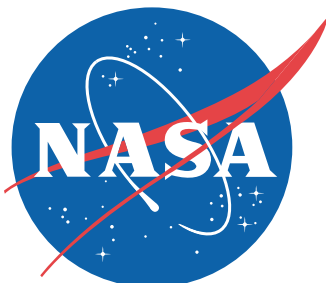# *Cabin Crew Safety Information Article*

Presented at the 17th International Aircraft Cabin Safety Symposium

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Cabin Crew Safety Information and
The NASA Aviation Safety Reporting System

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The NASA Aviation Safety Reporting System

Safety is a top priority for all participants in aviation operations. To the credit of all involved, the aviation accident rate in the U.S. is among the lowest in the world. In spite of this excellent safety record, in 1997 President William J. Clinton announced an aggressive national goal to reduce the aviation accident rate even further. With aviation operations forecast to double over the next decade, the President and his advisors were concerned about the possibility of a dramatic increase in aviation fatalities during this same period. In a report issued by the Gore Commission, the President set a national goal for the reduction of the U.S. aviation fatal accident rate 80% by the year 2010.

Relevant and timely safety information is necessary to make the constructive changes necessary to reach the President's goals for the National Aviation System. Some of this safety information is obtained from accident investigations, such as those performed by the National Transportation Safety Board (NTSB). However, due to the crew fatalities that commonly result in accidents, crucial information needed to assist accident prevention efforts may never be known.

Aviation incident reporting can provide this information. Because aviation incidents often involve similar event chains to accidents, they are sometimes called "accidents that did not happen." The information gap frequently experienced in accident investigations – specifically, the events leading up to the accident, factors that increased risk, how problems were detected, and attempts made to successfully resolve the problems – can be provided by individuals involved in incidents. Incident reporting is thus both a rich source of safety information, and of the human factors involved in the timeline of the event.

Those who work to improve aviation safety have long recognized that incident reporting from pilots and air traffic controllers does not provide a complete answer to improving the aviation safety record. Increasingly, incidents experienced by other aviation professionals – cabin crew, ground crew, and maintenance personnel – are being sought to complete "the big picture" in aviation safety.

The NASA Aviation Safety Reporting System (ASRS) is at the forefront of current efforts to improve the quality, and quantity, of incident information available to the system. The ASRS was created in 1976 by the FAA and NASA to receive, process, and analyze voluntarily submitted aviation safety reports. The ASRS is mandated to meet several missions:

- Identify deficiencies and discrepancies in the National Aviation System
- Provide data for planning and improvements to the National Aviation System
- Enhance the basis for human factors research, and make recommendations for future aviation procedures, operations, facilities, and equipment.

In 1997, responding to requests from the aviation community and safety leaders, the ASRS created and distributed new reporting forms for cabin crew and maintenance personnel, adding to its existing general (pilot) and air traffic controller forms. The evaluation of incident descriptions from these new reporting communities is being used to more accurately determine major safety issues, identify potential problem areas, and create solutions before accidents occur.

ASRS Confidentiality and Immunity Provisions
The Aviation Safety Reporting System is governed by the Federal Air Regulations (FAR 91.25) and Advisory Circular (AC No. 00-46D), as well as by an Advisory Subcommittee comprised of representatives from the aviation industry. This government/industry collaboration was created to establish a forum for constructive discussion concerning aviation safety incidents. Although the FAA is the major benefactor of the ASRS, NASA, a non-regulatory government research organization known for its aviation human factors programs, was chosen as the institution that would protect this sensitive data. NASA is therefore regarded as the "honest broker" of ASRS incident data.

Throughout the 24 years of ASRS operations and more than 480,000 report submissions, there has never been a breach of any reporter's *confidentiality*. This is a record of great pride to the ASRS. A significant event may attract the interest of FAA enforcement action, news media, legal interests, and industry operators, but there is no compromise on the confidentiality principles that have been established within the ASRS functions.

As with any system maintaining a delicate balance among numerous parties, the ASRS has guidelines under which it performs its program missions. Special reporting forms have been created to gather consistent information on all incidents reported to the ASRS. The top of the form, called the ID strip, is returned to reporters as proof of receipt following the processing of a report. Currently, there are four ASRS reporting forms. The original reporting form (NASA ARC 277B) is generally used by pilots. There are specific reporting forms for air traffic controllers (NASA ARC 277A), cabin crewmembers (NASA ARC 277C), and maintenance/ground crew personnel (NASA ARC 277D).

In addition to confidentiality, another important feature of ASRS program provisions is *immunity*. The FAA has endorsed incident reporting as a valuable accident prevention tool by providing limited immunity from disciplinary action to any reporter who files a NASA/ASRS report in the event of a real or suspected regulatory violation. The main guidelines addressing immunity provisions are explained in detail in the Advisory Circular (AC No. 00-46D)[1]. Briefly, the requirements for filing are:

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[1] Copies of AC No. 00-46D may be obtained from the NASA/ASRS, FAA, or the ASRS Home Page at http://olias.arc.nasa.gov/ASRS

1) The violation was inadvertent and not deliberate;
2) The violation did not involve a criminal offense, accident, or action under 49 U.S.C. Section 44709 which discloses a lack or qualification or competency, which are wholly excluded from this policy,
3) The person has not been found in any prior FAA enforcement action to have committed a violation of the 49 U.S.C. Subtitle VII, or any regulation cited there for a period of 5 years prior to the date of the occurrence; and
4) The person proves that, within 10 days following the violation, he or she completed and delivered or mailed a written report of the incident or occurrence to NASA under ASRS[2].

If an event is determined to be a legally defined accident, criminal in nature, or a deliberate violation of aviation regulations, there is no immunity advantage in submitting a report to the NASA/ASRS program. These types of events are ineligible for consideration within the provisions of the program. However, reporters often are involved in events in which a final determination of whether the occurrence is an incident or an accident cannot be made within the 10-day time limit for filing the ASRS report. The advice given to reporters in such cases is, "When in doubt, Fill It Out."

Even if an event or incident is not a violation or does not qualify for the program's immunity provisions, it still may contain information of safety value to aviation personnel, operators, regulators, and researchers. The ASRS is receptive to reporting on any unsafe conditions that are observed or directly experienced. The program encompasses a wide range of safety issues. Cabin crewmembers that report to the program are helping to bring new issues to the awareness of others.

The incident reports submitted to ASRS are processed at a rate of more than 2,600 per month. ASRS maintains an active database of more than 80,000 of these records. This database is used to identify current safety problems, and to provide relevant information for aviation safety efforts involving human factors research, evaluation of current policy, and improvements to aviation procedures.

Guidelines for Using the ASRS Reporting Form
ASRS reporting forms are designed to capture information about the quality of human performance in the aviation system, as well as a broad spectrum of incident details. Areas of special interest to ASRS staff and human factors researchers include problems involving human interaction with highly automated equipment; barriers to effective human performance; communication problems; and decision-making errors.

For example, a cabin attendant involved in an incident can fill out an ASRS reporting form which provides a detailed summary of the conditions and factors that contributed to the incident. The form requests information about the reporter's role at the time, qualifications and experience, type of aircraft involved, type of operator, types of cabin activity at the time of the

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[2] The proof of timely submission is provided to the reporter by the returned ID strip from the top of the NASA form. A date/time stamp will appear in the upper right-hand corner, indicating receipt at NASA/ASRS.

incident, weather, and many other event-specific details.

The most important part of the reported event, however, is provided in the narrative section of the report. In his or her own words, the reporter recounts the actual events before, during, and after the incident. The reporter also describes how the problem was detected and solved. Subsequent incident analyses use this information to target potential areas for safety improvements.

Because of the richness of the data provided to the ASRS, much effort and attention to quality is put into the analysis of each incident report. Each incident report is reviewed and analyzed by a team of experienced aviation safety analysts. This team is composed of retired pilots, air traffic controllers, mechanics, flight attendants, and other experts in specific subject areas. The analyst team has varied experience in all types of operations and environments, such as commercial Part 121 and Part 135, corporate, general aviation, and ATC operations at all levels.

ASRS analysts evaluate each incident report, make selections for full-format (database) processing, initiate telephone callbacks to selective reporters for needed clarifications, and process each report into a selection of categories describing the incident event characteristics. Figure 1 illustrates the reports received from a variety of different aviation environments, and shows the "Cabin Crew" category compared to other reporter categories. As indicated, the numbers of cabin crew reports received are small compared to the other reporter categories.
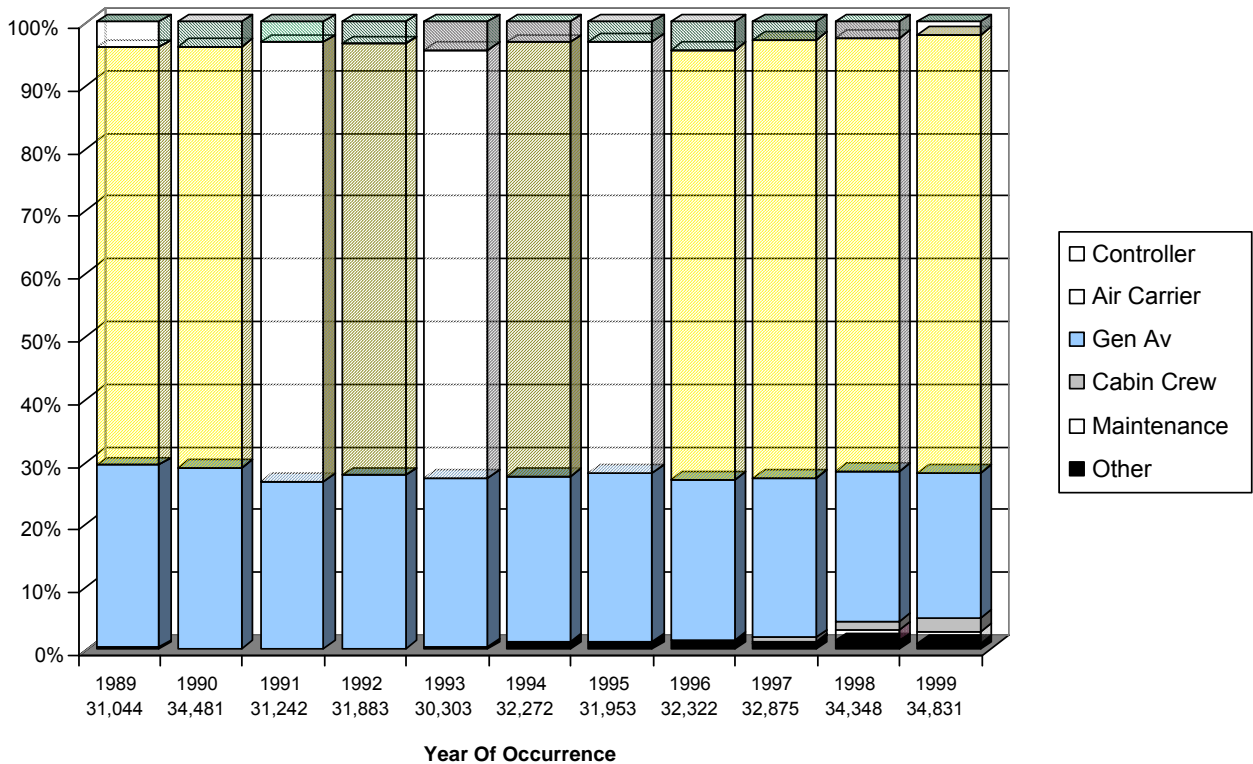

Figure 1. Annual Incident Reporter Distribution.

Cabin Crew Reporting to ASRS
The ASRS database has the capability to sort information on many variables. The database was recently queried concerning the number of reports directly submitted by cabin crew, and those submitted by other reporters referencing cabin crew involvement. A table of this information was created to show these comparisons and a comparison to the total number of incidents in the database (Table 1).

Further inspection of Table 1 shows that cabin crew reporting to ASRS increased dramatically between 1997 and 1999. The numbers of reports submitted by cabin crew increased 800% during this two-year interval, while the number of incidents referencing cabin crew involvement increased 250%. This increase was due in part to the introduction of a customized ASRS reporting form for the cabin crew community.
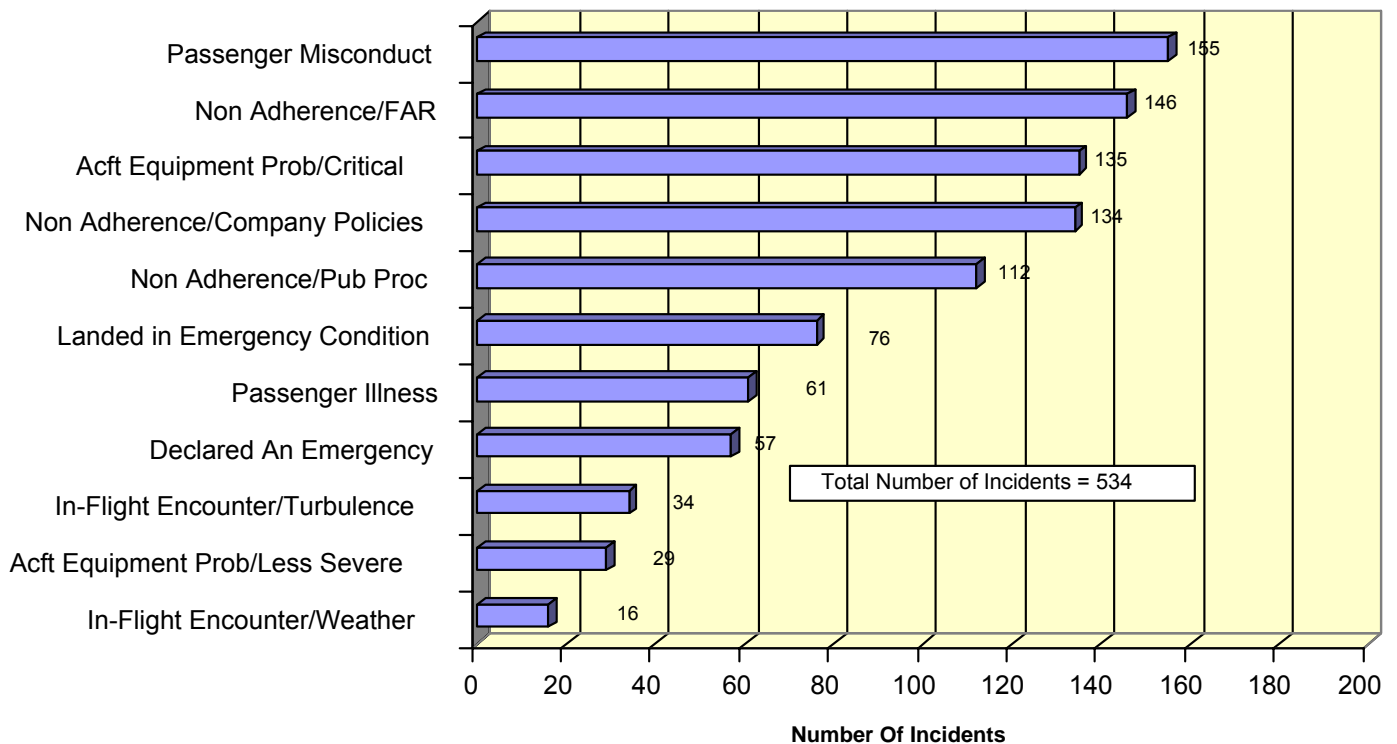
Table 1 also shows that reports referencing cabin crew involvement in incidents have steadily increased in numbers over the past decade. However, the total number of reports submitted annually to the ASRS has increased during this same period, also. Overall, incidents involving or submitted by cabin crew represent 4.5% of all database incidents between 1988-1999. The ratio of cabin crew-related reports to database reports varied from 1.4% in 1988, to 14.5% in 1999.

	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99
Incidents Submitted By Cabin Attendants	9	6	5	7	3	9	4	10	23	66	388	534
Other Incidents That Reference Cabin Crew Involvement	55	74	102	113	129	183	215	231	205	304	639	750
Total Database Incidents	4301	6748	7832	7040	6598	6860	6766	9129	8043	8024	8403	8829

Table 1. Annual Totals of Cabin Crew-Related Incidents Compared to Annual Totals of Database Incidents.

A collection of several incidents that share common characteristics can also illustrate safety issues. To further explore the group of incidents submitted by cabin crew, we analyzed the "Anomaly" category, the major types of unsafe events that occurred in the incident. Most incidents involve more than one anomaly. The top five anomaly categories for cabin crew reports are presented in Figure 2.

The leading anomaly category in cabin-crew reported incidents for 1999 was passenger misconduct. This distribution may represent the "tip of the iceberg" of a national phenomenon. Incidents of passenger misconduct toward cabin crewmembers have reached epidemic proportions in the last few years, prompting both airlines and legislators to consider more aggressive follow-up and stronger legal penalties.

Category	Number of Incidents
Passenger Misconduct	155
Non Adherence/FAR	146
Acft Equipment Prob/Critical	135
Non Adherence/Company Policies	134
Non Adherence/Pub Proc	112
Landed in Emergency Condition	76
Passenger Illness	61
Declared An Emergency	57
In-Flight Encounter/Turbulence	34
Acft Equipment Prob/Less Severe	29
In-Flight Encounter/Weather	16

Total Number of Incidents = 534

Number Of Incidents

* Categories are not mutually exclusive.

Figure 2. Cabin Crew Reported Incidents - Anomalies (January 1999 - December 1999)

Passenger Behavior Incidents in ASRS Data

Recent reviews of ASRS data have established that passenger behavior is a persistent source of in-flight safety problems. These problems run the gamut from minor disturbances, such as disputes over seating arrangements, to serious interference with crew duties and violation of federal aviation regulations. Passenger behavior problems reported to ASRS generally fall into several categories:

	Number
Alcohol-related behavior	66
Use of prohibited electronic devices	23
Smoking in lavatories	14
Drug or medication-related behavior	12
Bomb or hijack threat	8
Miscellaneous behavior problems	27
	152

* Categories are not mutually exclusive

Table 2. ASRS Passenger Behavior Incidents (1998).

- ♦ Uncooperative or unstable behavior
- ♦ Alcohol or drug-related events
- ♦ Possession of potentially hazardous materials, devices, or substances
- ♦ Bomb threats or hijacking attempts

The most serious passenger incidents reported to ASRS result in diversion of aircraft for emergency landings, physical injury to crew or passengers, and emotional trauma for all involved.

ASRS recently undertook an analysis of 152 passenger misconduct incidents reported to the program for a one-year period, January 1998 through December 1998. Seventy-seven of the reports were submitted by cabin crewmembers, and seventy-five reports by flight crews. The purpose of the analysis was to examine the common factors underlying passenger-related incidents, and to determine the effects of these incidents on both cabin and flight deck crew.

Alcohol –A Contributor to Passenger Misconduct
As shown by Table 2, passenger overindulgence in alcoholic beverages was by far the most prevalent factor associated with misconduct incidents in the 1998 ASRS data sample. Almost half of all incidents were directly attributed to intoxicated passengers. Passengers "under the influence" indulged in a variety of bizarre and alarming behaviors, refusing to comply with crew requests, using profane and abusive language, and assaulting crewmembers and other passengers. In some incidents, the cabin crew drew on their collective wisdom and training to contain a potentially hazardous situation. A cabin attendant's description of a Miami to Los Angeles flight provides an example:

> *About 3 or 4 hours into the flight, a passenger seated in the forward section of the*
> *main cabin revealed himself to be extremely rude and obnoxious. This became*

obvious during the meal service when he was very disrespectful to the crew and demanded to be served alcohol... Later on...as I was walking through the cabin, he directed to my attention that he believed "little furry animals were perched on the wings." He was serious, therefore I assured him that everything was OK and notified the #1 Flight Attendant and the Captain of this...behavior. As I was doing this, he demanded to be served more alcohol by the #2 Flight Attendant (a male), who refused. He then started to become agitated, pacing back and forth in the forward section of the main cabin. He eventually returned to his seat... The passenger stayed relatively calm until landing, "only" drawing faces of bearded men on many sheets of paper which he then crossed out to start all over again. He continued this incoherent drawing until landing...

Conclusion: we had to use our best judgement, and decided in the case of this obviously mentally disturbed man not to contradict him, not to be confrontational... This was a full aircraft and we tried to keep everything as calm as possible. Also, we remembered what our training taught us as far as dealing with terrorists and we didn't know what this man could do and how he would react... Other passengers in the airplane brought to our attention that the very passenger in question already had displayed erratic behavior in the terminal. Therefore, I would suggest a lot more surveillance in the terminal prior to boarding. (ASRS Report # 404435).

The suggestion offered by this reporter – that passengers should be monitored for erratic behavior before boarding – was given an unexpected twist in a Captain's description of another drunken passenger incident.

While boarding, the #1 Flight Attendant advised that we had a drunk passenger... In a very short time the #2 Flight Attendant advised me that he was a problem and that she wanted him off the plane. I called the ramp tower and asked for police and the proper people. He left the airplane peacefully and I don't know what happened after that. The agent working the flight was very helpful. All in all, this was no big deal except for one major problem. I later found out that the guy was so drunk that he had to be helped on the plane by the passenger assistance people. I don't mean our [gate] agents – who of course would know better – but the people that push the wheelchairs and drive the carts. Someone needs to counsel these people that while their job may be to assist passengers, it is not to assist drunk passengers on the airplanes. I feel that if a guy is too drunk to walk on the airplane, then he is too drunk to ride for 2-1/2 hours on the same full airplane. (ASRS Report # 356737).

Although cabin crews were the targets of choice for verbal and physical abuse by intoxicated passengers, they were not the only victims. Occasionally other passengers took their lumps, too, as in this sleeping-Prince tale gone awry:

Three to four hours into the flight, 2 coach class passengers seated next to each other had lunch and two drinks and both fell asleep. One passenger awoke to find

the other passenger sleeping on his shoulder and proceeded to punch him, bloodying his nose. Cabin attendants separated the passengers and brought the injured passenger to business class. Ten minutes later, the abusive passenger started punching another coach class passenger, at which point two cabin attendants separated them and called the flight crew, who restrained the combative passenger and diverted to alternate [airport] to deplane restrained passenger. Authorities met the aircraft and the flight continued to destination... (ASRS Report # 404287)

Passenger Electronic Devices – A New Age Hazard

Passenger use of prohibited electronic devices was the next most frequently reported problem behavior in the ASRS data sample. Increasingly, passengers enthralled by the e-world and its many accessories – laptops, pagers, cell phones, and wireless palm devices – are reluctant to sever their electronic umbilical cords, even for a short flight. Here was the response of one cell phone devotee to a cabin attendant's request that she not use the phone during the flight:

> *A passenger in the coach cabin refused to turn off her cell phone. She struck a flight attendant when asked to turn off the phone...* (ASRS Report # 419862).

In another incident, a flight instructor carried a Global Positioning System (GPS) device on board and insisted on using it – even after he was asked not to by a jump-seating cabin crew member:

> *While sitting on the jump seat I heard cockpit radio transmissions. I walked through the cabin to locate the device. A passenger had on a GPS with the VHF radio. I asked him to turn it off and keep it off for the remainder of the flight. At this time we were rolling toward the runway after a brief ground delay. He did put it away at that time under protest. He informed me he was a flight instructor and had read the Boeing manual and felt it stated he had the right to use his device and it would not interfere. I tried to explain that VHF radios were never allowed for use on the aircraft. After takeoff, as I walked through the cabin he had it out again, it was on, and he was in the process of hooking up head phones with a microphone attached. I asked him again to turn it off. He again protested. I requested the device to take [it] to the cockpit. The Captain kept it for the remainder of the flight...* (ASRS Report # 421707)

All Roads Lead to the Lavatory

Smoking on board aircraft, although strictly prohibited by U.S. air regulations since the mid-1990's, was also a conspicuous passenger behavior in the ASRS data reviewed. ASRS continues to alert the FAA about this issue as tobacco-deprived passengers become more creative and devious in neutralizing lavatory smoke detectors. In one of the 1998 incidents reviewed, an entire cabin-to-cockpit crew chain, as well as a spouse, was involved in a futile attempt to prevent a passenger from lighting up:

> *I am usually in the galley during flight setting up carts or cleaning and putting things away. I had no idea anyone was smoking in the lavatories until I heard*

our purser make another PA telling people not to smoke. Later, the same PA, only this time a reference was made about someone smoking in the lavatories. I'd heard that business class lavatories were involved. Later, another PA from the Captain. Later again, the purser made a PA saying people would have to ask permission to enter lavatories... As we deplaned, I noted the police at the jetbridge... I also saw the woman who I'd been told had been [smoking]... One of our attendants even warned her husband about his wife smoking the lavatories, but still she continued. (ASRS Report # 387685)

Effects of Passenger Misconduct on Flight Crews

It is well known, and perhaps obvious, that passenger behavior adversely affects cabin crews, in particular. In more than half of the 1998 ASRS data reports, passenger misconduct caused some level of interference with cabin crewmembers' duties. In 33 out of 152 incidents, cabin crewmembers were physically attacked by passengers.

Analysis of the ASRS data sample, which included almost equal numbers of reports from both cabin and flight deck crews, revealed another significant but less obvious finding. Passenger misconduct also can have a detrimental effect on flight crew performance. Both passengers and aircraft are exposed to higher risks of a serious incident, or accident, when pilots are distracted from flying tasks or become involved in restraining unruly passengers.

Sixty of the ASRS study incidents – more than a third – resulted in reported flight crew distraction from the flying tasks at hand. In 15 of these incidents, a pilot deviation from altitude assignment or other clearance resulted following their involvement in the passenger problem. In 20 incidents, the flight crew was required to divert to an airport short of destination to deplane an unruly passenger.

In almost a quarter of the study incidents, a member of the flight-deck crew was required to leave the cockpit to assist the cabin crew in restraining an unruly passenger. The majority of these incidents involved two-person flight crews, meaning that one crewmember was left alone in the cockpit to perform all the flight and communication tasks.

The following report illustrates the common ingredients and effects on a flight crew of a passenger misconduct incident – alcohol intoxication, threats of violence, use of a weapon, diversion from the planned route of flight, and an aircraft speed deviation during descent:

> *…Passenger became unruly and drunk. The Captain advised him no alcohol, no touching flight attendant or passengers. The Captain returned to the cockpit and was then advised by the flight attendant that the passenger was brandishing a knife. [We initiated] a descent and diversion to [alternate airport]. Exceeded 250 knots below 10,000 feet due to gravity of situation. SWAT team removed passenger and he was taken to jail.* (ASRS Report # 348706)

In some instances, the Captain and flight crew elected not to leave the cockpit during a passenger disturbance incident, but to deal with it on the ground. This decision may have been due to

company policy, or reluctance to lose the services of a flight deck crewmember during crucial approach and landing phases. An unusual smoke-in-the-lavatory incident illustrates:

> *A passenger on the flight from MIA to JFK became violent as we started the Shore Visual Approach to Runway 13L. I had the First Officer call for assistance on the ground and continued the approach. I elected to land as soon as possible and deal with the passenger on the ground. I landed the aircraft while the struggle went on. When we cleared the runway the flight attendants had trapped the passenger in the forward lavatory. I taxied to the gate and shut down and went into the cabin to help. As I stepped into the cabin the smoke alarm in the forward lavatory went off and smoke started to come out. The gate was not yet up to the aircraft, also the forward lavatory was between the passengers and the boarding door. I elected to have the aircraft stairs dropped and deplane the passengers onto the ramp. Police and Fire Department arrived and took control of the passenger after a struggle. The passenger had taken off his clothes in the lavatory and set fire to them in an attempt to set the aircraft on fire. The aircraft sustained little damage as the fire self-extinguished.* (ASRS Report # 394086)

Cabin Crew Community and ASRS Collaboration.
The reporting of cabin crew incidents is being strongly encouraged so that this information will be available in greater quantities for the ASRS database.   There are approximately 1,064 incidents submitted by cabin crewmembers in the current database.

The next challenges for the ASRS are to promote the distribution of the cabin crew reporting form, educate potential users, analyze the data received, and disseminate the resulting safety information to the industry. Through this tailored system of reporting, many current efforts in aircraft safety and human factors will be enhanced. This information is crucial to support on-going airline, industry, and government activities and research. Summaries, research projects, and data searches of these reports will be instructive for education, training, and accident prevention efforts.

The bottom line of "reduced accidents" is saving lives. All efforts toward gathering information on a national level for use by all interested organizations, unions, airlines, and others is imperative to improving safety. The NASA/ASRS is looking forward to cabin crew participation in the program, and is available to assist with any aviation safety efforts.

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                              Moffett Field, CA 94035

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