Air Traffic Services Investigation Guidelines

ISASI

"Air Safety through Investigation"

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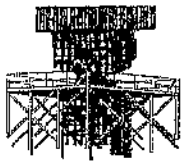
INTERNATIONAL SOCIETY OF AIR SAFETY INVESTIGATORS

BRIEFING PAPER

Air Traffic Services Investigation Guidelines

ISASI Briefing Papers are documents developed by the Working Groups and approved by the ISASI council. They are intended to provide guidance to personnel and organisations on the technical aspects of air safety investigation and may contain ISASI policy relating to air safety investigation.



AIR TRAFFIC SERVICES
GUIDANCE NOTES FOR INVESTIGATORS

International Society of Air Safety Investigators
Air Traffic Services Working Group
April 1997

EXECUTIVE SUMMARY:

This document was developed by the Air Traffic Services Working Group (ATSWG) of the International Society of Air Safety Investigators (ISASI). The Air Traffic Services (ATS) system is, by definition, a service-oriented process. Its purpose is to prevent collisions between aircraft, prevent collisions between aircraft and obstructions on the maneuvering area, to expedite and maintain an orderly flow of air traffic, to provide information useful for the safe and efficient conduct of flights, and to alert appropriate organizations of aircraft in need of search and rescue assistance.

The purpose of this document is to assist in the identification and training of the ATS investigator, identification of potential ATS issues, and ultimately the development of a formal report and safety recommendations associated with the investigation of the ATS system performance in the aftermath of an air safety occurrence.

When used in conjunction with applicable ICAO procedures, and combined with national and local supplements to support or enhance those international procedures, this guidance should provide the basis for a comprehensive and complete investigation of ATS issues. The ATS investigation should address all aeronautical and operational information services obtained from, and delivered by, commercial providers.

The document is not intended to be all-inclusive for all ATS investigations, as it recognized that each investigation might provide issues which in and of themselves are unique. Nor does it ensure that the conduct of the investigation will be completely objective, as it is subject to that investigator's training and potential personal prejudices. The format of this document was designed to permit expansion and amplification of those areas applicable to each individual user.

THE LEGAL ASPECTS OF ATS INVESTIGATION:

The International Civil Aviation Organization's Standards and Recommended Practices for Aircraft Accident and Incident Investigation are published in Annex 13 to the Convention on International Civil Aviation.

The Contracting States then incorporate those parts of the process into their own legislation as they consider appropriate but are required to notify differences between the national regulations and practices, and the corresponding International Standards in Annex 13. States are invited to extend the notification process to any differences from Recommended Practices.
It is vitally important that investigators are aware of the contents of Annex 13 and of the national regulations and practices that apply prior to the investigation of any accident or incident.

The sole objective of the investigation of any accident or incident under the Annex shall be the prevention of further accidents and incidents. It is not the purpose of this activity to apportion blame or liability. It should be borne in mind, however, that any accident or incident might lead to criminal or civil legal proceedings, instigated by others.

Investigators working under the provisions of Annex 13 should be aware that their actions and subsequent reports might come under the scrutiny of any number of legal authorities and other interested parties. Investigators should therefore be prepared to be called to testify to any legal proceedings commenced as a result of the accident or incident.

THE INVESTIGATOR:

Any investigator selection process seeks to deliver individuals that possess a healthy balance of experience and analytical skills. Theory without practice can be ineffective and uneconomical. Good communication skills and a team spirit are also vital assets to any investigator.

PRELIMINARY ATS EXPERIENCE:

To be considered for ATS investigator training, applicants should have a propensity for air safety investigation and have, as a minimum, the following prerequisite qualifications.

Hold, have held, or possess equivalent professional experience to an ATS license. Preferably this criterion should be combined with extensive experience in the provision of Air Traffic Services in at least one of the following areas, for a continuous period of more than five years. This experience should be obtained in more than one location;

a) Air traffic management in a radar or non-radar environment.

b) Demonstrated and proven competency in the provision of ab-initio and/or on the job ATS training.

c) Provision of aeronautical information services and/or search and rescue alerting activities.

d) Theoretical knowledge and practical experience in at least one of the following areas. This experience should be gained as a responsible officer in a planning or policy related area over a continuous period of at least five years.

   i) Specification, development, delivery, installation and/or commissioning of airways operating procedures and/or instructions.

   ii) Specification, development, delivery, installation and/or commissioning of airways communications, navigation and surveillance facilities, systems and/or projects involving terrestrial and/or satellite technology.

THE INVESTIGATION INTERVIEW:

Any investigation will be assisted by a free flow of information. The effective investigator has a number of methods by which to obtain information that may be critical to the successful resolution of the process. In considering these options a successful investigator should have a substantial awareness of those human factors which can have a predisposing effect on the production of operational errors.

TECHNIQUES FOR EFFECTIVE INFORMATION GATHERING:

1. Prior to the commencement of the interview:

- Introduce all participants at the interview to each other
- Describe the rules for the conduct of interview
- Work to develop a mutual rapport
- Record those details provided by the interviewee

2. During the interview:

- Encourage the interviewee to actively generate information.
- Allow the interviewee to describe what happened without omission of any details.
- Request detailed descriptions.
- Try to ask open-ended questions.
- Pause and reflect after each response from the interviewee.
- Do not interrupt.
- Listen actively.
- Pause before asking questions.
- Control the interview; don't dominate it.

3. Assisting the interviewee:

- Conduct a walkthrough at the place of the occurrence where possible.
- Attempt to recreate the original situation.
- Encourage the interviewee to concentrate.
- Encourage the concept of imagery. In developing these mental images; slow and steady is best.
- Empathize with the witness' situation.
- Adopt the witness's perspective.
- Utilize the interviewee's areas of expertise.

4. Concluding the interview:

- Ensure that the interviewee has nothing further to add.
- Thank them for their efforts.
- Leave contact details and request them to advise you of any aspect they may later recall.

5. Follow-up processes (one week later):

- Confirm or clarify any previous details
- Elicit further information that might not have been appropriate at the original interview

HUMAN FACTORS:

Introduction: Any ATS investigator will need to consider in detail the following aspects:

1. The principles of human error:

- Physiology.
- Physical well being of the operator.
- Communication processes utilized through the incident.
- Situational awareness.
- The personalities of all parties to the incident.

2. Rosters:

- Shift cycles.
- Rest periods provided and utilized.
- Length of day and night shifts.
- Additional tasks imposed on the operator.

3. Environment:

- Operational
- Domestic

4. Equipment and Facilities:

- Fitness for purpose
- Service history
- Maintenance

5. Management Aspects:

- Organizational culture.
- Training program.
- Safety programs and awareness.
- Visible support.
- Operational feedback processes.

6. Standards and Procedures:

- Standard Operating Procedures documented and available to all operators

7. Defense mechanisms utilized:

- Separation assurance techniques
- Quality management and control systems

ANALYSIS OF THE DATA:

In the vast majority of air traffic service related air safety occurrence investigations, the who, what, when and where is known and generally well documented and recorded.

The primary purpose of the analysis is to provide a seamless link from the factual information, through a rationalization of that information, to conclusions and findings that provide the answers to the whys.

The range of methods available to analyze any ATS incident or related accident is endless. The more experienced investigators will call upon their previous encounters and determine a suitable method.

It is important to remember that there is no specific right or wrong way to practice analytical investigation. However, the following steps may assist in reaching a timely result.

- Establish links. In any sequence of events, attempt to fill those gaps that exist between the facts. Extrapolate them where logically possible based on both theory and your practical knowledge.

- Avoid repetition. Repetition of factual data will be a source of distraction for all participants at any level of analysis.

- Evaluate the situation. Remember that these evaluations must always be based on factual evidence.

- Develop a progressive analysis. Attempt to always resolve any elements of controversy or contradictions in evidence at an early stage of the analysis.

- Apply accepted analytical models to support the analysis. The Reason
- Model or the SHEL Model can usually be applied to great effect. Why not try them at an early stage.

- Include all relevant facts. This is most important for completeness of the details.

- Exclude all irrelevant facts. They will add nothing but a source of further distraction to the analysis.

- Support realistic possibilities. Any relevant theme may be considered. Do not rule out the value of the hypothesis until it can no longer be supported.

- Reject possibilities, when they are no longer valid.

- Test the analysis with argument. If the analysis will stand scrutiny against the factual information then the validity is most likely to be logical and credible.

- Clearly indicate instances of opinion or fact.

- Conclude with a clear analysis. State that the analysis is clear. If it is not clear, then state that the analysis is undetermined

- Cautiously explain unsupported conclusions. If the conclusion cannot be fully and positively supported by weight of evidence, state that it is so. It aids the credibility process.

- Relate any uncovered issues. This is vital especially when relating those that did not directly contribute to the event.

- Identify ambiguities. If you don't then the reader will with a negative impact.

- Conduct a final review. Reaffirm your conviction as to the "who, what, when and where" of the investigation.

- Commit to the analysis.

CONCLUDING THE ATS INVESTIGATION:

Not only must air traffic services investigators possess the skills and training to initiate an investigation, they must also be aware of when the investigation is complete. The following guidance is provided:

- Review all documentation to ensure that it will support recommendations and debunk any issues that are not relevant to the investigation.

- Determine if additional information or documentation is required. Review with other investigators the findings and conclusions and proposed recommendations. Have answers to any issues they may present.

- Review interview summaries to ensure that any issues have been addressed

- Ensure that those individuals who have been interviewed are able to provide answers to any outstanding issues to which information has not been provided.

- Determine if the recommendations can be made informally through a briefing or require a formal submission (report)

- Remember that proposed corrective actions should be, feasible, realistic and will clearly remedy the deficiency.

- Determine if there are any items that require follow-up, such as corrective action that management may have taken that will preclude formal recommendations.

- Determine if identified deficiencies are isolated to that specific facility or part of a national trend

- Develop a draft report of investigation and disseminate, for comment, to other parties to the investigation

INVESTIGATION CONCLUSIONS:

There should be no new material introduced in this section of the report. Every finding must be clearly stated, identified and supported within the body of the report itself. This section of the report should follow the sequence of the occurrence as closely as possible by presenting all findings and significant factors without being a complete synopsis of what happened. These investigation conclusions should permit the reader to arrive at, and agree with, the logical processes and results of the investigation.

SIGNIFICANT FACTORS:

The significant factors are those factors (failures, errors or omissions) that, if removed from the sequence, would have prevented the occurrence. They must be:

- Tested for logic, relevance and importance before inclusion.
- Listed in a chronological sequence.
- Clear and provide a brief explanation whenever conclusions cannot be recorded.

WRITING THE REPORT

Usually every ATS investigation will end in a written report. This is to be expected as the medium of communicating the lessons of the occurrence. Systemic investigations will utilize all relevant reports. Each member state and organization will have a specific administrative format for investigative reports.

In the production of both the draft and the final report, the following aspects might be worthy of consideration:

- The purpose of the report.

- A glossary of the terms used in the report
- ICAO compliance
- National legislation
- International agreements
- Provisions for the release of information.

ATS INVESTIGATOR TRAINING MODEL:

This model prescribes a series of interdependent modules that take an experienced Air Traffic Services officer into the field of air safety investigation. It assumes a minimum of ten years experience at varying levels of operational complexity. It further assumes a level of exposure to ATS management in both administration and the development of operational policy.

The candidate will be exposed to a series of logical and necessary steps to provide for structured development. The concept of learning from the lessons of incidents is reinforced throughout.

Module 1: Deals with the fundamental issues of ATS investigation philosophy. Why we investigate, how do we obtain relevant information and what are the expectations, from a personal and a corporate perspective.

Module 2: Those rules that an investigator will operate under are covered in this module. The regulatory framework, the legal and social obligations are studied.

Module 3: Relates to the importance of Human Factors research and the relationship of this topic to ATS incident and accident causal factors.

Module 4: Quality Management and Risk Management are linked and examined. The daily compromise of risk and consequence is a topic for analysis.

Module 5: Relevant ATS incident case studies are discussed.

Modules 6: A comprehensive study of communication practices, techniques and information transfer strategies relevant to the ATS investigator.

Module 7: Relationships and variations to safety policy between civilian and military ATS.

Module 8: Major role play exercise to link all the skills of the ATS investigator.

Module 9: Evaluation and review.

MODULE 1:

- Role of the Incident Investigator.
- Why do we investigate incidents?
- Ethics.
- The Notification Process.
- Procedures that must be followed.
- Incident Reporting and Investigation.
- What happens to the data?
- An Investigator's Perspective.
- Personal experiences shared by current investigators.

MODULE 2:

- The Perspective of the ATS regulator.
- The Legal Perspective.
- Aviation Law.
- Implications for ATS investigators.
- Staff Association/Union Perspective.

MODULE 3:

- Introduction to Human Factors.
- Recognition of Human Factors.
- Individual v Systems Approaches:
- The SHEL Model
- The Reason Model
- Human Information Processing
- Conceptual models for incident investigation
- Review

MODULE 4:

- Quality Management and the link to Aviation Safety
- The principles
- The values
- The real story
- The Management of Risk
- The processes
- The confidence level
- The necessity
- Data collection and its management in ATS: Where does it go and what is it used for?

MODULE 5:

- The value of the case study
- Elimination of ATS Hazards
- Valuable lessons of case studies
- Syndicate exercise

MODULE 6:

- Communication Skills for Investigators
- Non-verbal Communication techniques for investigators
- Interviewing Principles for Incident Investigators
- Investigator exercises in interview techniques
- Report Writing for ATS Investigators: Writing to be understood
- Producing an outline structure for the incident report using appropriate ATS and ICAO formats
- Language factors in report writing
- Group Report Writing - large reports
- Individual Report Drafting - smaller reports

MODULE 7:

- The Maintenance of Military Air Safety - Is there a difference?

MODULE 8:

- Major Case Study - (seven hours)

MODULE 9:

- Course Evaluation