direct enforcement powers. For a number of years the Council of ICAO has been concerned that most States have been silent on where they stand on implementing annex provisions. Compounding this problem is the significant growth in recent years in the number of new Contracting States, most of which are unfamiliar with ICAO. Only through diplomacy, co-operation and assistance can States and ICAO help bring about widespread implementation. This requires States and ICAO to take additional measures.

A major initiative by the NTSB to improve the U.S. accident investigation policies and procedures is commendable. Within a year of ICAO's 1974 divisional meeting, the NTSB held its first investigation symposium in Downing, Pennsylvania in 1975, followed by its second one in Springfield, Virginia in 1983. Holding these symposiums to critique accident investigation policies and procedures is an excellent way for an investigation authority to identify and resolve difficulties. An excellent example of the extra effort needed and one which other States may wish to undertake.

Another such effort that will help overcome international investigation and prevention difficulties is a recent initiative by the FAA and NTSB, in co-operation with ICAO, to hold an investigation workshop. It is planned for 26 to 27 April, 1994 in Miami, FL for the Latin America and Caribbean States. This workshop is similar to the conference held in Singapore last March for the Asia-Pacific Region, hosted by the CAA of Singapore. ICAO fully appreciates this initiative and the support it has been given by other States and the industry. It's viewed as essential for developing the co-operation needed between States to overcome difficulties and to foster implementation of international provisions. No doubt the international civil aviation industry will benefit. We are confident the U.S., as well as other States, will continue to support these worthwhile initiatives.

ICAO needs the support of States and the industry to undertake the work of the FLIREC Panel and the two Study Groups that have now been formed in order to fulfill all of the AIG/92 recommendations. We trust that all States will live up to the new provisions in Amendment 9 to Annex 13, launched by the effort of many States at AIG/92.

**KENNETH C. ENSSLIN**
**SENIOR MANAGER - FLIGHT SAFETY**
**FEDERAL EXPRESS**

I am pleased to be here and equally pleased to see all my distinguished colleagues here at this important symposium. I must add that I indeed feel honored to be asked to address this symposium on the subject of International Accident Investigations. I have been in the accident prevention and investigation for over 30 years and this will be the first time I have ever written or delivered a paper.

But, I can provide a unique perspective on the International Accident Investigation scene, having worked both at the NTSB, for a short period of time, and for three major international carriers. So while I may offer a criticism or two, and a plea or two, I can objectively say that we, today more than ever, need the NTSB's help in the international arena.

While a great deal of work was done to revise ICAO Annex 13, a great deal more needs to be done and rather quickly. We should not wait 10 years or more before calling a meeting to again revise Annex 13 and make the air carriers a full participant in all accident investigation activities.

Working with the NTSB in the domestic arena, the carriers more or less know what to expect and what is expected of us during the accident investigation process. Having worked with each other over the years we are familiar with the process and our rights. Not so in the international arena. While a country or state may be a signatory of the ICAO document, we may find the procedures and our rights interpreted as something less than desired or expected. This varies from country to country or should I say state to state. Just as the investigative authority varies from country to country, we may work with a dedicated Board or the local magistrate depending on local laws and customs. We may follow ICAO procedures very closely or there may be no resemblance to Annex 13.

In some states, we the carrier may be treated as an equal participant, while in other states we may not have access to any of the information gathered by the investigative agency. In 1994, this may sound far fetched, but 5 short years ago I experienced exactly that situation when we lost a 4-engine cargo aircraft in a developing nation.

The local authorities allowed us access to the crash site but would not share any of the data they had accumulated. When the Accredited Representative from the NTSB arrived, we began to receive some information from the local authorities. At one point, one of my team members was asked to leave the site of the accident and mention was made of his less than desirable presence in the country. Within 48 hours, the NTSB Accredited Representative had us included in all the host country's meetings and information was beginning to be shared.

Unfortunately, we were unable to listen to the Cockpit Voice Recorder which was sent to a third party for readout. All we got back was an unfiltered re-recording. The read out of the Flight Data Recorder was not available until the NTSB prevailed upon the investigative body to do the read out for them several weeks later. The same scenario was followed with the Flight Data Recorder. As you can see, this became a disjointed, uncoordinated investigation. Fortunately, the sequence of events were easily determined and no major mystery remained. Had this been a complex accident, we would not have had enough evidence to piece the circumstances together and come up with reasonable conclusions. To this date, we have not seen the final accident report.

While tremendous demands by the investigating officials were made on our company, our requests for information often fell on deaf ears. When delays were encountered in delivering documents requested, the host government officials became disturbed. It was not easy explaining the delays in providing them the information they required.

When it became evident that we would be unable to gather any more useful information, we set a departure date and advised the investigative authority. We offered the use of our simulator for any testing they desired and any other information needed. But we never heard from them again.

We investigate accidents to prevent like type accidents from recurring - with accident investigations of the type briefly described to you today, we could have repeated the accident time and time again until we could conduct a thorough investigation.

Even the courtesy visit to the American Ambassador goes easier if the NTSB Representative is on scene.

As I mentioned before, I worked at the NTSB as an Investigator-in-Charge for a short period of time and I well know the budget constraints that our Federal Government is laboring under. But if I could leave one impression on the audience today it's this - we must have the NTSB on scene in these foreign accidents involving our airlines or US-manufactured equipment. We need more participation by the NTSB - not less. All too often, the loss of an American manufactured aircraft is made know to the aviation community through the newspapers. It's not until our NTSB Representative arrives on scene do we start to receive useful information. I use the word useful in that the facts, as disseminated by the NTSB, can be used in accident prevention by the carriers.

We, the carrier, need to have faster access to the documentation as it is developed. The Flight Data Recorder and Cockpit Voice Recorder for starters and then any communication transcripts that are available.

We need to have access to the final accident report, as soon as possible. Our only hope here is that the NTSB obtains and provides us with the information we need to prevent recurrence.

Additionally, we have to remain sensitive to the probability of litigation in these accidents. And while our role is accident investigation and prevention, we usually assist in preparation of the lawyers when litigation time rolls around. If we don't know and agree that something is broke - we can't fix it.

I for one would like to see the NTSB take a more active role in investigating accidents and incidents involving foreign made and operated aircraft overseas. I realize this may be a hard sell - but we are operating more and more foreign made products and we the US. operators need a timely source of accurate information for accident prevention purposes.

In summary, the airline industry needs to work to bring ICAO Annex 13 more in line with the NTSB's standards, giving the carriers equal rights to all the evidence and material discovered during the course of the investigation.

We need to be given copies of the final reports, although obtainable under other means and methods, we should not have to wait or fight to gain access to these reports for accident prevention purposes.

The Board must continue to devote assets to the International Accident Investigation effort. While some accidents or incidents seem insignificant at the outset, until we have a reliable source on scene, that determination can not be accurately assessed.

**PAUL ARSLANIAN**
**INSPECTION GENERALE**
**BUREAU ENQUETES-ACCIDENTS, FRANCE**

It was a privilege to be invited by the NTSB to share this collective review of your aviation accident investigation process. But it was also somehow frightening. How to contribute, how to express sensible, complex, and balanced views in just a few minutes. At the end, I felt that I should better just propose some ideas to your consideration, as appetizers for the debate.

And, to begin, very quickly, a short comment on the purpose of international accident investigations. Why does ICAO Annex 13 organize the cooperation between States? In my view, it derives directly from a logical approach to the problem:

- aviation safety is not granted, and every day efforts are needed to protect and improve it;

- the highly organized Aviation System is complex and associates many components, often in different States; by essence, it is international;

- an accident shows that there are still imperfections in the Aviation System;

- to identify them,. inputs to the investigation are needed, from the right people;

- to correct them, outputs from the investigation are needed, to the right people.

You know that, according to Annex 13 provisions, three States are supposed to join into an international investigation: the State of occurrence of the accident, the State of registration, and the State of manufacture of the aircraft.

Those States, and the related organizations, put together their facilities and manpower and join their expertise, under the leadership of the State of occurrence.

Then, they have to feed-back the whole Aviation System, each in its domain, with the safety lessons derived from the investigation.

It is a task-sharing approach, very different from what we, alas, see occasionally, that is to say a State behaving as if it was investigating on two other States. In that case, cooperation tends to be replaced by distrust, safety by personal or group's interests. But I must admit that it is very easy to fall into this trap. Spontaneously, the public, the media, ask for someone to blame. And disciplinary or judicial concerns exist everywhere and every time, as well as commercial or reputation interests.

But remember that safety relies on confidence, because you just cannot force safety on someone. If we want people or organizations to improve, deeply and permanently, let us not blame them. Let them share our work, our findings, our analysis.

Efficient international investigation depends on two conditions: the quick notification of the event, the sharing of information or, more precisely, of the right to use it. It is not simple to export information to the aviation community during the investigation, but it is essential and must be done properly.

For example, one needs to balance between the necessity of clearly establishing facts, before spreading them, because of the danger of misuse or controversy, and the necessity of informing operators, passengers, crews, etc. But the task is more difficult when the authorities in charge of the investigation and of the airworthiness of the aircraft, for example, are from two different States, with different habits or regulation.

Let me add that we have many contacts with the NTSB, at ICAO or at Europeans meetings for example, but also, in bilateral, during investigations. Investigations in the United States, in France, as well as in other countries. We know each other well, and I am confident that this may take care of any legal or cultural difference. May I, however, suggest that notification of events could be improved in this Organization?

**A European Example**

Europe is a group (ou, more exactly, different group) of neighboring States, with historical, commercial and frequently safety links, but also with major

differences in habits and in legal or social attitudes. And European States are competitors on many fields. This situation leads to differences, sometimes significant, in the handling or the follow-up of accident investigation, and thus to possible drawbacks for safety. This is why, seizing the opportunity offered by ICAO, when it convened the AIG 92 meeting, a double but consistent process was initiated within ECAC and the EEC (now the EU).

The European Civil Aviation Conference, ECAC, which pools 32 (or maybe more today) civil aviation administrations in Europe noted the need for a common European approach to accident investigation. And it established a permanent Group, called "Group of Experts on Accident Investigations," ACC in short, with the following aims:

- to promote coordination between accident investigation bodies in Member States, notably by improved knowledge of their respective structures and work methods; and

- to harmonize their rules, procedures, and practices.

In my view, these two aims respond adequately to the context which justified an ECAC involvement. The first aim is essential to the establishment of mutual confidence amongst Investigation Bodies Responsibles and/or investigators, thus enabling them to cooperate closely and efficiently in unpredictable and complex environments. The second aim is more in line with the established pattern of collective work with a view to reaching collective solutions and promoting their common implementation.

The European Commission has prepared, for the 12 Members States of the European Union, a draft directive on accident investigation. This directive, which is under final consideration by authorities, leads to a European consistent implementation of Annex 13 standards, and to an improved cooperation between European states.

KEN SMART
CHIEF INSPECTOR OF AIR ACCIDENTS
UNITED KINGDOM, DEPARTMENT OF TRANSPORT
AIR ACCIDENTS INVESTIGATION BRANCH

# INTERNATIONAL ACCIDENT INVESTIGATIONS - A CRITIQUE

## 1. General

The United Kingdom AAIB has worked with the NTSB on a regular basis over the years and we have a great deal of respect for the Board and in particular the NTSB Investigators that we have worked with. Our contacts have covered all the permutations of circumstances in which investigators meet; we have regularly worked on investigations where the NTSB has been responsible for conducting the investigation; conversely we have worked with the NTSB where the AAIB have been the authority responsible for the conduct of the investigation; we have also formally come together where both our organizations have been participating as accredited representatives or advisers in a third State's investigation. In addition I believe that we have also worked on investigations where one or other of us have been asked to manage an investigation on behalf of other States.

Based on this wide range of experience, I hope that I'm in a position to identify those things that the Board does well, and equally those things that it does less well. It is my hope that this Critique should be constructive and helpful to the Board in considering the actions that they will take in the aftermath of the Symposium.

## 2. International Accidents in the United States

The major "cultural" difference experienced by AAIB staff during their involvement in NTSB investigations in the United States is that the numbers of authorized personnel involved, exceeds that which you would find in almost any other part of the world. I am sure that the AAIB is not alone in our surprise at the very large numbers of organizations and personnel able to participate in NTSB investigations. This situation inevitably creates a problem for the Investigators in Charge (IICs) in exercising control of these very large teams. These problems for the IICs, in the management and control of the accident site, are compounded on occasions by the impression that the investigation is being run from Washington

rather than by the IIC. It is also our experience that IICs tend to be distracted on site by relatively minor administrative matters. There appears to be a clear case for competent administrative support at the accident site to assist them. The recommendation I would make is that the NTSB should provide better support for their IICs at accident sites and allow them the freedom to manage their investigations rather than giving the impression of controlling the investigation on a "hot line" from Washington.

The investigation processes adopted by the NTSB are very different from other organizations. The rigid group system which is usually adopted can give the impression of a number of dislocated and unfocused investigations being conducted by the individual groups. If you like each group having a blinkered approach when pursuing its investigation without reference to evidence or information being uncovered by other groups. We feel that there is scope for better coordination between the groups and the various accident site activities. This could result in a better focused investigation which could also be conducted with fewer personnel. This aspect also relates to the comments made earlier about the NTSB's support of their IICs in their management at accident sites.

The NTSB handling of the Press and the media is often the subject of comment by AAIB personnel. We are surprised by the release of what seems to be random technical facts gathered during each day which are meaningless in isolation and only tend to fuel press misinterpretation. There also appears to be a lack of coordination and even consistency between the information that is released to the Press in Washington and that which is released by the IIC at the accident site. Our suggestion here would be for consideration to be given to methods of providing a better coordination of press releases, particularly between Washington and the IIC at the accident site. It may be helpful to describe the procedure which the AAIB adopt in these circumstances. The information released at press conferences in the immediate aftermath of an accident is only that which is non-contentious and readily available, ie the flight details, number of passengers on board, injury figures if available, the form and scope of the investigation, etc. In other words, public confidence building statements that show that the investigation is being addressed in an urgent and professional manner. Within 2 or 3 days, the AAIB publish a Special Bulletin which gives a brief outline of the factual evidence gathered and describes the areas of investigation being pursued. We find that this publication damps down the wilder speculations of the media and forms the basis of some more responsible reporting.

The process of formulating the accident report is another area where the NTSB practice differs from other organizations. When the various groups factual reports have been produced,. Accredited Representatives are asked to submit proposed findings drawn from the factual evidence, a proposed probable cause, and proposed safety recommendations. Accredited Representatives and other parties are also asked whether they wish to raise any issues at a meeting in Washington DC or by teleconference. This is usually the first opportunity that Accredited Representatives have to address the analysis of the evidence because this aspect is strenuously avoided in the early stages of the investigation. We have often felt that earlier meetings with the parties to address these issues would ensure that the representations at this latter stage were better focused and maybe less contentious than they often are.

A further aspect which is obvious to all those parties involved in participating in an NTSB investigation is the strained relationship between the personnel from the NTSB and those from the FAA. Some of these problems may result from petty politicizing or relationship problems between the various personalities involved. Whatever the cause, it is in the best interests of aviation safety that ways are found for improving the working relationships between the two organizations.

## 3. International Accidents in the United Kingdom

Our experience of NTSB teams participating in investigations in the United Kingdom goes back a long way and the participation and co-operation has always been excellent and extremely worthwhile in the context of the investigations. There is however one observation we would like to offer for consideration.

On major accidents, where large teams arrive from the USA representing the NTSB, FAA, an aircraft manufacturer, an engine manufacturer and others, we have observed a tendency for each of these organizations to operate to their own agenda. There seems to be no natural tendency for them to act as part of a US Team under the US Accredited Representative. This may be another manifestation of the relationship problems referred to in my earlier comments on accidents in the USA. Whatever the cause, it creates problems for the IIC with respect to his control and management of the investigation. A briefing for the various representatives before departure or while travelling to an accident site may improve this problem.

## 4. Other Investigative Issues

The eighth edition of Annex 13, at present scheduled for introduction in November this year, calls for serious incidents to be investigated with the same processes as those presently adopted for accidents. In Europe, the European Civil Aviation Conference (ECAC) have already adopted many of the new ICAO provisions and the European Union has drawn up a "Directive" incorporating the new Annex 13 provisions into the European Union Law. The impact of these changes will be felt by all aviation accident investigation organizations but the major manufacturing States like the USA will be affected most acutely. I am sure that the NTSB recognizes their obligations and responsibilities under the new provisions and intends to play a full part, with the States of Occurrence, in the investigation of serious incidents to US manufactured aircraft. However, I understand that budgeting constraints have recently led to restrictions on overseas travel for NTSB investigation staff. This is a worrying development at a time when States are accepting a new obligation to investigate serious incidents. An effective investigation into many serious incidents will require participation by the NTSB.

## 5. Final Remarks

The NTSB has a well deserved reputation for excellence in the accident investigation field. In any organization, however, there are always areas that can be improved. The NTSB's declared aim within the Aviation Accident Investigation Symposium has been to identify those areas where improvements can be made and I applaud this initiative. I have tried to highlight areas from my own and my staff's experience where improvements would benefit international co-operation on accident investigations. It is my hope that these comments will act as a catalyst for discussion at the final session of the Symposium which will formulate the recommendations for changes in NTSB practices and procedures.

**JOHN W. PURVIS**
**DIRECTOR, AIR SAFETY INVESTIGATION**
**THE BOEING COMMERCIAL AIRPLANE GROUP**

Good afternoon. Thank you for inviting me to bring Boeing's remarks to this open forum once again. These exchanges are extremely beneficial and I'm honored to be part of such an important worldwide group of professionals. Before beginning, I'd like to say it is my belief that at this time the NTSB is the best it's been -- both professionally and technically -- at the Board level as well as at the staff level, and our relationship with you is as good as it's ever been. You may be pleased to know that, as I gathered remarks for this paper from many people at Boeing, a constant thread of praise was expressed for the quality of your work and the relationship we enjoy.

To open, I'd like to read you something from a Boeing letter sent to the NTSB:

> "The presence of NTSB personnel at the scene of foreign accident investigations has in all cases raised the investigation ... to an organized effort with definite aspects of professionalism which aircraft accident investigations require. Our experience on those occasions where NTSB personnel have been present and active as accredited representatives has been gratifying. ... With this good reputation the NTSB has acquired and the importance of NTSB participation to the US aviation industry, we feel that the NTSB should participate actively in all foreign accident investigations involving products of U.S. manufacturers."

That letter was sent by my predecessor, Prater Hogue, to the NTSB. The date was July 31, 1968. More than 25 years ago. This gem appeared on my desk during a major housecleaning recently. We all know how these things go; some ideas take time to implement. However, 25 years seems a little excessive. I wanted to share it with you to show how some things don't seem to change.

Our continued endorsement of the above policy will be one of two major themes in my remarks today. Another theme I'd like to pursue -- although not unique to foreign investigations -- is the safety recommendation process. Also, the concept of a cockpit video recorder will be raised for your consideration once again.

An example of a good investigation was the recent COPA accident in Panama. The local authorities would have had difficulty handling such a major investigation on their own. Essentially, they let the NTSB take the lead. You did an excellent job of leading without seeming to "take over." The Panamanians needed help and they got it while still staying in control. It was a good political balance and I think you earned the Panamanians' respect as a result.

However, it appears to us there is a trend for the NTSB to participate in fewer, rather than more, overseas investigations. If this is sustained, it can only serve to have a negative impact on aviation safety.

Your absence from many overseas accidents affects our ability to perform at the highest level and to get the information and cooperation required. Your absence may also convey a lack of interest which could discourage future invitations to investigations in that country. We need and want you there. The NTSB improves the operation of an investigation by its very presence. Some governments are reluctant to work with the manufacturers or the airlines. They may feel there's a potential for conflict of interest when we show up without you. Or they may feel that we are too close to the operator, since the operator is also our customer. We don't think so, but there's frequently some hesitation on their part. Occasionally that hesitation becomes downright refusal.

We acknowledge that your budget is frequently under pressure from outside agencies. However, you play a key role in the world's pursuit of aviation safety. American-made products represent approximately 82 percent of the western-built commercial jet fleet flying today. That fact represents an obligation and a significant NTSB responsibility. You should plan to be present at every major accident and you should budget for it. Our own participation at accident investigations is expected and our management understands that, in some years, the budget will be exceeded. It's just a fact of the business we're in. It needs to be recognized, expected and accommodated.

Listed below are several accidents involving Boeing aircraft in 1993 where your absence slowed down or halted the investigation, or may have otherwise made a difference. It does not include a similar number of accidents involving other USA manufactured products. All these events were hull losses and involved injuries; most resulted in fatalities. Each had safety lessons to be learned:

| | | | |
|---|---|---|---|
| March 1993 | 737 | Royal Thai Air Force | Khon Kaen |
| April 1993 | 737 | Indian Airlines | Aurangabad |
| May 1993 | 727 | SAM | Medellin |
| July 1993 | 737 | SAHSA | Managua |
| July 1993 | 737 | Asiana | Mokpo |
| November 1993 | 747 | China Airlines | Hong Kong |

Your rationale seems to be that you don't intend to go if there are no airworthiness issues involved. You say, "Let us know if there are airworthiness issues involved and then we'll send a team." Our response is that you need to be there to determine whether airworthiness issues are involved. There are many safety issues other than airplane airworthiness in which you should be interested such as crew performance, ATC, training, maintenance and survivability. For those issues, and others, you should be there.

Also, we believe you should be very selective in the use of field office personnel as your accredited representative in major foreign investigations. Some foreign agencies really need help from the USA. The NTSB's reputation can be hurt if the right experience level is not available for assistance. The field personnel, as good as they may be, are often not in tune with the needs and procedures of a major transport investigation. If you do use a field person, he or she should be accompanied by someone from your Washington D.C. major investigations team.

As a last point on this topic, we would like to see you take a more active role in obtaining copies of final accident reports from foreign governments and distributing them to the USA advisors. Reports are our main means of communicating findings throughout the industry - and our company. Many times these reports are difficult to obtain on our own. We need reports (and good ones) to get changes made, for safety studies and for the long term record which forms the basis for new product designs. Our designers need facts and data.

On the matter of reports, if it is obvious that a foreign agency is having difficulty writing a final report you should offer to give them help. We will assist you in that area any way we can.

The second major theme I'd like to air is the technical recommendations process. (By the way, this is one of the areas your Boeing admirers criticized frequently in their comments to me.)

Here, there are three areas of concern. One is the process of creating the recommendation itself. The second is the method by which they are communicated to us. The third is the need to separate recommendations generated by an accident from other unrelated issues. None of these should be a surprise to you since all of them have been discussed before.

My basic suggestion about the safety recommendation process is to take it out of the closet and put it on the table of open communication. Work with those parties able to contribute meaningfully and fairly and consider their inputs.

We understand and support the NTSB's need for independence in this area. However, we believe the NTSB would be well-served to solicit some input from the affected parties during the formation phase. You cannot be expected to have all the detailed airplane and system expertise necessary to write quality recommendations without help from outside. It isn't for lack of trying or professionalism on your part; it's just that several heads are better than one in this era of rapidly changing tech[illegible].

In addition, you should listen to these parties to assure that the recommendation is factual, accurate and meaningful. We believe that issuing a poorly thought-out recommendation degrades the image of the NTSB worldwide. We do not believe you would give up your independence by opening the process, since the final decision is still yours alone.

Second, I'd like to discuss how final recommendations are communicated to us. Using the current process, a recommendation could be conceived, developed, and issued without anyone outside the NTSB knowing about it. However, although not always the case, most recommendations do contain some element of surprise for us. Many times we may know that a recommendation is planned on a general topic, but we won't know the specifics. Sometimes your staff tries to inform us a few hours ahead of its release, but often our first notification comes when the Associated Press calls our public relations office asking for comment. Of course, part of this problem would go away if the process was more open from the beginning.

At the very minimum, it would be desirable to have an arrangement so we (the affected parties) could receive copies of final recommendations related to our products on a timely basis. Timely basis means before publication - as much before as possible.

Last, let's talk about the problem of separating unrelated recommendations from those generated by real events. A good example of this was the autopilot recommendation resulting from the ongoing UAL 767 Frankfurt investigation. This recommendation discussed items that had nothing to do with the incident itself. Referring to the Frankfurt incident in the autopilot recommendation created a substantial amount of confusion in the press and in the airline community. It would have been much better for the NTSB to have addressed these issues separately, without cross-referencing them.

As a final item, I'd like to give a commercial for a topic that has been of deep interest to me for many years: cockpit video recorders. This subject has been discussed in public forums before but no action has ever been taken. Initially, when cockpit video recorders were proposed, the NTSB response was that you wanted to see foil recorders discontinued in new production airplanes before worrying about videos.

Well, that was many years ago. We have actually gone through two major improvements in data recording since then and we are now installing solid state digital recorders in production. Once again, it is time to reconsider the many benefits to our industry which could derive from the use of cockpit video recorders. As airplanes become more digital and automated, and as we emphasize human performance, the need and potential benefits of video become greater. There are many objections to their use, primarily from the pilot community, but I think those concerns can be overcome with adequate controls and perhaps legislation. All parties, including the pilots, would benefit. Now is the time to take action. The NTSB should take the lead.

Once again, I appreciate the chance to participate and express our concerns. At Boeing we are in the midst of our own Continuous Quality Improvement program. Sometime in the near future, we'll be formally asking for your input on our performance as to what we can do better. However, don't wait for us to ask. This invitation should be considered an open one, not only to the NTSB but any other individuals or parties we deal with. Like you, we're always looking for positive suggestions for improvement.

We look forward to these meetings. We'd like to see these forums held regularly, perhaps every three years or so. I'll promise not to bring any more 25-year old letters!

**LEN HOUSTON**
**FLIGHT SAFETY MANAGER**
**JETSTREAM AIRCRAFT LIMITED**

Good Afternoon Members and Staff of the National Transportation Safety Board, Ladies and Gentlemen -

May I say immediately it is indeed a privilege to be invited to these proceedings onto the international panel to discuss the issues arising from accident investigations with overseas or foreign parties participation. It also happens to be a pleasure to meet in such a forum with those Safety Board investigators whom I have come to know personally throughout the years we have worked together.

My job is the Flight Safety Manager of Jetstream Aircraft Limited, a wholly owned subsidiary of British Aerospace. Our factory is based in Scotland and has the design authority and manufacturing responsibility for a range of regional turboprop aircraft. In the United States the types you will recognise here are the Jetstream 31, 32 and 41 and the ATP Advanced TurboProp which is soon to be relaunched as the Jetstream 61. In time, all of our turboprop products will have the generic name Jetstream.

I have been always personally involved representing our Company with the Safety Board on the Jetstream accidents and I know that each time I go to the site I am certain to recognise familiar faces amongst the teams. I must assure them that this paper is not a "hit-list" and I am bound to say from the outset of my critique that I am not at all concerned about the degree of professionalism which is and always has been displayed by the Board staff at a very high level.

Tom Haueter's briefing to us as participants, is to offer "positive criticism and recommendations to improve the quality and effectiveness of the Board's procedures" which later he abbreviates to the phrase we constantly use in industry, "the manner in which you do business."

These are the areas I would like to offer for discussion from my experience with the Board.

**The Elimination of Improbable Causes**

The primary area of concentration by all the various teams in the field is obviously to determine as soon as possible a valid probable cause. The contributory causes and safety recommendations come some time later when the technical evaluation process has completed the assessment of the factuals to develop the "picture" of the accident.

But it is the most likely probable cause which remains as the theme uppermost in people's minds, and that is what they strive for.

Now as we progress along this path, we are constantly sensitive to the fact that many vested interests are becoming involved and to be fair to the flying public, it is important to avoid lurid and emotive accounts and especially those which feature the so-called expert witnesses. For passengers waiting to board an airplane, it must be rather distressing to say the least to view the crash site scene on the airport lounge television with speculation on how the crash may have been caused without the full facts being available.

Nowadays, thanks to the marvels of communication technology, the media news travels at the speed of light and knows no frontiers. After two recent fatal Jetstream accidents in the US mid-States, details of them appeared as on-scene live pictures and reports on Scottish Television and local radio within only a few hours of them happening and many colleagues were telling me the "story" in the morning.

We in the industry know that there is always a possibility in any serious accident that from the outset and at any subsequent point during the course of an investigation, critical airworthiness factors may come to light to require urgent AD action.

The manufacturer and certification authorities then work closely in deliberate haste to resolve the circumstances and Jetstream Aircraft is committed to an urgent response whenever this is deemed necessary. As a corporate policy, the Company will take any action to maintain the continued airworthiness of its aircraft. Paramount in our culture, the safety of the aircraft occupants prevails despite what connotations the legal or insurance communities may attach to our responses.

In any accident, whether training, revenue or otherwise but particularly one in which fatalities have occurred, quite naturally concerns are raised by the flight and

cabin crews until the full results of the investigations are completed and issued. During this time there is clearly the prospect of false set attitudes being assumed which may have the effect of blunting the crew's safety perceptions of the operation of the aircraft.

Let me quote one example. Airframe ice accretion, and tailplane icing in particular, has been recognised as a safety issue for decades. A couple of years ago, the FAA Industry and Operators started a series of working seminars to revisit the phenomenon related to turboprop aircraft. Papers were subsequently issued with advice to commuter pilots on operational factors and techniques they should consider. A lot of flight test work was undertaken by our Company and improvement modifications introduced on the Jetstream.

To our dismay, there was some speculation in the media on two recent accidents which determined, quite erroneously, that loss of control was the result of tailplane icing. We received many approaches from pilots expressing their concerns and seeking reassurance that the safety and integrity of the aircraft was not suddenly compromised.

Speaking only from the point of view of the manufacturer, because, of course, the operator and certificating authority must also consider their positions with equal diligence, it is not equitable that unfounded accusations of unsafe characteristics remain unrefuted.

For this reason, in order to reassure our operators, Jetstream Aircraft issues priority notices to our type operators, setting out the significant facts after petitioning for the Board's approval, in the event confidential information is involved. Also, the Board holds media conferences during the course of the investigation and releases information to the media through its public relations office on the status of the investigation.

**Recommendation No. 1**: After due consideration of the best known facts, and at the earliest opportunity, both verbal and written media briefings by the Board are accurately coordinated and should be disseminated in such a way to ensure that facts are made available which convey the Board's judgement to eliminate causes which are not considered probable.

**Facilitating Information Transfer**

On arrival at the Field Investigation phase of an accident, one is always impressed with the rapid manner the Groups are set up. Often with up to 11 groups being formed at this initial period, each containing 4-5 representatives, you then have nearly 50 people working towards their own objectives but part of the common goal. It is clearly a real logistic problem for the Investigator-in-charge--and more of that subject later.

The nightly ritual of 6 o'clock briefings provide the essential sharing of information and an opportunity for all participants to discuss and question each other's activities. The party co-ordinators briefing called specifically by the IIC to reveal or reinforce certain aspects of the progress of the investigation, is also particularly useful for the manufacturer.

While this, in appearance, is a most effective way to communicate information, and this time is often the point at which the manufacturer's party co-ordinator may be able to obtain and convey important information back to the Company, in my experience I have perceived an essential link to be missing.

I refer to the way in which the information linkup between the CVR, FDR, Operations and Performance Groups appears to almost come about, rather than is organised. I am aware that this occurs because of the special and unique requirements of confidentiality imposed on the CVR/FDR Group and the essential need to preserve this confidentiality. Nevertheless, in my view, the progress of the Operations Group's examination of the flight and its details is significantly hampered by the lack of knowledge in the understanding of the cockpit scenario, where the pilots' actions, intentions and interrelationship are vital pieces which make up the jig-saw puzzle.

I am also conscious of the Board protocol which does not permit an individual into membership of more than one field group beyond the one he is assigned to on arrival at the investigation. The party co-ordinator of course normally has a free-range ticket so that he can access information from the groups which have his representatives on them and, because of this, he is best situated to evaluate the issuing facts with respect to his own organisation.

It seems to me that the apparently prolonged separation of the members of the CVR, FDR, Operations and Performance Groups is conducive to slow evolution of the discovery of the operational factors which are necessary to depict a composite, albeit preliminary, scenario.

**Recommendation No. 2:** In order to bring out all available information and enable the Operations Group to focus on the most appropriate aspects of the accident flight profile, a single FAA-approved type rating examiner/check airman on the type should be allocated to the CVR, FDR, Performance and operations Groups and be authorised to impart information to the groups and work with them throughout the investigation. Consideration should perhaps be given to facilitate initially reading out the CVR and FDRs at the Command Post location.

**Investigator-in-Charge Overload**

The IIC is responsible for setting up the Field Command Post and its attendant structure but in addition has to allocate much of his time addressing time consuming administrative issues. It is very obvious he is fully stretched to keep this under control while all the time co-ordinate and report the technicalities of the investigation. There must be a more efficient way to ensure the IIC has more time to perform his allotted function of managing the total investigation in the field to a conclusion.

**Recommendation No. 3:** To ensure that the working effort of the IIC is maximised to enable him to effectively plan, direct and control the accident investigation process, the Board team should consist of a Facilities Manager whose function is to unburden the IIC by the setting up, day to day running, and dismantling of the Command Post.

This completes my critique and I am pleased to have been able to present it and discuss it further.

**RICHARD B. DUXBURY**
**CHIEF ACCIDENT INVESTIGATOR**
**NORTHWEST AIR LINE PILOTS ASSOCIATION**

# INTERNATIONAL ACCIDENT INVESTIGATIONS

## AN AIRLINE PILOT'S PERSPECTIVE OR NIGHTMARE?

By way of background, I am a Captain with Northwest Airlines. I have been with Northwest for over 25 years. Prior to that I was a pilot with the United States Navy. I am the Chief Accident Investigator for the Northwest Air Line Pilots Association and a member of the National Air Line Pilots Association Accident Investigation Board.

The protocols and procedures for a major domestic (USA) aircraft accident investigation are generally understood and agreed upon. The (U.S.) National Transportation Safety Board (NTSB) has almost exclusive authority and responsibility for the investigation. Party status is normally offered to a variety of organizations to assist the NTSB throughout the investigation process.

This is not the case with international aircraft accidents. The waters can become instantly muddy. International Civil Aviation Organization (ICAO) Annex 13 is a good starting point but does not provide universal coverage. Many countries ("states") do not have extensive aircraft accident investigation expertise. On the other hand, some "states" have experienced and established aircraft accident investigation organizations at least equal to the U.S. National Transportation Safety Board. No matter what the situation, however, there is no guarantee that qualified line pilots, trained and experienced in accident investigation, will be assisting the process in the international arena.

The NTSB, in its role as the accredited representative to an Annex 13 investigation, is in a position to rectify this situation, both by its selection of advisors and by its input to the investigative authority.

## TWO OBSERVATIONS AND A RECOMMENDATION

Reflecting back on both my military accident investigation and commercial aircraft accident reports, I have often heard similar comments, "Didn't they ever think to ask some experienced line pilots about that finding, conclusion, or recommendation" -- or, in the military, "Was this investigation done at headquarters by Colonels or Commanders sitting around a desk?"

In the past we have been asking, "Has anyone at the NTSB really flown the line as a commercial airline pilot in the last 20 years?"

Observation No. 1.--A current experienced line pilot can add a measure of credibility to the accident investigation team that is not available from any other source. Valid comments such as, "Yes, I know that is the position of Boeing and our operational manuals, but ask any other pilots how the aircraft really performs," or "We are not trained on visibility measurements and must generally rely on the reported weather," or "It is not unusual to be dispatched with just two Inertial Nav units and later find that one is somewhat unreliable."

The list could be continued. The greatest value is to be sure that the accident investigation team does not either chase off on a tangent area of little relevancy or worse, inadvertently overlook areas of potential air safety significance.

Observation No. 2.--If my first observation has any validity, then I must also make this additional comment.

Having a qualified, experienced line pilot as part of the accident investigation team is a plus. It could also be a minus. If the individual assigned has absolutely no background or training in accident investigation procedures it could offset his/her usefulness. Cheap "hip shots" during the investigative process are of limited value. They may occasionally be on target but really do not contribute to the full and (hopefully) impartial investigative process. The result could be what we in the military once called "incomplete staff work."

Thus I believe that a pilot assigned to an accident investigation should be a trained and experienced aircraft accident investigator. This requirement should be mandatory if assigned to an international accident investigation. (It is true that such a restriction would tend to limit the so-called assignment pool.)

How would such a list be generated? Frankly it is in existence today within the International Federation of Air Line Pilots Associations (IFALPA). The Accident Analysis committee of IFALPA has been reviewing applications for years, and when appropriate, certifying pilots as accredited accident investigators.

Prior to IFALPA Certification at least four items must be established:

1. The applicant must be an experienced line pilot (almost 100 percent certified are captains).

2. The applicant must be specifically recommended by his/her sponsoring organization.

3. The applicant must have formal recognized accident investigation schooling often including both military and civilian.

4. The applicant must have prior experience with major aircraft accident investigations.

While I have used the example of IFALPA, it is not impossible for other pilot organizations to develop similar trained and qualified pilots. Assuming this rigorous screening process, the pilots assigned to the accident investigation team should add a perspective that is missing from any other source.

## RECOMMENDATIONS

The recommendation itself is easy to state but often difficult to achieve. Specifically, I recommend that at least one experienced line pilot from the involved air carrier be assigned to any international accident investigation team. This would not preclude more than one such pilot, but it must be understood that the screening stipulations mentioned above would be a prerequisite to such assignments.

Achieving this recommendation for U.S. carriers will require help from the NTSB. Part of this recommendation would include a request that the NTSB become even more aggressive in their approach to be a part of international accident investigations (accidents involving U.S. carriers or aircraft types frequently flown by U.S. carriers).

I should note that there has been notable NTSB involvement in recent international accidents/incidents, including the Boeing 747 freighter engine separations and the fire and emergency evacuation of a Northwest B747/400 in Japan. In this last case, the NTSB was instrumental in allowing comments from both Northwest Airlines and the Northwest Air Line Pilots Association to be forwarded to the Japanese authorities prior to publication of their final report.

However, with increased globalization of airlines I would encourage the NTSB to continue their thrust in the international arena of accident investigation. I should also note that both Mr. Bud Laynor and Mr. Ron Schleede would quickly point out that NTSB involvement in the international arena is usually on a "request or invitation basis." It is likely that such investigations may be beyond the funding guidelines of the organization. As an invited pilot accident investigator to this seminar I understand these considerations, but would remind the NTSB that you asked for our input at this forum.

It is vital that the NTSB pursue active involvement in two classes of international accident investigations. First, where a United States flag carrier is involved, the NTSB must participate. When this is not done, such as the midair collision between a Delta 727 and a Cessna at Guadalajara, Mexico, valuable safety information can be lost.

The second class is somewhat more controversial, because it involves an offshore accident to a foreign carrier where the airworthiness of a U.S. product is not initially suspect. There are cases where such an accident may be very relevant to an ongoing domestic safety investigation. For example, shortly after the U.S. air F-28 accident at LaGuardia, an F-100 crashed at Skopje, Yugoslavia under what seemed to be similar circumstances. Participation in that investigation may have greatly facilitated the USAir F-28 investigation.

Speaking as a pilot flying for a major international U. S. carrier, if additional NTSB funding is needed for this increasingly vital air safety area, then perhaps it is time for all of us to address the issue.

Whatever it takes, the NTSB must maintain and attempt to increase its involvement in international investigations. We cannot rely upon other organizations to investigate and analyze accidents which can affect the operation of United States aircraft.

From many viewpoints, the prospect of a major international accident investigation is a nightmare scenario. To the extent that we can ensure that the interested and qualified parties are part of this team, it will reduce this nightmare. More importantly it will significantly add to the quality of the investigation and the resultant recommendations to improve international aviation safety.

## SUMMARY

1. Experienced airline pilots can add a great measure of credibility to any accident investigation team. This routinely happens in domestic investigations.

2. Pilots assigned should also be trained and experienced in aircraft accident investigation.

3. It is equally important to have this pilot representation on international accident investigations.

4. The NTSB must maintain and attempt to increase its involvement in international investigations, including experienced line pilot participation.

**MICHAEL YOUNG**
**ACCIDENT INVESTIGATION COORDINATOR**
**PRATT & WHITNEY**

# EFFECTIVE COMMUNICATIONS DURING FOREIGN ACCIDENT INVESTIGATIONS

On behalf of Pratt & Whitney, I am pleased to have this opportunity to speak at this symposium. I would like to commend the NTSB for having this forum where the industry can offer suggestions, recommendations, and constructive criticism. Today I would like to offer comments regarding effective communications during a foreign accident investigation.

By nature, foreign accident investigations are complex to support. Travel to the site, language and culture differences and working under various jurisdictions are all part of the "normal" conditions of accident investigation that we all accept. One area of the investigation process that we feel could be improved is communication during a foreign accident investigation. Particularly where a non-US registered aircraft is involved and the US is the state of manufacture.

In any investigation effective communications between the IIC and all the US. parties is important. However, in the above-mentioned situation it is critical, especially after the on-site phase has been completed. The critical time is when the various Phase II follow-on activities are underway at the parties' home bases around the world.

We feel that the most effective way of communicating between the US parties and the foreign agency IIC is through the NTSB as the accredited representative as outlined in ICAO Annex 13.

We have been involved with investigations where the Safety Board had taken an obvious role as the US accredited representative. During those investigations there was a definite sense of organization and effective communication. All of the US. parties were kept informed of actions taken by the IIC and of the various investigation activities and had a forum to make comments or suggestions. This communication often took the form of scheduled conference calls and, when necessary, technical meetings to which all of the US. parties were invited.

On the other hand, there have been investigations where the Safety Board was not so obviously involved. In those occurrences the individual parties, left to themselves, received at best only sporadic communications in a non-organized manner. The absence of NTSB leadership and organization in these situations could lead to inadvertent miscommunication among the parties or the IIC which could result to serious misunderstandings.

To bring about more effective communication we recommend the Safety Board work with the foreign IIC to do the following:

Arrange that the Safety Board be the focal point for all questions and responses between the US parties and the IIC.

Ensure that the Safety Board is copied on all progress reports issued by the IIC and circulate the reports among the US parties.

Be the focal point for review of draft final reports and circulate comments among the US parties.

Schedule periodic progress meetings or conference calls among the US parties to review and discuss activities.

Ensure that the Safety Board is notified of all progress meetings and the US parties are notified of such meetings.

The benefits of this improved communication would be:

The NTSB would be current on all investigation activities of the US parties and of any safety recommendations.

All of the parties would have a clearer understanding of each other's activities, including the purpose of the activities and the intended goals.

A Safety Board-led organization would help prevent a party, due to the lack of perceived organization, to take actions that might be misinterpreted.

Prevent awkwardness of parties discussing investigation activities among themselves without the IIC represented by the Safety Board as the accredited representative

We hope that these comments will be found useful to make the investigation process as efficient as possible.

**CAPTAIN EDMOND L. SOLIDAY**
**DIRECTOR OF CORPORATE SAFETY AND SECURITY**
**UNITED AIRLINES**

# EXCELLENCE THROUGH TEAMWORK IN INTERNATIONAL INVESTIGATIONS

Every accident or incident investigation is unique and presents its own complexities and challenges. However, when we are faced with the challenges of an international investigation the order of magnitude of complexity can increase exponentially. If there is to be a quality result from the investigation, a high level of commitment by operators, manufacturers, labor organizations, and government agencies to mutual respect, teamwork and understanding must be cultivated.

ICAO Annex 13 clearly delegates the investigative authority to the country of occurrence. The safety professionals employed by the operators understand this fact clearly. They also know it is a privilege to operate in a foreign country and realize that a damaged relationship could hinder their ability to conduct day-to-day business in the future. However, everyone must understand that the operator feels a strong moral obligation to their customers, employees, and the traveling public to find the cause of the accident or incident and prevent it from happening again. This natural tendency on the part of the operators needs to be understood and put to positive use by the responsible government agencies.

Usually within a few hours after a serious international incident or accident the operator will have sent a team of technical experts and humanitarian aid personnel to the country of occurrence by the most expeditious means possible. This will probably be true of the manufacturers and possibly the labor organizations as well. All of us are eager to supply help to our colleagues, employees, and customers who are involved in the incident. If the incident is not serious, we are eager to bring our crew members home and return our aircraft to service.

Before departure for the site, an operator will have notified the NTSB with as much detail about the occurrence as is known. Each of us recognizes that the NTSB is the logical legal "accredited representative" for U. S. operators and manufacturers. We also recognize that the NTSB is not staffed to investigate every safety-related incident in the world.

It is true that each event is different and requires a unique response, but it would be very helpful if the NTSB could make very effort to:

Assign an experienced IIC or single point of contact as soon as possible, so everyone understands who is in charge and the primary point of contact for supplying information to the investigators from the country of occurrence, even if the IIC never leaves the United States to visit the scene.

If the IIC is traveling to the site, then an available primary U.S. contact should be established to coordinate information during the travel time of the IIC. A great deal can happen in the fourteen to twenty-four hours of travel time to locations in the Pacific.

When an engineer or other staff member is the only NTSB representative being sent to assist the country of occurrence, his role and relationship with the operator and manufacturers should be as clearly defined as soon as possible before arrival at the site. Is he an IIC for the NTSB side of the investigation? If so, he should be trained to organize the advisors and properly coordinate their activity.

If the country of occurrence delegates the investigation to the NTSB, an IIC should be assigned immediately and conventional party system rules should be established to eliminate misunderstandings before they occur.

Procedural norms should be established as soon as possible. How will records and documentation be delivered to the country of occurrence representatives, through the NTSB or delivered directly? Who will receive copies? What advisory committees will be allowed? How will field notes be handled? What will constitute official release of our flight crew and aircraft for return to service.

If the NTSB representative is not planning to arrive for several days or if the Board is not planning to directly participate at all, the Board should do everything possible to convince the investigators of the country of occurrence to include the operator as an advisor and move ahead with the investigation to expedite the release of crewmembers and the aircraft.

When an investigation has been completed by a foreign government and the NTSB feels that it would like to gather more information, allow us to bring our aircraft and flight crew home to conduct further investigation. Do not encourage the government of the country of occurrence to reopen the active investigation.

The operators, especially the large international carriers, and the manufacturers each are repositories of a wealth of unique information which is essential to the conduct of a quality investigation. However, each have elaborate operating procedures, computerized record keeping systems, complex training, engineering and maintenance organizations as well as sophisticated communications networks that are not easily understood without guidance from people within the organizations.

The flight crews will have first hand information of the event, but will be reluctant to discuss the matter in depth unless they have the support of familiar organizations such as the operator or their labor organization.

It is in everyone's best interest to make full use of these resources as early in the investigation as possible. The NTSB can be very helpful in coordinating and encouraging the investigators from the country of occurrence in the use of these resources. In fact, such facilitation can only be effectively accomplished by the NTSB.

Admittedly, operators, manufacturers and labor organizations bring a degree of bias into any investigation, because each is committed to ensuring fair treatment of their own organization. Such commitment should not negatively impact an investigation, if properly channeled. We all have learned from our CRM experiences that teamwork always leads to higher quality conclusions than individuals acting alone. Exclusion of parties from the investigation means exclusion of facts, reduced quality, and damaging dissenting opinions.

Building a strong effective investigative team requires that the members be willing to take the risk of trusting one another. This has been difficult enough in the context of our own U.S. culture and is even more difficult when international cultures are involved.

I would challenge the NTSB staff and Board Members, at every opportunity, to speak well of the U.S. operators, manufactures and labor organizations as key

assets in the investigative process; to encourage foreign governments to include us in investigations as trusted advisors and technical experts in our field. In so doing they will foster the creation of high quality, multi-disciplined, committed investigative teams who work together to find the true cause of accidents and facilitate the prevention of unnecessary accidents which cause death, injury and loss of valuable assets.

**HAROLD DONNER**
**ASSISTANT MANAGER, ACCIDENT INVESTIGATION DIVISION**
**FEDERAL AVIATION ADMINISTRATION**

# INTERNATIONAL ACCIDENT INVESTIGATIONS

Although the National Transportation Safety Board has maintained a high level of participation in foreign aircraft accident investigations, I believe that there are several reasons to urge even greater participation in the future. Before discussing those reasons, it is important to understand the international agreements that govern this participation.

> With few exceptions, international aircraft accident investigations are conducted in accordance with the provisions of Article 26 and Annex 13 of the Convention on International Civil Aviation. Article 26, adopted by ICAO in 1947, established the obligation of the State in which an accident occurs to institute an investigation. Annex 13, adopted in April 1951, contains the standards and recommended practices for conducting the investigation.
>
> Annex 13 states that the fundamental objective of an investigation is the prevention of (future) accidents and incidents, and defines the rights of contracting States to participate in such investigations. The State of Registry and the State of the Operator are entitled to appoint an accredited representative. The State of Manufacture is entitled to appoint an accredited representative whenever it is believed that its participation in the investigation could be useful or result in increased safety. There are also provisions for the participation of States which provide information, facilities, or experts, or suffer fatalities to its citizens. In any case, if a State is entitled to appoint an accredited representative, it is also entitled to appoint advisers to assist its accredited representative.

The first reason for increased participation in foreign investigations concerns the timely acquisition of safety information. If the goal of any accident investigation is the prevention of future accidents, then one of the most important functions of the investigation team is the prompt transfer of critical information from the accident site to those organizations that are responsible for taking appropriate corrective action. When we are deciding whether or not to participate, the preliminary

information from an accident site halfway around the world seldom gives us a clear picture of a safety issue that requires our on-scene presence. With the benefit of hindsight, however, we find more often than not that there were significant issues that would have justified our participation. When we choose not to participate, it is not unusual to wait months for a report that contains information that is incomplete and inadequate for the difficult task of persuasion that usually accompanies any significant recommendation for change. If we want accurate information quickly, then we need to be there.

The second reason concerns the NTSB's status as the official representative of the U.S. government in all matters dealing with foreign accident investigations. If we accept the premise that the U.S. is a world leader in all aspects of aviation safety, then we must accept the responsibilities that accompany that role. I believe that one of those responsibilities is participation in investigations that do not have an immediately apparent "payoff" for us. For example, an accident that appears to be caused by operational factors occurs in a small country that immediately asks for U.S. assistance. How many times has the Board responded by designating an accredited representative (who will not travel) and offering to read out the recorders if they are brought to Washington? This failure to respond often leaves our manufacturers in the uncomfortable position of being the only U.S. presence at the accident site, in a country that may not be technically able to conduct an adequate investigation. It leaves the impression that our Government is only interested in the high-profile, high-publicity accidents, and that the investigators of smaller nations must be prepared to fend for themselves or seek help elsewhere. Nature abhors a vacuum, and if we don't adequately fulfill our role as a world leader, someone else will. This has been evident in several recent accidents where countries that otherwise would not have been involved offered their expertise and ended up leading the investigation, enhancing both their image and their influence.

A third reason concerns the environment in which foreign accidents frequently occur. Accidents involving poorly maintained and aging aircraft, inadequate crew selection and training, and safety standards compromised by financial or political considerations can be harbingers of issues that we might be required to deal with in the future. We cannot always expect to find the details of issues such as these in accident reports; only on-scene participation will give us the information we need to truly understand the circumstances of the accident and to avoid similar problems.

Once the Board decides to participate in a foreign investigation, several important points should be considered:

Direct Communication: The Board must establish direct communication with the foreign authorities as quickly as possible. Although Annex 13 recommends the Aeronautical Fixed Tele-communications Network (AFTN) as the most suitable and quickest means for transmitting the standard initial notification message, an exchange of messages on the AFTN network is probably the slowest and therefore least desirable means of communicating other information. Several options are available: a phone call to the investigative authority, a call to our embassy, or direct communication with an FAA international representative. Any of these resources should be able to confirm an invitation to participate in the on-scene investigation faster than an exchange of telex messages would. Direct communication also allows us to make an informed decision on the technical experts we should send to the site, and to make the necessary arrangements for visas, State Department clearances, and accommodations.

Timely Response: The reasons for a prompt departure for the accident site are obvious and include maximizing participation during the on-scene investigation, examination of the wreckage before it is moved, and minimizing disruption of the foreign authority's investigation by arriving when the on-scene activities are well underway. Whether travel is to be accomplished via commercial air or FAA aircraft, the Board should make every effort to have all members of the U.S. team depart together, thereby simplifying the demands placed on the host government for meeting flights, facilitating entry, and making local travel and hotel arrangements.

Aggressive Follow-up: When the on-scene investigation is complete and everyone returns home, there is a tendency to feel that our most important work is done. The Board should maintain an active role in the entire investigation, including a willingness to travel to subsequent meetings and reviews of the draft report. If budgetary considerations do not allow full participation in these activities, the Board should encourage and sanction the participation of its advisers, whether they represent the operator, manufacturer, or FAA, in these follow-on activities. The Board's record of participation in these activities has been very good, and I mention it only

to emphasize its importance and to urge continued participation in the future.

I thank the Board for giving me the opportunity to present these suggestions, and for their demonstrated dedication to the advancement of worldwide aviation safety.

# OFFICE OF AVIATION SAFETY

# GUIDANCE FOR PARTY COORDINATORS AND OTHER PARTICIPANTS IN THE INVESTIGATION OF AIRCRAFT ACCIDENTS IN THE UNITED STATES[1]

As mentioned in the opening statement by the Investigator in Charge (IIC) during the organizational meeting for this accident, this guidance pamphlet contains expanded information concerning your role as a party to the investigation and general Safety Board administrative procedures. Please keep in mind that these guidelines are not intended to be all-encompassing. If procedural questions arise during the investigation, the Investigator in Charge is your best source of information.

## 1. Role of Parties to the Investigation

The primary purpose of permitting the participation of organizations in an accident investigation is to assist the Board in developing a complete and accurate factual record of the accident. It likewise enables responsible safety officials whose product or services might be involved to have immediate access to facts regarding the accident from which they may initiate preventive and/or corrective action. You will participate initially during the field phase of the investigation as a Party Coordinator or as a representative of a party to the investigation. Later, your organization may be designated as a party to any public hearing on the accident the Board may hold, providing it meets the Board's requirements. Participation in the investigation does not automatically guarantee party status at an NTSB public hearing, if one is held. Likewise, participation in the investigation is not a prerequisite to participation in a hearing.

***All persons participating in the Safety Board's investigation must be in a position to contribute specific factual information or skills that would not otherwise be available to the Board. Also, no participating organization will be permitted to be represented by a person whose interests lie beyond the safety objective of the accident investigation. See Appendix B.*** The Board's rules specifically prohibit any party from being represented by a person who represents

[1]Revision 4. This guidance was last modified on February 15, 1994.

claimants or insurers. Participants in the investigation shall be responsive to the direction of Safety Board personnel and may be expelled from the investigation if they conduct themselves in a manner prejudicial to the investigation or do not comply with their assigned duties. If you are a coordinator for your organization, you will also be required to sign a statement to ensure your complete understanding of 49 CFR Part 831.11 of the Board's Regulations related to parties to the field investigation. During the on-scene phase of the investigation, party coordinators are responsible for the behavior of their employees or representatives.

## 2. The Role of the Federal Aviation Administration in the Investigation

The National Transportation Safety Board is charged by Congress in accordance with Title VII of the Federal Aviation Act of 1958 with the responsibility of investigating civil aircraft accidents and to report the facts, conditions, and circumstances relating to each accident and probable cause thereof.

To preclude any misunderstanding concerning the responsibilities of the Safety Board and the Federal Aviation Administration (FAA), you are referred to Title VII of the Act, as amended, which sets forth the responsibilities for the investigation of aircraft accidents and to the Transportation Safety Act of 1974, which sets forth duties of the Safety Board.

Section 701(g) of the Act states, "In order to assure the proper discharge by the Secretary of Transportation of his duties and responsibilities, the [Safety] Board shall provide for the appropriate participation of the Secretary of Transportation and his representatives in any investigations conducted by the Board under this Title: Provided, that the Secretary of Transportation or his representatives shall not participate in determination of probable cause by the Board under this Title." The FAA on behalf of the DOT is the only party as a matter of right; no other organization is automatically entitled to participate in an NTSB investigation.

In certain occasions in the past, some individuals have been reluctant to talk to Safety Board investigative teams because some of the team members are employees of the FAA, the organization responsible for enforcement of Federal Aviation Regulations. To preclude such reluctance, Safety Board working policy permits an interviewee to request exclusion of FAA employees from investigative interviews. Be advised however, if FAA personnel are excluded from the NTSB interview, the FAA will probably want to interview the person involved in the accident immediately following the NTSB interview. Also be aware that the

substance of the NTSB interview will be made available to all of the parties, including the FAA.

### 3. Public Hearing

Should circumstances dictate that a public hearing be held in conjunction with this accident, you will be notified. Public hearings are conducted in accordance with CFR Part 845 (see appendix C) of the Board's Rules of Practice in Aircraft Accident Inquiries. After the hearing, a transcript of the hearing will be prepared for inclusion in the public docket of the accident. Public hearings are discussed in further detail later in this paper.

### 4. Recovery and Security of Wreckage

For the purposes of its investigation, the Safety Board requires only the recovery of certain portions of the aircraft wreckage and protection of the accident site from interference by unauthorized individuals. The Safety Board cannot assume responsibility for the recovery of deceased accident victims, crowd control, the recovery and removal of wreckage that may constitute a public danger or nuisance, or normal police, fire, and rescue services. Should special and unusual circumstances arise in this area, consultations with appropriate local government officials will take place. Following completion of the on-site investigation or examination of the airplane, the site and aircraft wreckage will be released. Any further provision of security of the site or aircraft parts are not the responsibility of the Safety Board. Be advised that the release of wreckage may be incremental. The Safety Board may desire to maintain control of certain aircraft components longer than it maintains control of the overall wreckage.

### 5. Handling of Accident Information Within the NTSB Investigation

The flow and dissemination of information during the course of a Safety Board investigation should follow a distinct premise: No individual or group will withhold information and failure to follow this policy is grounds for dismissal from the investigation. Factual information obtained by group members assigned to the team will be brought to the attention of their respective Safety Board group chairmen. All information gathered by various groups during the investigation will be passed to the Investigator in Charge by the group chairman. Each participating party will designate a party coordinator (spokesman) for its organization. Group members may pass factual information to their respective party coordinators after

this information has been given to their group chairman. All of the factual information and developments of the investigation that are known to the IIC will be passed on to each of the party coordinators. Coordinators may relay information to their respective organizations provided the information is factual and in correct perspective. This information should be transmitted on a "need to know" basis for purposes of accident prevention, remedial action, or other similar reasons, and not for public release. The party coordinators should keep the IIC apprised of how the information will be put to use. Common sense and good judgment must predominate in this matter, to eliminate acting on preliminary information that later proves to be untrue.

## 6. Dissemination of Information to the Public

Contacts with news media regarding the facts and circumstances of the accident will be made only by the on-scene Member of the Safety Board or the on-scene Safety Board Office of Public Affairs representative. If neither a Board Member nor a representative of the Office of Public Affairs is available such contacts will only be by the IIC. Contact with the media by party coordinators, NTSB group chairmen, or group members is not authorized and will be grounds for removal of those individuals or organizations from the investigation.

Immediately following each Progress Meeting, the Board Member (or in their absence the IIC or Public Affairs Officer) will fully brief the media on all significant factual information that is presented and confirmed during the Progress Meeting. We reserve the right to hold additional special briefings or media availabilities at any other time during this investigation to release significant information as it is developed.

These news briefings are held because the Safety Board is a public agency conducting the public's business. The Safety Board is best suited to serve as the only source of all information concerning this investigation because our single interest is the pursuit of safety. In this way, other parties with vested interests are discouraged from "leaking" partial information to the media that serves only their own narrow interest. We understand that by releasing factual information in a timely manner, some parties may be adversely affected. Therefore, it is important that if any party questions whether the information shared during the evening Progress Meeting is factual, they should state their concerns at that time - not after the media has been briefed and the stories reported.

If any party has any questions concerning these procedures, please let the Board Member, Public Affairs Officer or the Investigator in Charge know before the next media briefing.

Party coordinators are authorized to allow their public affairs representatives to release general background information about their organization to the news media during the on-scene phase of the investigation. General information such as the number of employees in a company, the numbers and types of aircraft in a fleet, and the like, is releasable. When in doubt about releasing information, contact the IIC or the NTSB Office of Public Affairs representative.

In closing, the guiding policy of the Safety Board regarding release of information may be summarized as follows:

> The Safety Board is a public agency engaged in the public's business and supported by public funds. The work it does in the business of aviation safety is open for public review, and the Act under which it operates makes this mandatory. The Safety Board believes that briefing news media factually during the on-site investigation of an aircraft accident should be a normal operational part of that investigation.

Copies of 49 CFR Part 801, the National Transportation Safety Board's Procedural Regulations regarding public disclosure of aircraft accident information, are available from the IIC for guidance in this matter.

## 7. Assignment and Duties of Group Members

The IIC and group chairmen will assign and organize the various investigating groups. As this is done, please keep in mind that those selected as group members ***should have expertise in their proposed area of investigation and must be prepared to remain with the investigation until completion or until released by the group chairman and the IIC.*** The on-scene phase of an investigation requires the undivided attention of participants for up to two weeks. In extraordinary circumstances, any necessity to move or remove a person from any investigative group must be promptly brought to the attention of the IIC by the respective group chairman or the involved party coordinator. Party coordinators and key party personnel can expect to be involved in the investigation, perhaps intermittently, for between 6 to 9 months or longer.

## 7a. Group Notes

Group notes are a compilation of factual findings discovered by the group during the on scene phase of the investigation. Under the direction of the Safety Board group chairman, one set of group notes will be developed for each group at the accident scene. Depending upon the group, the notes could contain interview summaries, wreckage diagrams, cockpit documentation lists, damaged component descriptions, photographs, video/audio tapes, and the like. Group notes are very important because they are the foundation for the Group Chairman's factual report. They are also important because witness memories can change with time, and the wreckage itself could be altered, if not destroyed, shortly after the on scene phase of the investigation is completed. Therefore, the group notes are the only official representation of conditions immediately after the accident.

Each group member will participate in a complete review of the group notes for technical accuracy and adequacy of the scope of the investigation and to provide feedback to improve the factual report. Before the group members are released, each group member will be given an opportunity to sign the group notes signifying that he/she has reviewed the notes and that any existing discrepancies reflected in these notes have either been corrected, resolved, or annotated as dissenting opinions. Each group member will be provided with a copy of such group notes prior to release from the working group to which he or she is assigned. At a later date, copies of group chairman's final factual report will be provided to the participating group members. Group members will normally be provided an opportunity to comment on the factual reports before they are finalized. It should be understood, however, that the final factual report is the group chairman's responsibility and concurrence by the entire group is not required. Dissenting opinions should be provided to the group chairman.

## 8. Observers

The Safety Board IIC may designate properly accredited members of foreign and domestic governments and designated military personnel as observers to the investigation. The sole purpose of the observer status is for training and familiarization with the investigative process. Observers should not have any self-interest in the investigation, and they will be permitted access to only those portions of the investigation deemed necessary by the IIC. Observer status must be coordinated and approved in advance. Personnel so accepted will be under the direct control of the IIC and will be given factual information on a "need to know

basis." The restrictions concerning dissemination of accident information apply to all observers.

Persons not qualified in the above categories shall not be granted observer status during the on-scene phase of the investigation.

## 9. Accredited Representatives of Foreign Governments

The Accredited Representative of a foreign government and his properly designated advisors will be afforded the courtesies and rights as outlined in Annex 13 to the Convention on International Aviation. The restrictions concerning dissemination of accident information to the public apply to accredited representatives.

## 10. Safety Precautions During the Accident Investigation

Aircraft wreckage sites can be hazardous for many reasons other than the obvious ones of possible adverse terrain and adverse climatic conditions. Personnel involved in the recovery, examination and documentation of wreckage may be exposed to considerable physical hazards posed by such things as flammable and toxic fluids, the likelihood of injury from torn metal or falling objects, and disease. An NTSB group chairman (normally the structures group chairman) will be assigned as the accident site work sequence coordinator. This individual is responsible for wreckage security and site safety. The Safety Board urges everyone to exercise good judgment, utilize available protective devices and clothing, and use extreme caution when working in the wreckage. Most importantly, do not exceed your physical limitations.

In addition, before anyone is allowed to be on the site, the Safety Board, in conjunction with the aircraft operator and appropriate officials, will determine if hazardous materials were carried as cargo on the aircraft. In the event hazardous materials were identified on the flight manifest, decisions must be made regarding the type of material and the actions to be taken to either remove the material or to reduce the risk of contamination or injury must be determined. Once such a determination has been made, work at the site will be permitted.

The wreckage of an airplane involved in an accident may contain bloodborne pathogens. Bloodborne pathogens are microorganisms in human blood that can cause disease in humans. They could include, but are not limited to, hepatitis B

virus (HBV) and the human immunodeficiency virus (HIV), which causes AIDS. These viruses do not die upon contact with oxygen, or when they dry out. Current studies, in fact, show that certain climatic conditions may prolong the infectiousness of HIV. The Safety Board urges anyone who will work on or in the wreckage to use extreme caution concerning bloodborne viruses. At a minimum, heavy leather work gloves over nonpermeable rubber gloves should be worn when touching the wreckage. Under certain conditions, such as enclosed spaces within the wreckage where investigators may be splashed with blood or human remains, particulate masks or full face masks should be worn over the nose and mouth, protective goggles should protect the eyes, and disposable overalls should be worn.

The Safety Board will not assume responsibility for any personal injuries incurred during the course of an investigation by any representative of any organization participating in the investigation as a party, or by an authorized observer. Nor can the Board provide protective equipment to team members. Again, all participants are urged to use extreme care and to provide for their own needs on site. Safety concerns should be promptly expressed to the respective group chairman or the IIC.

## 11. Signing of Attendance Roster

Attendance rosters will be circulated during the organizational meeting and nightly progress meetings held as part of the investigation. Please ensure that you have signed the roster prior to the end of the meeting. ***Please include both local and office phone and fax numbers on the roster. Your signature on the attendance roster of the organizational meeting will signify that you understand and agreed to adhere to the guidelines set forth in this information sheet.*** Failure to do so could lead to dismissal from the team. Copies of the attendance rosters will be distributed to all party coordinators.

## 12. Follow-on Activity Concerning an Investigation

Following the approximate 1 to 2 week on-scene phase of the investigation, a tentative schedule of follow-on events will be established by the IIC. Several of these events are of importance to parties to an NTSB investigation. Items on this schedule include:

a. Work Planning Meeting

This is an internal meeting of the Safety Board Group Chairmen and senior staff, chaired by the IIC. During the work planning meeting the staff decides what remains to be done concerning component teardowns, follow-on interviews with witnesses or survivors, and the like. The report writing schedule is discussed during this meeting.

b. Factual Report Due Date

This date, decided upon during the work planning meeting, is the date the IIC can expect the Group Chairmen to have their final factual reports completed, so he and the report writer, if one is assigned, can begin consolidating the reports into the factual portion of the Board's final report. The non-NTSB investigative group members will have been provided an opportunity to review and comment on the draft factual reports prior to this date.

c. Factual Reports Mailed to Parties

The IIC will approve and mail copies of all the finalized factual reports directly to the coordinators, with some exceptions. If a public hearing is to be held, you will not receive the CVR transcript or other reports that use direct quotes from the CVR recording. By law, these can only be released on the day of the public hearing. Other procedures will apply, concerning CVR related reports, if no public hearing is held. Also, on occasion, some complex reports cannot be completed by the time this initial mass mailing occurs. In these cases, you will receive these additional reports later, but always in time to use them for the public hearing. The reports you receive prior to the hearing are sometimes referred to as hearing exhibits and will be the final, IIC-approved versions. All preliminary or draft versions in your company's possession should be discarded or very clearly marked as drafts, to avoid future confusion. These factual reports and amendments that may be produced later, along with the transcript from the public hearing should be the only basis for your party submissions to the Safety Board. See item I.

d. Prehearing Conference

Parties to the NTSB Public Hearing will attend a prehearing conference held either at the site of the public hearing or in Washington, D.C., about one or two weeks prior to the first day of the public hearing. At this meeting, ground rules for conduct and questioning during the hearing will be outlined. Also, the areas of questioning and the witnesses to be questioned will be discussed. This will be the last opportunity for parties to request that certain areas be explored, certain witnesses be questioned, and new exhibits be included in the record, during the hearing.

e. Public Hearing

An NTSB Public Hearing is another step in the Safety Board's fact gathering process. It is usually held in a city near where the accident occurred and is a proceeding where witnesses are questioned under oath by the NTSB Group Chairmen (called the Technical Panel), and a Board of Inquiry. Each of the party spokesmen is afforded an opportunity to question the witnesses after their initial questioning by the Safety Board technical staff. These witnesses could be FAA policy makers, surviving crewmembers or passengers, air traffic controllers, fire and rescue personnel, manufacturer's design engineers, and the like. The hearing is under the overall direction of the Presiding Officer (an NTSB Board Member). Administrative matters for the hearing are controlled by the NTSB hearing officer who is sometimes, but not always, also the Investigator in Charge of the investigation.

On the morning of the first day of the public hearing, usually a Monday, all the factual reports generated to that date, including the CVR transcript and reports using direct quotes from the CVR recording, are entered into the public docket for this accident. The public docket is the formal collection of documents relating to the investigation, and is open to public review. The CVR information is also released to the party spokesmen at that time. Generally, no witnesses related to CVR information are questioned on this first day, so that the parties will have time to fold CVR information into their lines of questioning of the witnesses. Sometimes, witnesses

dealing with issues not pertinent to CVR information (rescue personnel, for example) are heard on the first day.

Also during this session, the Presiding Officer reads an opening statement concerning hearing protocol and the Investigator in Charge also reads a statement concerning facts gathered to date into the public record.

Since this will be the first opportunity for the media to have access to written factual information concerning the accident, parties should be prepared for press inquiries. The CVR transcript often becomes the focus of their interest and crew comments in that transcript are often taken out of context. As always, the NTSB is prepared to field any or all press questions, but the hard and fast rule on media contact that the Board enforced on-scene no longer applies. In other words, since the factual reports have been released, if a party feels a need to talk to reporters, the NTSB would not object to the disclosure of accurate information of a factual nature.

The remainder of the three or four days of the hearing is used to question witnesses. Depending upon the complexity of their testimony, five to seven witnesses are questioned each day. Testimony and statements during the hearing are transcribed by a court reporter and transcripts can be obtained from the court reporter about one month after the hearing.

Parties to the public hearing will receive further information from the hearing officer once the decision to hold a hearing is made.

f. Report Outline Issued

The IIC and the report writer will make up a detailed report outline for the entire consolidated final report soon after the public hearing. It is for our internal use, to ensure that no issues are left out.

g. Report Planning Meeting

This is an internal meeting to discuss and modify the aforementioned report outline, if required.

h. Analytical Report Due Date

This is the date that the Group Chairmen have agreed to furnish the IIC with their analysis of the facts they have gathered in their areas of expertise. The parties may have input to the analytical reports via their continued contact with the NTSB Group Chairmen and the IIC. The parties may also have input to the Safety Board's analytical process through the "party submissions" (see explanation below). However, the analytical reports themselves are for Safety Board use and will not be released to the parties or the public. As with the factual reports, the IIC and the report writer will consolidate the analytical reports in the final version of the report of the investigation.

i. Party Recommendations as to Findings, Recommendations and Probable Cause (Party Submissions)

Any party to the investigation is encouraged to submit to the Safety Board written recommendations as to the proper findings and conclusions to be drawn from the evidence produced during the course of the investigation (see 49 CFR 831.14). The Safety Board believes that, after the completion of the investigative activities relating to the accident and before determination of probable cause is made, it is the responsibility of each party to the investigation to make known to the Safety Board its interpretation of the findings and conclusions to be drawn from the evidence. If a party chooses to furnish the Safety Board with a submission, that party must also concurrently provide copies of the submission to the other parties to the investigation. The party submissions become part of the public docket of the investigation.

***Submissions will be due to the IIC within 30 days after the copies of the public hearing transcript become available, or on a date selected by the IIC if no hearing is held.*** These party submissions

are extremely important because they are the only way the parties can officially inform the IIC, report writer, the senior NTSB staff, and the Board Members of their beliefs and opinions concerning the accident issues.

There is no set format for party submissions. Some parties simply write a letter expressing their views. Others follow the NTSB report format. The choice is up to the party, and the choice to submit something is voluntary. ***Please contact the IIC if you have any questions concerning the party submission process.***

j. Technical Review Meeting

The parties to the investigation may be invited to an optional technical review meeting in Washington, D.C. NTSB personnel who attend this meeting are the Investigator in Charge, the Group Chairmen, and mid level NTSB supervisors. Only party coordinators and party specialists assigned to investigative groups may attend. Each factual report written by the Group Chairmen will be offered up for final technical review. The goal here is to make sure that each factual report is accurate and complete. Grammatical editing, the tone or style of the reports, and the like, are not the focus of this meeting.

For accident investigation of lesser scope, the parties may be invited to review the first draft of the factual section of the final investigation report through the mail. In this case, this review will serve as the technical review by parties to the investigation.

k. Initial Draft Distributed

The IIC will distribute an internal initial draft of the entire report to the group chairmen and mid-level NTSB supervisors for their review and comments. The entire document is not made available to the parties; however, the factual portion of the report may be made available. See section (j.) above.

l. Director's Draft Distribution

After comments and corrections from the group chairmen (and appropriate party analysis through their submissions to the Safety Board) have been added to the initial draft, it becomes the Director's draft. This internal draft is then given to the Directors of our Office of Aviation Safety, Office of Safety Recommendations, Office of Research and Engineering, General Counsel, and the NTSB Managing Director, for their comments and corrections.

m. Director's Review Meeting

Once they have finished their review of the Director's draft, the NTSB office Directors will schedule an internal meeting to discuss report content, organization, and the like. It is a closed meeting for the NTSB senior staff.

n. Notation Draft Distribution

The internal notation draft is the final version of the report that is presented to the five Presidential appointees that are the Safety Board. They then review the draft for several weeks in preparation for the Board Meeting.

o. Board Meeting

Following review of the report by the Board Members, a public Board Meeting will be held in Washington D.C. This is sometimes referred to as the "Sunshine Meeting." The NTSB staff (the IIC, the group chairmen and others) will present and comment on the report before the Board. Party representatives are welcome to observe this meeting. However, all dialogue is between the NTSB staff and the Board Members.

At this meeting the Board may require further investigation or rewriting before approving the report; they may adopt the report in its entirety; or they may adopt it with changes that are discussed during the meeting. After considering the accident report, the

Members will discuss and vote on the findings, recommendations, and the probable cause of the accident. Media representatives will be present at this meeting and usually conduct interviews after the meeting.

As soon as possible after the meeting, usually within an hour, the Board's Office of Public Affairs releases the last few pages of the report that was just adopted, with changes made during the meeting. These pages contain the Board's conclusions, probable cause and safety recommendations. Parties can be expected to be questioned on this material by the press that day.

Once changes decided upon during the Board Meeting are included in the report, a camera-ready copy is sent to the printer. Bound copies become available about three weeks after that. The publishing of the final report is normally the final step in the NTSB investigative process.

p. Request for Reconsideration of Probable Cause

Although the publishing of a final report is the final step in the investigative process, NTSB investigations are never formally closed. Parties to our investigations can petition the Board to reconsider and modify the findings and probable cause of an accident for two reasons:

- The party believes the Board's finding are erroneous, and the Board made a mistake in its analysis during its original assessment of probable cause.

- The party discovers new evidence that would require modification of the original findings and probable cause.

Parties can petition the Board to reconsider the findings and probable cause at any time after the Board Meeting. Lastly, petitions for reconsideration from parties that do not offer up submissions to the Safety Board during the investigation will not be entertained.

# APPENDIX A

## TITLE 49 - TRANSPORTATION
## CHAPTER VIII - NATIONAL TRANSPORTATION SAFETY BOARD

## AMENDED: JUNE 21, 1989

## PART 830-NOTIFICATION AND REPORTING OF AIRCRAFT ACCIDENTS OR INCIDENTS AND OVERDUE AIRCRAFT, AND PRESERVATION OF AIRCRAFT WRECKAGE, MAIL, CARGO, AND RECORDS



Authority: 49 U.S.C. 1441 and 1901 et seq.

## Subpart A-General

### §830.1 Applicability.

This part contains rules pertaining to:

(a) Notification and reporting aircraft accidents and incidents and certain other occurrences in the operation of aircraft when they involve civil aircraft of the United States wherever they occur, or foreign civil aircraft when such events occur in the United States, its territories or possessions.

(b) Reporting aircraft accidents and listed incidents in the operation of aircraft when they involve certain public aircraft.

(c) Preservation of aircraft wreckage, mail, cargo, and records involving all civil aircraft in the United States, its territories or possessions.

### §830.2 Definitions.

As used in this part the following words or phrases are defined as follows:

"Aircraft accident" means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage.

"Civil aircraft" means any aircraft other than a public aircraft.

"Fatal injury" means any injury which results in death within 30 days of the accident.

"Incident" means an occurrence other than an accident associated with the operation of an aircraft, which affects or could affect the safety of operations.

"Operator" means any person who causes or authorizes the operation of an aircraft, such as the owner, lessee, or bailee of an aircraft.

"Public aircraft" means an aircraft used exclusively in the service of any government or of any political subdivision thereof, including the government of any State, Territory, or possession of the United States, or the District of Columbia, but not including any government-owned aircraft engaged in carrying persons or property for commercial purposes. For purposes of this section "used exclusively in the service of" means, for other than the Federal Government, an aircraft which is owned and operated by a governmental entity for other than commercial purposes or which is exclusively leased by such governmental entity for not less than 90 continuous days.

"Serious injury" means any injury which: (1) Requires hospitalization for more than 48 hours, commencing within 7 days from the date of the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ; or (5) involves second-or third-degree burns, or any burns affecting more than 5 percent of the body surface.

"Substantial damage" means damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage" for the purpose of this part.

## Subpart B-Initial Notification of Aircraft Accidents, Incidents and Overdue Aircraft

### §830.5 Immediate notification.

The operator of an aircraft shall immediately, and by the most expeditious means available, notify the nearest National Transportation Safety Board (Board) field office when:

(a) An aircraft accident or any of the following listed incidents occur:

(1) Flight control system malfunction or failure;

(2) Inability of any required flight crewmember to perform normal flight duties as a result of injury or illness;

(3) Failure of structural components of a turbine engine excluding compressor and turbine blades and vanes;

(4) In-flight fire;

(5) Aircraft collide in flight.

(6) Damage to property, other than the aircraft, estimated to exceed $25,000 for repair (including materials and labor) or fair market value in the event of total loss, whichever is less.

(7) For large multiengine aircraft (more than 12,500 pounds maximum certificated takeoff weight):

(I) In-flight failure of electrical systems which requires the sustained use of an emergency bus powered by a back-up source such as a battery, auxiliary power unit, or air-driven generator to retain flight control or essential instruments;

(ii) In-flight failure of hydraulic systems that results in sustained reliance on the sole remaining hydraulic or mechanical system for movement of flight control surfaces;

(iii) Sustained loss of the power or thrust produced by two or more engines; and

(iv) An evacuation of aircraft in which an emergency egress system is utilized.

(b) An aircraft is overdue and is believed to have been involved in an accident.

**§830.6 Information to be given in notification.**

The notification required in 830.5 shall contain the following information, if available:

(a) Type, nationality, and registration marks of the aircraft;

(b) Name of owner, and operator of the aircraft;

(c) Name of the pilot-in-command;

(d) Date and time of the accident;

(e) Last point of departure and point of intended landing of the aircraft;

(f) Position of the aircraft with reference to some easily defined geographical point;

(g) Number of persons aboard, number killed, and number seriously injured;

(h) Nature of the accident, the weather and the extent of damage to the aircraft, so far as is known; and

(I) A description of any explosives, radioactive materials, or other dangerous articles carried.

**Subpart C-Preservation of Aircraft Wreckage, Mail, Cargo, and Records**

**§830.10 Preservation of aircraft wreckage, mail, cargo, and records.**

(a) The operator of an aircraft involved in an accident or incident for which notification must be given is responsible for preserving to the extent possible any aircraft wreckage, cargo, and mail aboard the aircraft, and all records, including all recording mediums of flight, maintenance, and voice recorders, pertaining to the operation and maintenance of the aircraft and to the airmen until the Board takes custody thereof or a release is granted pursuant to 831.12(b) of this chapter.

(b) Prior to the time the Board or its authorized representative takes custody of aircraft wreckage, mail, or cargo, such wreckage, mail, or cargo may not be disturbed or moved except to the extent necessary:

(1) To remove persons injured or trapped;
(2) To protect the wreckage from further damage; or
(3) To protect the public from injury.

(c) Where it is necessary to move aircraft wreckage, mail or cargo, sketches, descriptive notes, and photographs shall be made, if possible, of the original positions and condition of the wreckage and any significant impact marks.

(d) The operator of an aircraft involved in an accident or incident shall retain all records, reports, internal documents, and memoranda dealing with the accident or incident, until authorized by the Board to the contrary.

**Subpart D-Reporting of Aircraft Accidents, Incidents, and Overdue Aircraft**

**§830.15 Reports and statements to be filed.**

(a) Reports. The operator of an aircraft shall file a report on Board Form 6120.1 (OMB No. 3147-005) or Board Form 6120.2 (OMB No. 3147-0001) within 10 days after an accident, or after 7 days if an overdue aircraft is still missing. A report on an incident for which notification is required by 830.5(a) shall be filed only as requested by an authorized representative of the Board.

(b) Crewmember statement. Each crewmember, if physically able at the time the report is submitted, shall attach a statement setting forth the facts, conditions, and circumstances relating to the accident or incident as they appear to him. If the crewmember is incapacitated, he shall submit the statement as soon as he is physically able.

(c) Where to file the reports. The operator of an aircraft shall file any report with the field office of the Board nearest the accident or incident.

**Subpart E-Reporting of Public Aircraft Accidents and Incidents**

**§830.20 Reports to be filed.**

The operator of a public aircraft other than an aircraft of the Armed Forces or Intelligence Agencies shall file a report on NTSB Form 6120.1 (OMB No. 3147-001) within 10 days after an accident or incident listed in 830.5(a). The operator shall file the report with the filed office of the Board nearest the accident or incident.

Signed at Washington, DC, on this 16th day of September 1988.

James L.Kolstad,
Acting Chairman

National Transportation Safety Board field offices are listed under U.S. Government in the telephone directories in the following cities: Anchorage, Alaska; Atlanta Ga.; Chicago, Ill.; Denver, Colo.; Fort Worth, Tex.; Kansas City, Mo.; Los Angeles, Calif.; Miami, Fla.; New York, N.Y.; Seattle, Wash.

Forms are available from the Board field offices, the NTSB, Washington, DC 20594, and the FAA, Flight Standards District Office.

# APPENDIX B

# TITLE 49-TRANSPORTATION
# CHAPTER VIII-NATIONAL TRANSPORTATION SAFETY BOARD

## EFFECTIVE: JUNE 3, 1988

## PART 831 - ACCIDENT/INCIDENT INVESTIGATION PROCEDURES

Sec.



**Authority. Title VII, Federal Aviation Act of 1958, as amended, 72 Stat. 781, as amended by 76 Stat. 921 (49 U.S.C. 1441 et seq.); and the Independent Safety Board Act of 1974, Pub. L. 93-633, 88 Stat. 2166 et seq., as amended by 95 Stat. 1065 (49 U.S.C. 1901 et seq.).**

### §831.1 Applicability of part.

Unless otherwise specifically ordered by the National Transportation Safety Board (Board), the provisions of this part shall govern all accident or incident investigations, conducted under the authority of title VII of the Federal Aviation Act of 1958, as amended, and the Independent Safety Board Act of 1974. Rules applicable to accident hearings and reports are set forth in Part 845.

**831.2 Responsibility of Board.**

(a) *Aviation.* (1) The Board is responsible for the organization, conduct and control of all accident investigations involving civil aircraft, or civil and military aircraft, within the United States, its territories and possessions. It is also responsible for investigation of accidents which occur outside the United States, and which involve U.S. civil aircraft or civil and military aircraft, at locations determined to be not in the territory of another state (i.e., in international waters).

(2) Certain aviation field investigations are conducted by the Federal Aviation Administration (FAA), pursuant to a request to the Secretary of the Department of Transportation, effective February 10, 1977 (see appendix to Part 800 of this chapter),[2] but the Board determines the probable cause of such accidents. Under no circumstances shall investigations conducted by the Board be considered joint investigations in the sense of sharing responsibility. However, in the case of an accident or incident involving civil aircraft of U.S. registry or manufacture in a foreign state which is a signator to Annex 13 to the Chicago Convention of the International Civil Aviation Organization, the state of occurrence is responsible for the investigation. If it occurs in a foreign state which is not bound by the provisions of Annex 13 to the Chicago Convention, the conduct of the investigation shall be in consonance with any agreement entered into between the United States and the foreign state.

(b) *Surface.* The Board is responsible for the investigation of railroad accidents in which there is a fatality, substantial property damage, or which involve a passenger train (see Part 840 of this chapter); major marine casualties and marine accidents involving a public and nonpublic vessel or involving Coast Guard functions (see Part 850 of this Chapter); highway accidents, including railroad grade-crossing accidents which it selects in cooperation with the States: and pipeline accidents in which there is a fatality or substantial property damage.

(c) *Other Accident.* The Board is also responsible for the investigation of an accident which occurs in connection with the transportation of people or property which in the judgment of the Board, is catastrophic, involves problems of a

[2]The authority of a representative of the Federal Aviation Administration during such field investigations shall be the same as that of a Board investigator under this part.

recurring character,or would otherwise carry out the policy of the Independent Safety Board Act of 1974.

### §831.3 Authority of Directors.

The Director, Bureau of Accident Investigation, or the Director, Bureau of Field Operations, subject to the provisions of 831.2, may order an investigation into any accident or incident.

### §831.4 Nature of investigation.

Accident or incident investigations are conducted by the Board in order to determine the facts, conditions, and circumstances relating to each accident or incident and the probable cause thereof and to ascertain measures which will best tend to prevent similar accidents or incidents in the future. The investigation includes the field investigation, report preparation, and, where ordered, the public hearing. Accident investigations are factfinding proceedings with no formal issues and no adverse parties and are not subject to the provisions of the Administrative Procedure Act (Pub. L. 89-554, 80 Stat. 384 (5 U.S.C. 554 et seq.)) Such investigations are not conducted for the purpose of determining the rights or liabilities of any person.

### 831.5 Priority of Board Investigations.

Any investigation of an accident (except marine)[3] conducted by the Safety Board shall have priority over all other investigations of such accident conducted by other Federal agencies. The Safety Board shall provide for the appropriate participation by other Federal agencies in any such investigation, except that such agencies may not participate in the Safety Board's determination of the probable cause of the accident. Nothing in this section impairs the authority of other Federal agencies to conduct investigations of an accident under applicable provisions of law or to obtain information directly from parties involved in, and witnesses to, the transportation accident. The Safety Board and other Federal agencies shall assure that appropriate information obtained or developed in the course of their investigations is exchanged in a timely manner.

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[3]The joint regulations of the Board and Coast Guard for the investigation of marine casualties are set forth in Part 850 of this chapter.

**831.6 Request to withhold information.**

Any person may make written objection to the public disclosure of information contained in any report or document filed, or of information obtained by the Board, stating the grounds for such objection. The Board, on its own initiative or if such objection is made, may order such information withheld from public disclosure when, in its judgment, the information can be withheld under the provisions of an exemption to the Freedom of Information Act (Pub. L. 93-502, amending 5 U.S.C. 552) and its release is not found to be in the public interest (see Part 801).

**§831.7 Right of representation.**

Any person interrogated by an authorized representative of the Board during the field investigation shall be accorded the right to be accompanied, represented, or advised by counsel or by any other duly qualified representative.

**831.8 Investigator-in-charge.**

The designated investigator-in-charge organizes, conducts, and controls the field phase of investigation. He shall assume responsibility for the supervision and coordination of all resources and of the activities of all personnel, both Board and non-Board, involved in the onsite investigation.

**831.9 Authority of Board representatives.**

(a) General. Any employee of the Board, upon presenting appropriate credentials is authorized to enter any property wherein a transportation accident has occurred or wreckage from any such accident is located and do all things necessary for proper investigation.

Upon demand of an authorized representative of the Board and presentation of credentials issued to such representative, any Government agency, or person having possession or control of any transportation vehicle or component thereof, any facility, equipment, process or controls, relevant to the investigation, or any pertinent records and memoranda, including all files, hospital records, and correspondence now or hereafter existing and kept or required to be kept, shall forthwith permit inspection, photographing, or copying thereof by such authorized representative for the purpose of investigating an aircraft accident/incident, other

accident, overdue aircraft, study, or investigation pertaining to safety or the prevention of accidents. Authorized representatives of the Board may interrogate any person having knowledge relevant to an aircraft accident/incident, overdue aircraft, study, or special investigation.

(b) *Aviation.* Any employee of the Board upon presenting appropriate credentials is authorized to examine and test to the extent necessary any civil aircraft, aircraft engine, propeller, appliance, or property aboard an aircraft involved in an accident in air commerce.

(c) *Surface.* (1) Any employee of the Board, upon presenting appropriate credentials, is authorized to test or examine any vehicle, vessel, rolling stock, track, pipeline component, or any part of such item when such examination or testing is determined to be required for purposes of such investigation.

(2) Any examination or testing shall be conducted in such a manner so as not to interfere with or obstruct unnecessarily the transportation services provided by the owner or operator of such vehicle, vessel, rolling stock, track, or pipeline component, and shall be conducted in such a manner so as to preserve, to the maximum extent feasible, any evidence relating to the transportation accident, consistent with the needs of the investigation and with the cooperation of such owner or operator.

**§831.10 Autopsies.**

The Board is authorized to obtain with or without reimbursement, a copy of the report of autopsy performed by State or local officials on any person who dies as a result of having been involved in a transportation accident within the jurisdiction of the Board. The investigator-in-charge, on behalf of the Board, may order an autopsy or seek other tests of such persons as may be necessary to the investigation, provided that to the extent consistent with the needs of the accident investigation, provisions of local law protecting religious beliefs with respect to autopsies shall be observed.

**§831.11 Parties to the field investigation.**

(a) The investigator-in-charge may, on behalf of the Director, Bureau of Accident Investigation, or the Director, Bureau of Field Operations, designate parties to participate in the field investigation. Parties to the field investigation shall

be limited to those persons, government agencies, companies, and associations whose employees, functions, activities, or products were involved in the accident or incident and who can provide suitable qualified technical personnel to actively assist in the field investigation.

(b) Participants in the field investigation shall be responsive to the direction of the appropriate Board representative and may be relieved from participation if they do not comply with their assigned duties or if they conduct themselves in a manner prejudicial to the investigation.

(c) No party to the field investigation designated under 831.11(a) shall be represented by any person who also represents claimants or insurers. Failure to comply with this provision shall result in loss of status as a party.

(d) Section 701(g) of the Federal Aviation Act of 1958, as amended, provides for the appropriate participation of the Administrator in Board investigations, and section 304(a) of the Independent Safety Board Act of 1974, as amended, provides for the appropriate participation of other Federal agencies in Board investigations. Thus, components of the Department of Transportation, and, when appropriate, other Federal agencies, will normally be a party to field investigations and will have the same rights and privileges and be subject to the same limitations as other parties.

**§831.12 Access to and release of wreckage, records, mail, and cargo.**

(a) Only the Board's accident investigation personnel and persons authorized by the investigator-in-charge, the Director, Bureau of Accident Investigation, or the Director, Bureau of Field Operations to participate in any particular investigation, examination or testing shall be permitted access to wreckage, records, mail, or cargo which is in the Board's custody.

(b) Wreckage, records, mail, and cargo in the Board's custody shall be released by an authorized representative of the Board when it is determined that the Board has no further need of such wreckage, mail, cargo, or records.

**831.13 Flow and dissemination of accident information.**

(a) Release of information during the field investigation, particularly at the accident scene, shall be limited to factual developments, and shall be made only

through the Board Member present at the accident scene, the representative of the Board's Office of Public Affairs, or the investigator-in-charge.

(b) All information concerning the accident or incident obtained by any personnel participating in the field investigation shall be passed to the investigator in charge, through appropriate channels. Upon approval of the investigator in charge, parties to the investigation may relay to their respective organization information which is necessary for purposes of prevention or remedial action. Under no circumstances shall accident information be released to, or discussed with, unauthorized persons whose knowledge thereof might adversely affect the investigation.

**§831.14 Proposed findings.**

Any person, Government agency, company, or association whose employees, functions, activities, or products were involved in an accident under investigation may submit to the Board, prior to itsconsideration of probable cause, proposed findings to be drawn from the evidence produced during the course of the accident investigation, a proposed probable cause, and proposed safety recommendations designed to prevent future accidents.

Signed at Washington DC on this 12th day of April, 1988.

Jim Burnett
Chairman

# APPENDIX C

## TITLE 49 - TRANSPORTATION
## CHAPTER VIII - NATIONAL TRANSPORTATION SAFETY BOARD

## EFFECTIVE: MARCH 3, 1986

## PART 845- RULES OF PRACTICE IN TRANSPORTATION: ACCIDENT/INCIDENT HEARINGS AND REPORTS

Sec.

**Subpart C-Board Reports**



**Subpart D-Public Record**



**Authority: Sec. 304(b) of the Independent Safety Board Act of 1974. Pub. L. 93-633;88 Stat. 2169 (49 U.S.C. 1903(b)).**

**§845.1 Applicability.**

Unless otherwise specifically ordered by the National Transportation Safety Board (Board), the provisions of this part shall govern all transportation accident investigation hearings conducted under the authority of section 304(b) of the Independent Safety Board Act of 1974 (49 U.S.C. 1903(b) and accident reports issued by the Board.

**§845.2 Nature of hearing.**

Transportation accident hearings are convened to assist the Board in determining cause or probable cause of an accident, in reporting the facts, conditions, and circumstances of the accident, and in ascertaining measures which will tend to prevent accidents and promote transportation safety. Such hearings are factfinding proceedings with no formal issues and no adverse parties and are not subject to the provisions of the Administrative Procedure Act (Pub. L. 89-554, 80 Stat. 384 (5 U.S.C. 554)).

**§845.3 Sessions open to public.**

(a) All hearings shall normally be open to the public (subject to the provision that any person present shall not be allowed at any time to interfere with the proper and orderly functioning of the board of inquiry).

(b) Sessions shall not be open to the public when evidence of a classified nature or which affects national security is to be received.

**Subpart A-Initial Procedure**

**§845.10 Determination to hold hearing.**

The Board may order a public hearing as part of an accident investigation whenever such hearing is deemed necessary in the public interest: Provided that if a quorum of the Board is not immediately available in the event of a catastrophic accident, the determination to hold a public hearing may be made by the Chairman of the Board.

**§845.11 Board of inquiry.**

The board of inquiry shall consist of a Member of the Board who shall be chairman of the board of inquiry, and such other employees as may be designated by the chairman of the board of inquiry. Assignment of a Member to serve as the chairman of each board of inquiry shall be determined by the Board. The board of inquiry shall examine witnesses and secure, in the form of a public record, all known facts pertaining to the accident or incident and surrounding circumstances and conditions from which cause or probable cause may be determined and recommendations for corrective action may be formulated.

**§845.12 Notice of hearing.**

The chairman of the board of inquiry shall designate a time and place for the hearing which meets the needs of the Board. Notice to all known interested persons shall be given.

**§854.13 Designation of parties.**

(a) The chairman of the board of inquiry shall designate as parties to the hearing those persons, agencies, companies, and associations whose participation in the hearing is deemed necessary in the public interest and whose special knowledge will contribute to the development of pertinent evidence. Parties shall be represented by suitable qualified technical employees or member who do not occupy legal positions.

(b) No party, shall be represented by any person who also represents claimants or insurers. Failure to comply with this provision shall result in loss of status as a party.

## Subpart B-Conduct of Hearing

### §845.20 Powers of chairman of board of inquiry.

The chairman of the board of inquiry, or his designee, shall have the following powers:

(a) To designate parties to the hearing and revoke such designations;

(b) To open, continue, or adjourn the hearing;

(c) To determine the admissibility of and to receive evidenceand to regulate the course of the hearing;

(d) To dispose of procedural requests or similar matters; and

(e) To take any other action necessary or incident to the orderly conduct of the hearing.

### §845.21 Hearing officer.

The hearing officer, upon designation by the Chairman of the Board, shall have the following powers:

(a) To give notice concerning the time and place of hearing;

(b) To administer oaths and affirmations to witnesses; and

(c) To issue subpoenas requiring the attendance and testimony of witnesses and production of documents.

### §845.22 Technical panel.

The Director, Bureau of Accident Investigation, or the Director, Bureau of Field Operations, shall designate members of the Board's technical staff to participate in the hearing and initially develop the testimony of witnesses.

**§845.23 Prehearing conference.**

(a) Except as provided in paragraph (d) of this section for expedited hearings, the chairman of the board of inquiry shall hold a prehearing conference with the parties to the hearing at a convenient time and place prior to the hearing. At such prehearing conference, the parties shall be advised of the witnesses to be called at the hearing, the areas in which they will be examined, and the exhibits which will be offered in evidence.

(b) Parties shall submit at the prehearing conference copies of any additional documentary exhibits they desire to offer. (Copies of all exhibits proposed for admission by the board of inquiry and the parties shall be furnished to the board of inquiry and to all parties, insofar as available at that time.)

(c) A party who, at the time of the prehearing conference, fails to advise the chairman of the board of inquiry of additional exhibits he intends to submit, or additional witnesses he desires to examine, shall be precluded from introducing such evidence unless the chairman of the board of inquiry determines for good cause shown that such evidence should be admitted.

(d) Expedited hearings. When time permits, the chairman of the board of inquiry may hold a prehearing conference. In the event that an expedited hearing is held, the requirements in paragraphs (b) and (c) of this section concerning the identification of witnesses, exhibits or other evidence may be waived by the chairman of the board of inquiry.

**§845.24 Right of representation.**

Any person who appears to testify at a public hearing shall be accorded the right to be accompanied, represented, or advised by counsel or by any other duly qualified representative.

**§845.25 Examination of witnesses.**

(a) Witnesses shall be initially examined by the board of inquiry or its technical panel. Following such examination, parties to the hearing shall be given the opportunity to examine such witnesses.

(b) Materiality, relevancy, and competency of witness testimony, exhibits, or physical evidence shall not be the subject of objections in the legal sense by a party to the hearing or any other person. Such matters shall be controlled by rulings of the chairman of the board of inquiry on his own motion. If the examination of a witness by a party is interrupted by a ruling of the chairman of the board of inquiry, opportunity shall be given to show materiality, relevancy, or competency of the testimony or evidence sought to be elicited from the witness.

**§845.26 Evidence.**

The chairman of the board of inquiry shall receive all testimony and evidence which may be of aid in determining the cause of accident. He may exclude any testimony or exhibits which are not pertinent to the investigation or are merely cumulative.

**§845.27 Proposed findings.**

Any party may submit proposed findings to be drawn from the testimony and exhibits, a proposed probable cause, and proposed safety recommendations designed to prevent future accidents. The proposals shall be submitted within the time specified by the presiding officer at the close of the hearing, and shall be made a part of the public docket. Parties to the hearing shall serve copies of their proposals on all other parties to the hearing.

**§845.28 Stenographic transcript.**

A verbatim report of the hearing shall be taken. Copies of the transcript may be obtained by any interested person from the Board or from the court reporting firm preparing the transcript upon payment of the fees fixed therefor. (See Part 801, Appendix-Fee Schedule.)

**§845.29 Payment of witnesses.**

Any witness subpoenaed to attend the hearing under this part shall be paid such fees for his travel and attendance as shall be certified by the hearing officer.

**Subpart C-Board Reports**

**§845.40 Accident report.**

(a) The Board will issue a detailed narrative accident report in connection with the investigation into those accidents which the Board determines to warrant such a report. The report will set forth the facts, conditions and circumstances relating to the accident and the probable cause thereof, along with any appropriate recommendations formulated on the basis of the investigation.

(b) The probable cause and facts, conditions, and circumstances of all other accidents will be reported in a manner and form prescribed by the Board.

**§845.41 Petitions for reconsideration or modification.**

(a) Petitions for reconsideration or modification of the Board's findings and determination of probable cause filed by a party to an investigation or hearing or other person having a direct interest in the accident investigation will be entertained only if based on the discovery of new evidence or on a showing that the Board's findings are erroneous. The petitions shall be in writing. Petitions which are repetitious of proposed findings submitted pursuant to 845.27, or of positions previously advanced, and petitions filed by a party to the hearing who failed to submit proposed findings pursuant to 845.27 will not be entertained. Petitions based on the discovery of new matter shall: identify the new matter; contain affidavits of prospective witnesses, authenticated documents, or both, or an explanation of why such substantiation is unavailable; and state why the new matter was not available prior to Board's adoption of its findings. Petitions based on a claim of erroneous findings shall set forth in detail the grounds relied upon.

(b) When a petition for reconsideration or modification is filed with the Board, copies of the petition and any supporting documentation shall be served on all other parties to the investigation or hearing and proof of service shall be attached to the petition. The other parties may file comments no later than 90 days after service of the petition.

(c) Oral presentation before the Board normally will not form a part of proceedings under this part. However, the Board may permit oral presentation where a party or interested person makes an affirmative showing that the written petition for reconsideration or modification is an insufficient means to present the

party's or person's position to the Board. Where oral presentation is allowed, the Board will specify the issues to be addressed and all parties to the investigation or hearing will be given notice and the opportunity to participate.

**Subpart D-Public Record**

**§845.50 Public docket.**

(a) The public docket shall include all factual information concerning the accident. Proposed findings submitted pursuant to 831.12 or 845.27 and petitions for reconsideration and modification submitted pursuant to 845.41, comments thereon by other parties, and the Board's rulings, shall also be placed in the public docket.

(b) The docket shall be established as soon as practicable following the accident, and material shall be added thereto as it becomes available. Where a hearing is held, the exhibits will be introduced into the record at the hearing.

(c) A copy of the docket shall be made available to any person for review at the Washington office of the Board. Copies of the material in the docket may be obtained, upon payment of the cost of reproduction, from the Public Inquiries Section, Bureau of Administration, National Transportation Safety Board, Washington, D.C. 20594.

**§845.51 Investigation to remain open.**

Accident investigations are never officially closed but are kept open for the submission of new and pertinent evidence by any interested person. If the Board finds that such evidence is relevant and probative, it shall be made a part of the docket and, where appropriate, parties will be given an opportunity to examine such evidence and to comment thereon.

## APPENDIX D

## STATEMENT OF PARTY REPRESENTATIVES TO NTSB INVESTIGATION

Aircraft Identification:

Registration Number _____
Make and Model _____
Location _____
Date _____

The undersigned hereby acknowledge that they are participating in the above-referenced aircraft accident field investigation (including any component tests and teardowns or simulator testing) on behalf of the party indicated adjacent to their name, for the purpose of providing technical assistance to the National Transportation Safety Board.

The undersigned further acknowledge that they have read the attached copy of 49 CFR Part 831 and have familiarized themselves with 49 CFR 831.11, which governs participation in NTSB investigations and agree to abide by the provisions of this regulation.

It is understood that a party representative to an investigation may not be a person who also represents claimants or insurers. The placement of a signature hereon constitutes a representation that participation in this investigation is not on behalf of either claimants or insurers and that, while any information obtained may ultimately be used in litigation, participation is not for the purposes of preparing for litigation.

By placing their signatures hereon all participants agree that they will neither assert nor permit to be asserted on their behalf, any privilege in litigation, with respect to information or documents obtained during the course of and as a result of participation in the NTSB investigation as described above. It is understood, however, that this form is not intended to prevent the undersigned from participating in litigation arising out of the accident referred to above or to require disclosure of the undersigned's communications with counsel.

| SIGNATURE | NAME (Printed) | PARTY | DATE |
| --- | --- | --- | --- |
| _____ | _____ | _____ | _____ |
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