DOT/FAA/AR-09/21

Air Traffic Organization
NextGen & Operations Planning
Office of Research and
Technology Development
Washington, DC 20591

Federal Aviation Administration Aging Mechanical Systems Program: Emergency Evacuation System

November 2009

Final Report

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U.S. Department of Transportation
Federal Aviation Administration

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Technical Report Documentation Page

1. Report No. DOT/FAA/AR-09/21	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle FEDERAL AVIATION ADMINISTRATION AGING MECHANICAL SYSTEMS PROGRAM: EMERGENCY EVACUATION SYSTEM		5. Report Date November 2009 6. Performing Organization Code
7. Author(s) Susan I. Hill		8. Performing Organization Report No. UDR-TR-2008-00232
9. Performing Organization Name and Address Structures and Materials Evaluation Group Materials Division University of Dayton Research Institute 300 College Park Dayton, OH 45469-0133		10. Work Unit No. (TRAIS) 11. Contract or Grant No. DTFACT-04-C-00021
12. Sponsoring Agency Name and Address U.S. Department of Transportation Federal Aviation Administration Air Traffic Organization NextGen & Operations Planning Office of Research and Technology Development Washington, DC 20591		13. Type of Report and Period Covered Final Report 19 August 2004 through 31 May 2008 14. Sponsoring Agency Code ANM-110

15. Supplementary Notes

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16. Abstract

The Federal Aviation Administration (FAA) was tasked to determine if material degradation in emergency evacuation systems (EES) was a major mode of failure for the air operators. The FAA Aging Mechanical Systems Program was established to examine the current reported problems with EES, to investigate the adequacy of the current testing standard, and to identify potential long-term material problems.

The current reported problems with EES, EES testing, and material-related issues were evaluated. EES-related reports and incidents, covering 1 January 1999 to 31 August 2006, were categorized and summarized into a database.

Mechanical attachment problems were the primary source of the EES reported incidents, regardless of the aircraft model. This issue must be addressed by the aircraft manufacturers, since the EES manufacturers do not have design responsibility for this portion of the EES system, except for the Boeing 777.

Material-related EES reports were mainly due to corrosion, failure, or wearing of mechanical attachment components. Reported slide abrasions, seam tears, punctures, or holes were probably due to improper handling during assembly or improper packing. A small and limited number of slide entries could be associated with material degradation or seam separation.

The requirements for EES qualification tests need to be clarified. Some airlines report an inadvertent deployment as a successful test meeting the requirement of testing one slide per door per aircraft type in their fleet every 3 years. While an inadvertent deployment may serve as a go-no-go qualification test, it does not provide sufficient information regarding time of inflation or deflation.

Southwest Airlines' interpretation of Title 14 Code of Federal Regulations 121.703 (17) for a reportable Service Difficulty Report is distinctly different from the rest of the industry. It is recommended that the FAA review the requirements and provide guidance to the airlines and maintenance operations for the correct interpretation of this regulation.

17. Key Words Emergency evacuation system, Slide, Slide/raft		18. Distribution Statement This document is available to the U.S. public through the National Technical Information Service (NTIS), Springfield, Virginia 22161.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 92	22. Price

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

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LIST OF ACRONYMS

ACZ	AirCruisers
AD	Airworthiness Directive
AIDS	Accident and Incident Data System (FAA)
ASIAS	Aviation Safety Information Analysis and Sharing
ASRS	Aviation Safety Reporting System (FAA/NASA)
BFG	BF Goodrich
CAA	Civil Aviation Authority
CFR	Code of Federal Regulation
EES	Emergency evacuation system
EESD	EES database
FAA	Federal Aviation Administration
JASC	Joint Aircraft System/Component Codes
NASA	National Aeronautics and Space Administration
NASDAC	National Aviation Safety Data Analysis Center
NTSB	National Transportation Safety Board
OEM	Original equipment manufacturer
SDR	Service Difficulty Report
SWAA	Southwest Airlines
TSO	Technical Standard Order
UALA	United Airlines

EXECUTIVE SUMMARY

The Federal Aviation Administration (FAA) was tasked to determine if material degradation in emergency evacuation systems (EES) was a major mode of failure for the air operators. The FAA Aging Mechanical Systems Program was established to examine the current reported problems with EES, to investigate the adequacy of the current testing standard, and to identify potential long-term material problems.

The initial program scope included three basic tasks: background review, evaluation of current EES systems, and a final assessment of EES testing and materials. Reported instances of EES deployment were gathered from several databases, reports, and websites for the time period of 1 January 1999 through 31 August 2006. Information was also gathered from visits to the two United States EES original equipment manufacturers (OEM), a maintenance facility, and FAA offices. The data were categorized and summarized into a database. Results from the preliminary analysis did not support the inherent assumption of the program, i.e., materials-related failures were a large problem for EES systems. The program scope was revised to focus on data mining the EES reported incidents.

Mechanical attachment problems were the primary source of the EES reported incidents, regardless of the aircraft model. With the exception of the Boeing 777, the EES manufacturers do not have design responsibility for this portion of the EES. For this reason, these issues must be addressed by the OEMs of the mechanical attachments.

Materials-related EES failure reports were mainly due to corrosion, failure, or wear of mechanical attachment components. Reported slide abrasions, seam tears, punctures, or holes were probably due to improper handling during assembly or improper packing. A limited number of slide entries could be associated with material degradation or seam separation.

The requirements for EES qualification tests need to be clarified. Some airlines report an inadvertent deployment as a successful test meeting the requirement of a minimum of one EES deployment per plane model per fleet every 3 years. The inadvertent deployments, while sufficient as a go-no-go qualification test, do not provide sufficient information regarding time of inflation or deflation.

Southwest Airlines' interpretation of Title 14 Code of Federal Regulations 121.703 (17) for a reportable Service Difficulty Report is distinctly different from the rest of the industry. It is recommended that the FAA review the requirements and provide guidance to the airlines and maintenance operations for the correct interpretation of this regulation.

1. INTRODUCTION.

1.1 PURPOSE.

The Federal Aviation Administration (FAA) was tasked to determine if material degradation in emergency evacuation systems (EES) was a major mode of failure for the air operators. This program was established to examine the current reported problems with EESs, to investigate the adequacy of the current testing standard [1], and to identify potential long-term material problems.

1.2 BACKGROUND.

The FAA was interested in researching the modes of failure associated with EESs on transport category airplanes. EESs included evacuation slides, doors, and related mechanical systems. The FAA was particularly interested in whether the current test protocols related to slide materials were sufficient to identify potential long-term material problems (i.e., a service life of 15+ years). The current procedures are contained within Technical Standard Order (TSO)-C69c. The current requirement is to test a minimum of one EES per airplane model per fleet per year. The EES can be from any location on the airplane. Each EES should be tested every 3 years for the first 15 years of service life and annually thereafter.

The initial program scope included three basic tasks:

- Task 1 Background Review—Review of EES-related documentation, on-site visits to EES maintenance facilities, review of documented EES malfunctions or failures, and access to failed components.

- Task 2 Evaluation of Current EES Systems—Collation of materials-related property data and test procedures, evaluation of current test protocols, and evaluation of potential alternative materials.

- Task 3 Final Assessment of EES Testing and Materials—Recommendations of changes to existing test protocols based on Task 2 results.

The scope was revised after a review of the preliminary results, as described in section 2.2.

A meeting was held at the FAA offices in Renton, Washington, on 6 October 2004 to discuss the program scope and project plan. A draft program plan was submitted to the FAA December 2004 for their review and approval.

BF Goodrich (BFG), Phoenix, Arizona, and AirCruisers (ACZ), Belmar, New Jersey, are original equipment manufacturers (OEM) of EES slides and slide/rafts. The design of the attachment and release mechanism is the responsibility of the airframers (Airbus, Boeing, Bombardier, Embraer, etc.). The EES OEMs are limited in their control and responsibility in this area. The exception is the B-777, for which Boeing has authorized ACZ to design and manufacture the EES.

Visits were made to BFG (April 2005), ACZ (31 March 2006), FAA Pittsburgh (12 April 2006), and US Airways maintenance facility (25 May 2006). EES functional tests were witnessed at BFG, ACZ, and the US Airways maintenance facility. Some of the items discussed were the experiences with slide-related problems at each facility, the predictability of current TSO-C69c tests, and the suggestions for improved test methods or procedures. Information was also solicited from various FAA representatives, maintenance facility operators, and air carrier maintenance personnel.

2. EVALUATION APPROACH.

Initial efforts focused on gathering relevant documents (such as TSO-C69c, TSO-referenced material test standards, and relevant Advisory Circulars) and understanding the manufacturing steps of the EES systems.

Reported instances of EES deployment were gathered from several databases, reports, and websites for the time period of 1 January 1999 through 31 August 2006.

The databases included Aviation Safety Information Analysis and Sharing (ASIAS), Aviation Safety Reporting System (ASRS-FAA/National Aeronautics and Space Administration (NASA), Bureau of Transportation Statistics, FAA Service Difficulty Reports (SDR), FAA Accident and Incident Data System (AIDS), international civil aviation authorities and safety boards, international transportation safety boards, National Transportation and Safety Board (NTSB) Aviation Accident and Incident Data System, and the World Aircraft Accident Summary. Support information was found in the Air Registry, air operators and Joint Aircraft System/Component (JASC) linked websites. The general search terms included emergency, evacuation, slide, slide/raft, girt, EES, and deployment.

The ASIAS links the user to several of the databases. Several websites contained pictures of accidents that showed aircraft with deployed slides. The occurrences were cross-referenced with specific reports detailing the accidents to identify the slides and to determine whether any problems were reported in deployment.

2.1 THE UNIVERSITY OF DAYTON RESEARCH INSTITUTE-GENERATED EES DATABASE METHODOLOGY.

The various reported incidents and occurrences of EES use and malfunctions were summarized in a new database, hereafter referred to as the EES database (EESD). The initial EESD contained over 4650 entries from 69 identified airline operators and data from 15 sources. A list of the airline operators and data sources is in appendix C.

A single entry from a source database or report may refer to multiple slides or problems. Each problem or slide was included as a separate item. Some of the particulars for the various data sources are described below.

2.1.1 Emergency Door Location.

The item "Emergency Door Used" was added to the EESD to indicate which EES door was involved or described. The door numbering system followed the following protocol:

- Normal access doors of the aircraft were numbered from front to back on the left side as L1, L2, etc., and on the right side as R1, R2, etc.

- Doors located just before or after a wing were sequenced with the typical exit/entrance doors.

- Escape slides located over the wings were described as LW or RW for left overwing and right overwing, respectively.

- Tailcone slides (DC8 and DC9) were listed as TC.

2.1.2 Incident Type.

The various problems described in the databases were categorized using a code number, listed in the EESD as the "Type" variable. The major incident type code categories included deployment/inflation problems, design, electrical/fault messages, inadvertent deployment (other than accidental opening of armed door), incorrect installation/parts, maintenance, material/component damage, mechanical and attachment issues, normal deployment, packing, pressure indicator/inflation mechanics, and miscellaneous. Several subcategories were created because of the frequency of specific problems in the EESD. The subcategory descriptions were based on the descriptive text in the entries.

2.1.3 Service Difficulty Report Database.

The FAA SDR items were the most complete with regards to the aircraft, problem identification, and parts. The majority of the items in the EESD are from the SDR database.

Problems associated with EESs or components must be reported to the FAA within 24 hours via an SDR, per the requirement in the Code of Federal Regulations (CFR) for air carrier operations. 14 CFR 121.703 [2] lists the conditions as:

> "Emergency evacuation systems or components including all exit doors, passenger emergency evacuation lighting systems, or evacuation equipments that are found defective, or that fail to perform the intended functions during an actual emergency or during training, testing, maintenance, demonstration, or inadvertent deployments…"

Each air carrier is required to test one slide per door per aircraft type in their fleet every 3 years. The EES may be deployed from the aircraft or removed from the aircraft and deployed on the ground. Improper deployment or any type of adjustment to the EES during unscheduled or routine maintenance checks should be reported via an SDR.

In conversations between FAA and ACZ personnel, some airlines consider deployments during accidents or incidents as a functional test of the EES. Only a few items in the SDR database included emergency deployments. Items related to emergency deployments were generally found in Civil Aviation Authority (CAA) reports, ASRS database, AIDS database, NTSB reports, and accident websites.

2.1.3.1 The SDR Search Methodology.

The major SDR variables include report number, difficulty date, discrepancy, operator designator, submitter type code, JASC code, registry number, aircraft make, aircraft model, aircraft serial number, part make, part number, part serial number, part condition, and part location. All of the variables are shown in the EESD file.

The SDR searches used both the JASC code numbers and part descriptions. The part terms were emergency, evacuation, slide, slide/raft, girt, EES, and deployment. The part term searches included both the discrepancy text and the part description variables.

The JASC codes that contained relevant items were 2150 (cabin cooling system), 2500 (cabin equipment), 2550 (cargo compartments), 2560 (emergency equipment), 2561 (life jacket), 2562 (emergency locator beacon), 2564 (life raft), 2565 (escape slide), 2597 (stabilizer system warning), 2611 (smoke detection), 3230 (landing gear retraction), 3350 (landing gear steering system), 5210 (passenger/crew doors), 5220 (emergency exit), 5240 (service doors), 5320 (fuselage misc. structure), and 5340 (fuselage main attach fittings). Most of the reports carried the 2565 JASC code, as shown in table 1.

Table 1. Relevant JASC Codes

JASC Code	Frequency	Percent of Total (%)
2150	1	0.02
2500	12	0.29
2550	1	0.02
2560	57	1.37
2561	2	0.05
2562	1	0.02
2564	4	0.10
2565	4055	97.41
2597	2	0.05
2611	7	0.17
3230	2	0.05
3350	9	0.22
5210	2	0.05
5220	2	0.05
5240	4	0.10
5320	1	0.02
5340	1	0.02
Grand Total	4163	100

2.1.3.2 Misidentified JASC Codes.

Some JASC codes were not initially used in the searches but were identified through the search results using part terms. For example, report 205UALA01354 describes a misrouting of the evacuation slide electrical harness and was assigned a JASC code of 2561 (life jacket). Because it would be unexpected for code 2561 to be relevant to EES, the item would not have been found with a search using only JASC codes. The SDR database was subsequently searched using the additional JASC codes to ensure that other items were not missed.

2.1.3.3 Multiple Planes on the Same Report.

Each airplane was given a separate entry based on its registry number even if the same SDR number was used to record two different airplanes. This often occurred for Southwest Airlines (SWAA) entries prior to June 2005. For example, SDR Report No. SWAA052835 indicates "L1 Emergency evac slide fell out of container. Reinstalled slide per MM." The same report number refers to two different airplanes, a DC9 (registry number 14871) and a B-737 (registry number 623SW).

2.1.3.4 Conflicting Part Information.

The SDR database allows for entries related to part make, part number, part serial number, part condition, part location, and a description of the problem (i.e., discrepancy). Often, the part location was contradicted by the written explanation in the discrepancy. For example, SDR Report No. USASB02215 describes a problem with the forward right service door escape slide, i.e., R1. However, the Part Location entry lists the LT Wing, i.e., left overwing. The door referenced in the Discrepancy was used in the Emergency Door Used listing if the information could not be verified by other means.

An attempt was made to verify the door location via the part number. However, there were several part numbers for a given door and aircraft model. A partial list of part numbers referenced in the SDRs is provided in appendix C. The same slide could be used in several door locations for the same aircraft, such as the B-737. Other models had design changes during the production cycle. For example, the second door on the B-757 had an option for a dual- or single-lane slide. The single-lane slide was used for both the left and right doors. The dual-lane slide initially had different slides for the left and right doors. ACZ designed a single part for both sides before the production end run in the late 1990s.

2.1.3.5 The SDR Discrepancy Text.

Over half of the SDR reports were from SWAA. In the SWAA reports, several common phrases were repeated, such as "Slide fell out of container. Reinstalled slide assembly per MM," "Slide out of adjustment," "Evac slide out of position." Preselected text may have been used for the general problem and then, the Part Location entry was used to identify the actual door location. This may explain some of the conflicting information in the Discrepancy versus Part Location entries mentioned in section 2.1.3.4.

2.1.4 Aviation Safety Reporting System Database.

The ASRS is a vehicle for airline personnel to anonymously report safety-related items. All identifying information regarding the aircraft, personnel, and date are removed from the public database. The ASRS items were reviewed and compared to data from other databases to avoid duplication as much as possible.

2.1.5 Civilian Transportation and Safety Board Reports.

The accident and incident items reported by the various civilian transportation and safety boards were reviewed for applicability. The reports may or may not have indicated cases of normal deployments or the exact exits used. Photographs of accident scenes were cross-referenced with the reports to help in identification. Most official reports indicated failed EESs. Not all reports provided an official root cause for the failure.

2.2 THE EESD PRELIMINARY ANALYSIS.

The incident code data were analyzed to determine the major problem areas for EES. The database entries for normal deployments were limited to those cited in accidents, incident reports, or photographs. Data were not available from airline quality records of EES functional checks. Since the complete EESD was not a true presentation of the relative amount of normal deployments under all situations, subsequent analyses excluded normal deployments.

The revised EESD contained 4322 entries. Table 2 lists the general incident codes, and table 3 shows the subcategories under each general incident code. The subcategories were based on the descriptive text or indicated problem(s) in the reports.

Input and comments concerning the preliminary results in table 3 were solicited from the FAA William J. Hughes Technical Center, FAA Northwest Region, FAA Pittsburgh, McDonnell-Douglas, Long Beach, CA, BGF, ACZ, and others.

The preliminary results did not support the inherent assumption of the program, i.e., materials-related failures were a large problem for EESs. Over 56% of the items were related to the mechanical attachment of the EES to the airplane. Materials- and component-related failures were only ~5.1%. The majority of these items (3.2% of the overall total) were problems associated with component wear, corrosion, or failure. The items that were clearly identified as slide material problems, such as a tear, seam delamination, or leaking, totaled 1.8%. Only six entries specifically listed material aging as the problem.

The FAA reviewed the preliminary results and revised the scope of the program to focus on data mining of the EESD. The balance of the effort was spent on refining the EESD and trying to identify relationships amongst the categories.

Table 2. Frequency of General Incident Type Codes, Excluding Normal Deployment

Category Total	Category as a Percent of Overall Total (%)	Incident Type Code	Code Description
2421	56.02	1	Mechanical and attachment issues
866	20.04	2	Pressure indicator/inflation mechanics
30	0.69	3	Inadvertent deployment (Other than accidentally opening armed door)
229	5.30	4	Deployment/inflation problems— did not deploy/inflate correctly when activated
222	5.14	5	Material/component damage
59	1.37	6	Packing
214	4.95	7	Incorrect installation, incorrect parts
103	2.38	8	Electrical/fault messages
11	0.25	9	Design (no other information)
8	0.19	10	Maintenance (no other information)
159	3.68	11	Miscellaneous
4322	100.0	Total	

* Data found using SDRs and NASA databases (limited and voluntary reporting), British CAA, various international civil aviation authorities, and NASDAC. Concorde data excluded.
Data summarized from 1 January 1999 to 31 August 2006.
Some database reports indicated numerous problems or slides in a single entry. These entries were duplicated as-needed to show a separate record for each slide or problem.

Table 3. Frequency of General Incident Type Codes, Excluding Normal Deployment, Showing the Subcategories

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
2421	56.02				1	MECHANICAL AND ATTACHMENT ISSUES
		151	6.24	3.49	1A	Slide partially or completely fell out of container. Slide assembly replaced/adjusted
		521	21.52	12.05	1B	Slide fell off of door/out of container. Reattached slide and cover or replaced slide.
		146	6.03	3.38	1C	Slide loose, partially out of container, loose within cover, or loose from housing/support
		57	2.35	1.32	1D	Slide out of position
		11	0.45	0.25	1E	Cover/container loose, Cover detached from housing – mechanical adjustment
		64	2.64	1.48	1F	Slide/arming/girt bar mechanisms hard to engage/disengage, not working properly
		109	4.50	2.52	1G	Girt bar/hook/bracket/lanyard/straps/cable loose or not attached or out of position
		1314	54.28	30.40	1H	Girt assembly loose, out of position, excessive play out, “Slide out of adjust”
		33	1.36	0.76	1J	Door opened from inside after disarming. Door did not disarm. Slide fell out of container/partially unpacked/deployed.
		15	0.62	0.35	1K	Door opened from outside. Door did not disarm. Slide fell out of container and partially deployed, or fully deployed.
866	20.04				2	PRESSURE INDICATOR/INFLATION MECHANICS
		412	47.58	9.53	2A	Pressure gauge not visible. Repositioned slide
		417	48.15	9.65	2B	Pressure low/out of limits
		16	1.85	0.37	2C	Aspirator/valve related—broken, leakage, missing O-ring, etc.
		10	1.15	0.23	2D	Squib related

Table 3. Frequency of General Incident Type Codes, Excluding Normal Deployment, Showing the Subcategories (Continued)

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
866	20.04				2	PRESSURE INDICATOR/INFLATION MECHANICS (Continued)
		10	1.15	0.23	2E	Pressure indicator window cracked, dirty, missing
		1	0.12	0.02	2F	Misc.
30	0.69				3	INADVERTENT DEPLOYMENT (other than accidentally opening armed door)
		10	33.33	0.23	3A	During flight—spontaneous partial/full deployment
		3	10.00	0.07	3B	On ground—spontaneous partial/full deployment
		1	3.33	0.02	3C	On-ground—during installation or maintenance
		15	50.00	0.35	3D	On-ground—partial/full deployment while opening door after disarming/closing door, girt related issues
		1	3.33	0.02	3E	Misc. or no identified reason
229	5.30				4	DEPLOYMENT/INFLATION PROBLEMS - DID NOT DEPLOY/INFLATE CORRECTLY WHEN ACTIVATED
		21	9.17	0.49	4A	Automatic inflation failed but manually inflated
		101	44.10	2.34	4B	Did not deploy, deployed with partial or no inflation, did not inflate within required time
		29	12.66	0.67	4C	Slide twisted or wrong orientation, Deployed partially within door frame
		8	3.49	0.19	4D	Aspirator, actuator, relief valve related
		23	10.04	0.53	4E	Girt bar, release assembly related
		23	10.04	0.53	4F	Cover, lanyard, strap, lacing, cable related
		3	1.31	0.07	4G	Did not maintain pressure/tear in slide
		12	5.24	0.28	4H	Failed test (no specific cause mentioned)
		3	1.31	0.07	4J	Deployed during accident. Problems indicated in text of accident description.
		6	2.62	0.14	4K	Misc.

Table 3. Frequency of General Incident Type Codes, Excluding Normal Deployment, Showing the Subcategories (Continued)

Category Total	Category as a Percent of Overall Total	Subcategory Total	Percent of Subcategory Total	Subcategory as Percent of Overall Total	Incident Type Code	Code Description
222	5.14				5	MATERIAL/COMPONENT DAMAGE
		20	9.01	0.46	5A	Slide material punctured, torn, cut, or worn
		30	13.51	0.69	5B	Girt assembly/latch cable/lacing/lanyard frayed or torn.
		3	1.35	0.07	5C	Slide cover punctured or damaged
		3	1.35	0.07	5D	Slide seam delaminations or blisters (no leak indicated)
		30	13.51	0.69	5E	Slide seam separation or tear
		18	8.11	0.42	5F	Slide leaked - failed retention test, pinholes, no reasons given
		6	2.70	0.14	5G	Aging - no description
		65	29.28	1.50	5H	Broken or worn parts other than slide material - latch, bracket, pressure switch, hose, tubing, bearings, etc.
		2	0.90	0.05	5J	Leak by aspirator joint or holes opposite aspirator
		44	19.82	1.02	5K	Corrosion on slide support fitting/girt bar mounts
		1	0.45	0.02	5L	Misc. - girt assembly fabricated from unknown material
59	1.37				6	PACKING
		32	54.24	0.74	6A	Incorrect packing - no identified reason
		6	10.17	0.14	6B	Slide/aspirator damaged due to incorrect packing (per incident report)
		17	28.81	0.39	6C	Slide packing loose, broken laces
		4	6.78	0.09	6D	Repacking needed
214	4.95				7	INCORRECT INSTALLATION, INCORRECT PARTS
		32	14.95	0.74	7A	Incorrect parts or missing parts
		10	4.67	0.23	7B	Girt bar/firing mechanism
		76	35.51	1.76	7C	Cable/lanyard/wiring routing problem
		13	6.07	0.30	7D	Other identified cause

Table 3. Frequency of General Incident Type Codes, Excluding Normal Deployment, Showing the Subcategories (Continued)

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
214	4.95				7	INCORRECT INSTALLATION, INCORRECT PARTS (Continued)
		83	38.79	1.92	7E	Reason not given for incorrect installation
103	2.38				8	ELECTRICAL/FAULT MESSAGES
		44	42.7	1.02	8A	Failed emergency light amp/voltage/EPSU failure/pressure indicator LIGHT
		24	23.3	0.56	8B	Emergency lights on slide not working, fault message for slide
		35	34.0	0.81	8C	Indicator lights/emergency buzzer/door sensor not working, misc.
11	0.25	11	100.00	0.25	9	DESIGN (no other information)
8	0.19	8	100.00	0.19	10	MAINTENANCE (no other information)
159	3.68				11	MISCELLANEOUS
		12	7.55	0.28	11A	Slide inoperable, damaged (no stated reason), replaced without stated reason
		8	5.03	0.19	11B	RII (Required inspection item) not done or not per regulation
		21	13.21	0.49	11C	Shipping strip or Safety pin not removed/not in position for shipment
		11	6.92	0.25	11D	Pack received with firing mechanism still armed
		11	6.92	0.25	11E	Misc.
		96	60.38	2.22	11F	Unknown (Not attributed to maintenance, design, inflation, etc. no other information)
4322	100.0	4322		100.0	Total	

* Data found using SDRs and NASA databases (limited and voluntary reporting), British CAA, various international civil aviation authorities, and NASDAC. Concorde data excluded.
Data summarized from 1 January 1999 to 31 August 2006.
Some database reports indicated numerous problems or slides for a single entry. These entries were duplicated as needed to show a separate record for each slide or problem.

2.3 SOUTHWEST AIRLINES CONTRIBUTION.

Sixty-seven percent of the EESD entries were submitted by SWAA, which immediately raised the concern that the data were skewed and did not represent the industry as a whole. Over 43% of the SWAA items were due to Incident Type Code 1H, "Emergency evac slide out of adjust." SWAA mentioned that they had instituted a change in maintenance procedures. A new procedure required personnel to report any adjustments of the EES, such as a loose girt assembly, loose pack, or improper slide position on an SDR. This is probably the reason for the larger amount of "out of adjust" items. Other airline operators disagree that this type of adjustment of the slide or components fits the requirements of 14 CFR 121.703 (17) for a reportable event, i.e., the EES failing "to perform the intended functions." Instead, it could be handled as a routine preventative procedure. This area should be clarified by the FAA with the maintenance personnel at the OEMs and contract maintenance facilities if this type of adjustment is a recordable item under the SDR system.

Another item, Incident Type Code 2A, "pressure gauge not visible," usually had added text that the slide was repositioned and/or that the girt assembly was loose. All these entries had report numbers that began with SWAA, suggesting that the maintenance was performed at an SWAA facility for other air operators. Items under this incident code were grouped into Incident Type Code 1H because it seemed that the likely cause was a mechanical attachment issue and not pressure mechanics.

The B-737 portion of the EESD entries is also heavily weighted by SWAA-based reports, since the SWAA fleet consists of B-737. Therefore, data analysis based on the aircraft model is strongly affected by SWAA results.

3. RESULTS AND DISCUSSION.

3.1 INITIAL INCIDENT CODE ANALYSIS.

3.1.1 Database Grouping.

Subsequent analyses looked at three different databases to determine the relative effects of the SWAA entries on the results. The databases were

- EESD_As-is with 4322 entries
- EESD without the contribution of SWAA Incident Type Code 1H (EESD_woSWAA1H) with 2666 entries
- EESD without all SWAA entries (EESD_woSWAA) with 1434 entries

Tables 4 and 5 show the incident code frequency tables for EESD_woSWAA1H and EESD_woSWAA, respectively.

Table 4. Frequency of Incident Type Codes, Excluding Normal Deployment and Southwest Airlines Data for Incident Type Code 1H

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
1177	44.15				1	MECHANICAL AND ATTACHMENT ISSUES
		151	12.83	5.66	1A	Slide partially or completely fell out of container. Slide assembly replaced/adjusted
		521	44.27	19.54	1B	Slide fell off of door/out of container. Reattached slide and cover or replaced slide.
		146	12.40	5.48	1C	Slide loose, partially out of container, loose within cover, or loose from housing/support
		57	4.84	2.14	1D	Slide out of position
		11	0.93	0.41	1E	Cover/container loose, Cover detached from housing—mechanical adjustment
		64	5.44	2.40	1F	Slide/arming/girt bar mechanisms hard to engage/disengage, not working properly
		109	9.26	4.09	1G	Girt bar/hook/bracket/lanyard/straps/cable loose or not attached or out of position
		70	5.95	2.63	1H	Girt assembly loose, out of position, excessive play out, “Slide out of adjust”
		33	2.80	1.24	1J	Door opened from inside after disarming. Door did not disarm. Slide fell out of container/partially unpacked/deployed.
		15	1.27	0.56	1K	Door opened from outside. Door did not disarm. Slide fell out of container and partially deployed, or fully deployed.
454	17.03				2	PRESSURE INDICATOR/INFLATION MECHANICS
		417	91.85	15.64	2B	Pressure low/out of limits
		16	3.52	0.60	2C	Aspirator/valve related—broken, leakage, missing O-ring, etc.
		10	2.20	0.38	2D	Squib related
		10	2.20	0.38	2E	Pressure indicator window cracked, dirty, missing
		1	0.22	0.04	2F	Misc.

Table 4. Frequency of Incident Type Codes, Excluding Normal Deployment and Southwest Airlines Data for Incident Type Code 1H (Continued)

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
30	1.13				3	INADVERTENT DEPLOYMENT (other than accidentally opening armed door)
		10	33.33	0.38	3A	During flight - spontaneous partial/full deployment
		3	10.00	0.11	3B	On ground - spontaneous partial/full deployment
		1	3.33	0.04	3C	On-ground - during installation or maintenance
		15	50.00	0.56	3D	On-ground - partial/full deployment while opening door after disarming/closing door, girt related issues
		1	3.33	0.04	3E	Misc. or no identified reason
229	8.59				4	DEPLOYMENT/INFLATION PROBLEMS - DID NOT DEPLOY/INFLATE CORRECTLY WHEN ACTIVATED
		21	9.17	0.79	4A	Automatic inflation failed but manually inflated
		101	44.10	3.79	4B	Did not deploy, deployed with partial or no inflation, did not inflate within required time
		29	12.66	1.09	4C	Slide twisted or wrong orientation, Deployed partially within door frame
		8	3.49	0.30	4D	Aspirator, actuator, relief valve related
		23	10.04	0.86	4E	Girt bar, release assembly related
		23	10.04	0.86	4F	Cover, lanyard, strap, lacing, cable related
		3	1.31	0.11	4G	Did not maintain pressure/tear in slide
		12	5.24	0.45	4H	Failed test (no specific cause mentioned)
		3	1.31	0.11	4J	Deployed during accident. Problems indicated in text of accident description.
		6	2.62	0.23	4K	Misc.

Table 4. Frequency of Incident Type Codes, Excluding Normal Deployment and Southwest Airlines Data for Incident Type Code 1H (Continued)

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
222	8.33				5	MATERIAL/COMPONENT DAMAGE
		20	9.01	0.75	5A	Slide material punctured, torn, cut, or worn
		30	13.51	1.13	5B	Girt assembly/latch cable/lacing/lanyard frayed or torn.
		35	34.0	1.31	8C	Indicator lights/emergency buzzer/door sensor not working, misc.
11	0.41	11	100.00	0.41	9	DESIGN (no other information)
8	0.30	8	100.00	0.30	10	MAINTENANCE (no other information)
159	5.96				11	MISCELLANEOUS
		12	7.55	0.45	11A	Slide inoperable, damaged (no stated reason), replaced without stated reason
		8	5.03	0.30	11B	RII (Required inspection item) not done or not per regulation
		21	13.21	0.79	11C	Shipping strip or Safety pin not removed/not in position for shipment
		11	6.92	0.41	11D	Pack received with firing mechanism still armed
		11	6.92	0.41	11E	Misc.
		96	60.38	3.60	11F	Unknown (Not attributed to maintenance, design, inflation, etc. no other information)
2666	100.0	2666		100.0	Total	

* Data found using SDRs and NASA databases (limited and voluntary reporting), British CAA, various international civil aviation authorities, and NASDAC. Concorde data excluded.
Data summarized from 1 January 1999 to 31 August 2006.
Some database reports indicated numerous problems or slides for a single entry. These entries were duplicated as-needed to show a separate record for each slide or problem.

Table 5. Frequency of Incident Type Codes, Excluding Normal Deployment and all Southwest Airlines Data

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
434	30.26				1	MECHANICAL AND ATTACHMENT ISSUES
		68	15.67	4.74	1A	Slide partially or completely fell out of container. Slide assembly replaced/adjusted
		147	33.87	10.25	1B	Slide fell off of door/out of container. Reattached slide and cover or replaced slide.
		52	11.98	3.63	1C	Slide loose, partially out of container, loose within cover, or loose from housing/support
		3	0.69	0.21	1D	Slide out of position
		7	1.61	0.49	1E	Cover/container loose, Cover detached from housing - mechanical adjustment
		41	9.45	2.86	1F	Slide/arming/girt bar mechanisms hard to engage/disengage, not working properly
		26	5.99	1.81	1G	Girt bar/hook/bracket/lanyard/straps/cable loose or not attached or out of position
		70	16.13	4.88	1H	Girt assembly loose, out of position, excessive playout, “Slide out of adjust”
		9	2.07	0.63	1J	Door opened from inside after disarming. Door did not disarm. Slide fell out of container/partially unpacked/deployed.
		11	2.53	0.77	1K	Door opened from outside. Door did not disarm. Slide fell out of container and partially deployed, or fully deployed.
195	13.60				2	PRESSURE INDICATOR/INFLATION MECHANICS
		169	86.67	11.79	2B	Pressure low/out of limits
		14	7.18	0.98	2C	Aspirator/valve related—broken, leakage, missing O-ring, etc.
		10	5.13	0.70	2D	Squib related

Table 5. Frequency of Incident Type Codes, Excluding Normal Deployment and all Southwest Airlines Data (Continued)

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
195	13.60				2	PRESSURE INDICATOR/INFLATION MECHANICS (Continued)
		2	1.03	0.14	2E	Pressure indicator window cracked, dirty, missing
		0	0.00	0.00	2F	Misc.
22	1.53				3	INADVERTENT DEPLOYMENT (other than accidentally opening armed door)
		8	36.36	0.56	3A	During flight - spontaneous partial/full deployment
		2	9.09	0.14	3B	On ground - spontaneous partial/full deployment
		0	0.00	0.00	3C	On-ground - during installation or maintenance
		11	50.00	0.77	3D	On-ground - partial/full deployment while opening door after disarming/closing door, girt related issues
		1	4.55	0.07	3E	Misc. or no identified reason
190	13.25				4	DEPLOYMENT/INFLATION PROBLEMS - DID NOT DEPLOY/INFLATE CORRECTLY WHEN ACTIVATED
		16	8.42	1.12	4A	Automatic inflation failed but manually inflated
		83	43.68	5.79	4B	Did not deploy, deployed with partial or no inflation, did not inflate within required time
		28	14.74	1.95	4C	Slide twisted or wrong orientation, Deployed partially within door frame
		8	4.21	0.56	4D	Aspirator, actuator, relief valve related
		15	7.89	1.05	4E	Girt bar, release assembly related
		22	11.58	1.53	4F	Cover, lanyard, strap, lacing, cable related
		2	1.05	0.14	4G	Did not maintain pressure/tear in slide
		7	3.68	0.49	4H	Failed test (no specific cause mentioned)

Table 5. Frequency of Incident Type Codes, Excluding Normal Deployment and all Southwest Airlines Data (Continued)

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
190	13.25				4	DEPLOYMENT/INFLATION PROBLEMS - DID NOT DEPLOY/INFLATE CORRECTLY WHEN ACTIVATED (Continued)
		3	1.58	0.21	4J	Deployed during accident. Problems indicated in text of accident description.
		6	3.16	0.42	4K	Misc.
128	8.93				5	MATERIAL/COMPONENT DAMAGE
		14	10.94	0.98	5A	Slide material punctured, torn, cut, or worn
		19	14.84	1.32	5B	Girt assembly/latch cable/lacing/lanyard frayed or torn
		2	1.56	0.14	5C	Slide cover punctured or damaged
		1	0.78	0.07	5D	Slide seam delaminations or blisters (no leak indicated)
		22	17.19	1.53	5E	Slide seam separation or tear
		10	7.81	0.70	5F	Slide leaked - failed retention test, pinholes, no reasons given
		6	4.69	0.42	5G	Aging - no description
		41	32.03	2.86	5H	Broken or worn parts other than slide material - Latch, bracket, pressure switch, hose, tubing, bearings, etc.
		2	1.56	0.14	5J	Leak by aspirator joint or holes opposite aspirator
		11	8.59	0.77	5K	Corrosion on slide support fitting/girt bar mounts
		0	0.00	0.00	5L	Misc. - Girt assembly fabricated from unknown material
44	3.07				6	PACKING
		30	68.18	2.09	6A	Incorrect packing - no identified reason
		3	6.82	0.21	6B	Slide/aspirator damaged due to incorrect packing (per incident report)
		9	20.45	0.63	6C	Slide packing loose, broken laces
		2	4.55	0.14	6D	Repacking needed

Table 5. Frequency of Incident Type Codes, Excluding Normal Deployment and all Southwest Airlines Data (Continued)

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
163	11.37				7	INCORRECT INSTALLATION, INCORRECT PARTS
		27	16.56	1.88	7A	Incorrect parts or missing parts
		10	6.13	0.70	7B	Girt bar/firing mechanism
		34	20.86	2.37	7C	Cable/lanyard/wiring routing problem
		10	6.13	0.70	7D	Other identified cause
		82	50.31	5.72	7E	Reason not given for incorrect installation
95	6.62				8	ELECTRICAL/FAULT MESSAGES
		38	40.0	2.65	8A	Failed emergency light amp/voltage/EPSU failure/pressure indicator LIGHT
		23	24.2	1.60	8B	Emergency lights on slide not working, Fault message for slide
		34	35.8	2.37	8C	Indicator lights/emergency buzzer/door sensor not working, misc.
11	0.77	11	100.00	0.77	9	DESIGN (no other information)
8	0.56	8	100.00	0.56	10	MAINTENANCE (no other information)
144	10.04				11	MISCELLANEOUS
		7	4.86	0.49	11A	Slide inoperable, damaged (no stated reason), replaced without stated reason
		8	5.56	0.56	11B	RII (Required inspection item) not done or not per regulation
		14	9.72	0.98	11C	Shipping strip or safety pin not removed/not in position for shipment
		11	7.64	0.77	11D	Pack received with firing mechanism still armed
		9	6.25	0.63	11E	Misc.

Table 5. Frequency of Incident Type Codes, Excluding Normal Deployment and all Southwest Airlines Data (Continued)

Category Total	Category as a Percent of Overall Total (%)	Subcategory Total	Percent of Subcategory Total (%)	Subcategory as Percent of Overall Total (%)	Incident Type Code	Code Description
144	10.04				11	MISCELLANEOUS (Continued)
		95	65.97	6.62	11F	Unknown (Not attributed to maintenance, design, inflation, etc. no other information)
1434	100.0	1434		100.0	TOTAL	

* Data found using SDRs and NASA databases (limited and voluntary reporting), British CAA, various international civil aviation authorities, and NASDAC. Concorde data excluded.
Data summarized from 1 January 1999 to 31 August 2006.
Some database reports indicated numerous problems or slides for a single entry. These entries were duplicated as-needed to show a separate record for each slide or problem.

3.1.2 Air Operators.

Figure 1 shows the contribution of the various air operators in the three EESD databases. The overwhelming influence of the SWAA entries is immediately noticeable. The next highest identified contributor is United Airlines (UALA), at only 9% of the EESD_As-is database. Table 6 lists the relative ranking and percentages of the air operators in the three databases based on the number of entries.

Table 6. Relative Ranking of Air Operators in Databases Based on Number of Entries

	EESD As-Is	EESD Without SWA Entries for 1H	EESD Without SWA Entries
Air Operator	SWAA (66.8%)	SWAA (46.2%)	UALA (11.2%)
	UALA (8.95%)	UALA (6.04%)	USAA (9.90%)
	USAA (3.72%)	USAA (5.33%)	GTIA (8.30%)
	GTIA (3.29%)	GTIA (4.46%)	IPXA (7.04%)
	IPXA (2.75%)	IPXA (3.79%)	AALA (5.58%)
	AALA (2.34%)	AALA (3.00%)	MWEA (4.18%)
	MWEA (1.85%)	MWEA (2.25%)	DALA (3.56%)
	DALA (1.39%)	DALA (1.91%)	AWXA (3.21%)
	AWXA (1.18%)	AWXA (1.72%)	NWAA (2.51%)
	NWAA (1.06%)	NWAA (1.35%)	ASAA (2.37%)

The relative pattern of air operator contribution in figure 1 is similar for both the EESD_woSWAA and the EESD_woSWAA1H. This suggests that the SWAA SDRs for the evacuation slide being out of position (Incident Type Code 1H) are the exception and not the norm, i.e., the other air operators do not consider this type of repair procedure an SDR-reportable item.

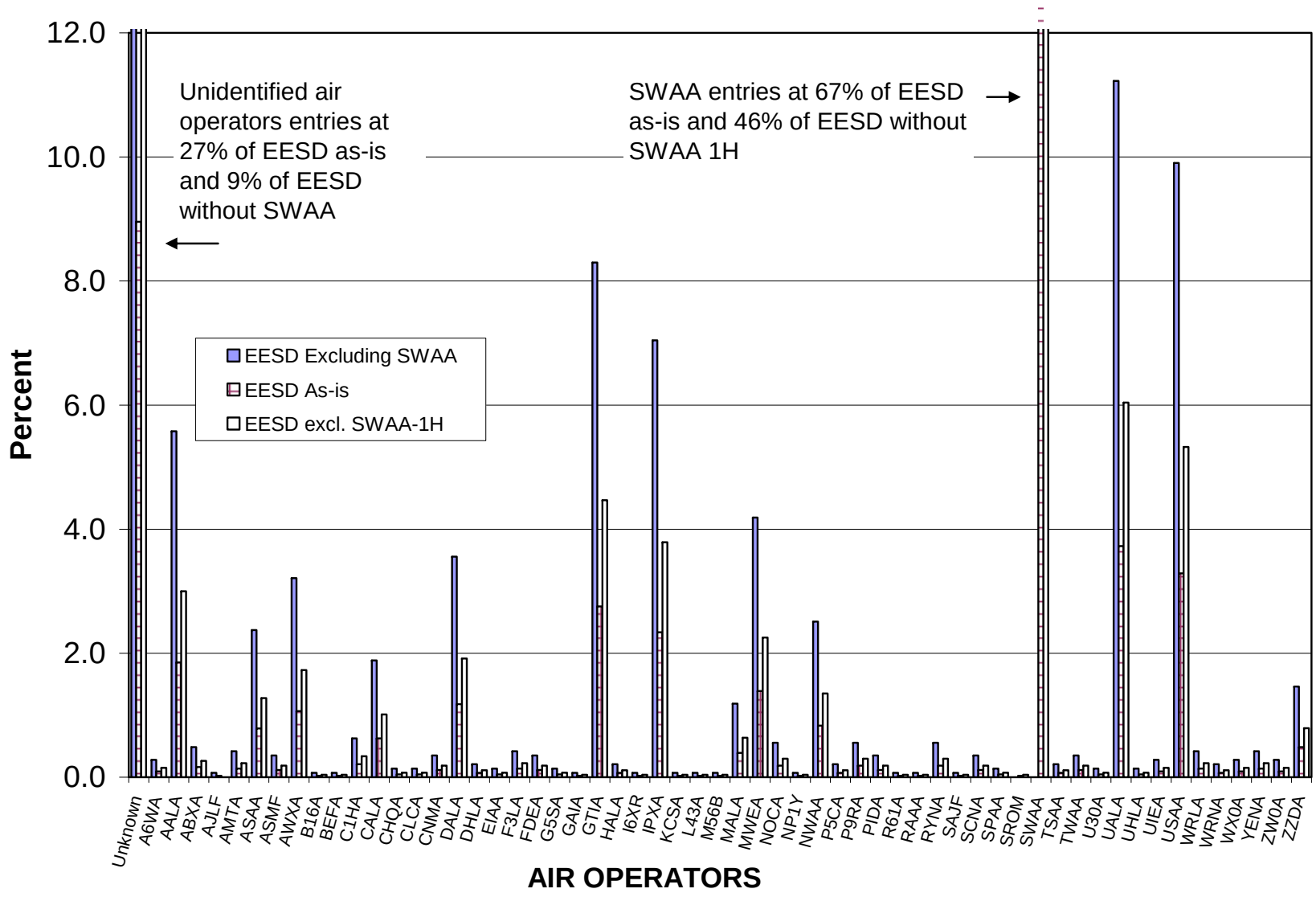

Figure 1. Contribution of Various Air Operators in the EESD With and Without the SWAA Entries

3.2 DATABASE REVISION ON THE BASIS OF LIKELY CAUSE.

3.2.1 Background.

Initial analysis focused on whether there was a pattern regarding incident code frequency over the last 7 years. Data from each major category for the three EESD variations were grouped on the basis of several variables, such as air operator, airplane manufacturer, airplane model, and trends during 1999-2006.

No clear pattern was indicated using either the general incident code categories or the subcategories. The subcategories were then re-examined to see if a likely cause could be assigned based on the descriptive text for each entry.

3.2.2 Methodology for Likely Cause.

Some of the descriptions were sufficient to assign a likely cause. For example, failure to do a required inspection before aircraft release was categorized as a failure in training/maintenance since the oversight was due to human error.

Other entries were not as clear. For example, an entry of "Evacuation slide fell out of container" may have several likely causes, such as a loose girt bar, a loose girt bar retaining hook, a broken bracket or hook, or improper installation. General descriptions such as these were labeled as mechanical attachment issues. Cases where the text clearly indicated a broken retaining hook, bracket, or strap were identified as a component problem.

Aging or seam separation was called a slide material issue. A slide material puncture, tear, or cut was also labeled as a slide material issue, even though the root cause may have been improper packing or improper handling.

The selected likely cause categories were based on a review of the British CAA report [3], and discussions with FAA personnel and ACZ. The categories were component/part, design, inflation, training/maintenance, mechanical attachment, packing, slide material, and unknown (not enough information to place into one of the preceding categories). It should be noted that each entry would have to be investigated to accurately determine the root cause. The revised EESD summary tables are shown in tables 7, 8, and 9.

Table 7. The EESD Breakdown Showing Initial Incident Type Code and Subsequent Likely Cause Classification, Excluding Normal Deployments

Category Total	Percent of Category Total (%)	Subcategory Total	Incident Type Code	Likely Cause	Code Description
2833	65.55		1		MECHANICAL AND ATTACHMENT ISSUES
		151	1A	M	Slide partially or completely fell out of container. Slide assembly replaced/adjusted
		521	1B	M	Slide fell off of door/out of container. Reattached slide and cover or replaced slide.
		146	1C	M	Slide loose, partially out of container, loose within cover, or loose from housing/support
		57	1D	M	Slide out of position
		11	1E	M	Cover/container loose, Cover detached from housing—mechanical adjustment
		64	1F	M	Slide/arming/girt bar mechanisms hard to engage/disengage, not working properly
		109	1G	M	Girt bar/hook/bracket/lanyard/straps/cable loose or not attached or out of position
		1726	1H	M	Girt assembly loose, out of position, excessive play out, “Slide out of adjust”
		33	1J	M	Door opened from inside after disarming. Door did not disarm. Slide fell out of container/partially unpacked/deployed.
		15	1K	M	Door opened from outside. Door did not disarm. Slide fellout of container and partially deployed, or fully deployed.
454	10.50		2		PRESSURE INDICATOR/INFLATION MECHANICS
		417	2B	I	Pressure low/out of limits
		16	2C	C	Aspirator/valve related—broken, leakage, missing O-ring, etc.
		10	2D	C	Squib related
		10	2E	C	Pressure indicator window cracked, dirty, missing
		1	2F		Misc.
30	0.69		3		INADVERTENT DEPLOYMENT (other than accidentally opening armed door)
		10	3A	M	During flight - spontaneous partial/full deployment
		3	3B	M	On ground - spontaneous partial/full deployment
		1	3C	TM	On-ground - during installation or maintenance
		15	3D	M	On-ground - partial/full deployment while opening door after disarming/closing door, girt related issues
		1	3E		Misc. or no identified reason

Table 7. The EESD Breakdown Showing Initial Incident Type Code and Subsequent Likely Cause Classification, Excluding Normal Deployments (Continued)

Category Total	Percent of Category Total (%)	Subcategory Total	Incident Type Code	Likely Cause	Code Description
229	5.30		4		DEPLOYMENT/INFLATION PROBLEMS - DID NOT DEPLOY/INFLATE CORRECTLY WHEN ACTIVATED
		21	4A	I	Automatic inflation failed but manually inflated
		101	4B	I	Did not deploy, deployed with partial or no inflation, did not inflate within required time
		29	4C	P	Slide twisted or wrong orientation, Deployed partially within door frame
		8	4D	I	Aspirator, actuator, relief valve related
		23	4E	M	Girt bar, release assembly related
		23	4F	M	Cover, lanyard, strap, lacing, cable related
		3	4G	SM	Did not maintain pressure/tear in slide
		12	4H	U	Failed test (no specific cause mentioned)
		3	4J	U	Deployed during accident. Problems indicated in text of accident description.
		6	4K		Misc.
222	5.14		5		MATERIAL/COMPONENT DAMAGE
		20	5A	SM	Slide material punctured, torn, cut, or worn
		30	5B	C	Girt assembly/latch cable/lacing/lanyard frayed or torn.
		3	5C	C	Slide cover punctured or damaged
		3	5D	SM	Slide seam delaminations or blisters (no leak indicated)
		30	5E	SM	Slide seam separation or tear
		18	5F	SM	Slide leaked - failed retention test, pinholes, no reasons given
		6	5G	SM	Aging - no description
		65	5H	C	Broken or worn parts other than slide material - Latch, bracket, pressure switch, hose, tubing, bearings, etc.
		2	5J	P	Leak by aspirator joint or holes opposite aspirator
		44	5K	C	Corrosion on slide support fitting/girt bar mounts
		1	5L	C	Misc. - Girt assembly fabricated from unknown material
59	1.37		6		PACKING
		32	6A	P	Incorrect packing - no identified reason
		6	6B	P	Slide/aspirator damaged due to incorrect packing (per incident report)
		17	6C	P	Slide packing loose, broken laces
		4	6D	P	Repacking needed

Table 7. The EESD Breakdown Showing Initial Incident Type Code and Subsequent Likely Cause Classification, Excluding Normal Deployments (Continued)

Category Total	Percent of Category Total (%)	Subcategory Total	Incident Type Code	Likely Cause	Code Description
214	4.95		7		INCORRECT INSTALLATION, INCORRECT PARTS
		32	7A	TM	Incorrect parts or missing parts
		10	7B	TM	Girt bar/firing mechanism
		76	7C	TM	Cable/lanyard/wiring routing problem
		13	7D	TM	Other identified cause
		83	7E	TM	Reason not given for incorrect installation
103	2.38		8		ELECTRICAL/FAULT MESSAGES
		44	8A	C	Failed emergency light amp/voltage/EPSU failure/pressure indicator LIGHT
		24	8B	C	Emergency lights on slide not working, Fault message for slide
		35	8C	C	Indicator lights/emergency buzzer/door sensor not working, misc.
11	0.25	11	9		DESIGN (no other information)
8	0.19	8	10	TM	MAINTENANCE (no other information)
159	3.68		11		MISCELLANEOUS
		12	11A	U	Slide inoperable, damaged (no stated reason), replaced without stated reason
		8	11B	TM	RII (Required inspection item) not done or not per regulation
		21	11C	TM	Shipping strip or safety pin not removed/not in position for shipment
		11	11D	TM	Pack received with firing mechanism still armed
		11	11E		Misc.
		96	11F	U	Unknown (Not attributed to maintenance, design, inflation, etc. no other information)
4322	100.0	4322	Total		

*M = Mech attachment; I = Inflation; P = Packing; SM = Slide material; C = Component/part; TM = Maintenance/Training; D = design; U = unknown

Data found using SDRs and NASA databases (limited and voluntary reporting), British CAA, airdisasters.com, various international civil aviation authorities, NASDAC. Concorde data excluded.

Data summarized from 1 January 1999 to 31 August 2006.

Some database reports indicated numerous problems or slides for a single entry. These entries were duplicated as-needed to show a separate record for each slide or problem.

Table 8. The EESD Breakdown Showing Initial Incident Type Code and Subsequent Likely Cause Classification, Excluding Normal Deployments and SWAA Incident Type Code 1H

Category Total	Percent of Category Total (%)	Subcategory Total	Incident Type Code	Likely Cause	Code Description
1177	44.15		1		MECHANICAL AND ATTACHMENT ISSUES
		151	1A	M	Slide partially or completely fell out of container. Slide assembly replaced/adjusted
		521	1B	M	Slide fell off of door/out of container. Reattached slide and cover or replaced slide.
		146	1C	M	Slide loose, partially out of container, loose within cover, or loose from housing/support
		57	1D	M	Slide out of position
		11	1E	M	Cover/container loose, Cover detached from housing—mechanical adjustment
		64	1F	M	Slide/arming/girt bar mechanisms hard to engage/disengage, not working properly
		109	1G	M	Girt bar/hook/bracket/lanyard/straps/cable loose or not attached or out of position
		70	1H	M	Girt assembly loose, out of position, excessive play out, ”Slide out of adjust”
		33	1J	M	Door opened from inside after disarming. Door did not disarm. Slide fell out of container/partially unpacked/deployed.
		15	1K	M	Door opened from outside. Door did not disarm. Slide fell out of container and partially deployed, or fully deployed.
454	17.03		2		PRESSURE INDICATOR/INFLATION MECHANICS
		417	2B	I	Pressure low/out of limits
		16	2C	C	Aspirator/valve related—broken, leakage, missing O-ring, etc.
		10	2D	C	Squib related
		10	2E	C	Pressure indicator window cracked, dirty, missing
		1	2F		Misc.
30	1.13		3		INADVERTENT DEPLOYMENT (other than accidentally opening armed door)
		10	3A	M	During flight - spontaneous partial/full deployment
		3	3B	M	On ground - spontaneous partial/full deployment
		1	3C	TM	On-ground - during installation or maintenance
		15	3D	M	On-ground - Partial/full deployment while opening door after disarming/closing door, girt related issues
		1	3E		Misc. or no identified reason

Table 8. The EESD Breakdown Showing Initial Incident Type Code and Subsequent Likely Cause Classification, Excluding Normal Deployments and SWAA Incident Type Code 1H (Continued)

Category Total	Percent of Category Total (%)	Subcategory Total	Incident Type Code	Likely Cause	Code Description
229	8.59		4		DEPLOYMENT/INFLATION PROBLEMS – DID NOT DEPLOY/INFLATE CORRECTLY WHEN ACTIVATED
		21	4A	I	Automatic inflation failed but manually inflated
		101	4B	I	Did not deploy, deployed with partial or no inflation, did not inflate within required time
		29	4C	P	Slide twisted or wrong orientation, Deployed partially within door frame
		8	4D	I	Aspirator, actuator, relief valve related
		23	4E	M	Girt bar, release assembly related
		23	4F	M	Cover, lanyard, strap, lacing, cable related
		3	4G	SM	Did not maintain pressure/tear in slide
		12	4H	U	Failed test (no specific cause mentioned)
		3	4J	U	Deployed during accident. Problems indicated in text of accident description.
		6	4K		Misc.
222	8.33		5		MATERIAL/COMPONENT DAMAGE
		20	5A	SM	Slide material punctured, torn, cut, or worn
		30	5B	C	Girt assembly/latch cable/lacing/lanyard frayed or torn
		3	5C	C	Slide cover punctured or damaged
		3	5D	SM	Slide seam delaminations or blisters (no leak indicated)
		30	5E	SM	Slide seam separation or tear
		18	5F	SM	Slide leaked - failed retention test, pinholes, no reasons given
		6	5G	SM	Aging - no description
		65	5H	C	Broken or worn parts other than slide material—Latch, bracket, pressure switch, hose, tubing ,bearings, etc.
		2	5J	P	Leak by aspirator joint or holes opposite aspirator
		44	5K	C	Corrosion on slide support fitting/girt bar mounts
		1	5L	C	Misc. - Girt assembly fabricated from unknown material
59	2.21		6		PACKING
		32	6A	P	Incorrect packing - no identified reason
		6	6B	P	Slide/aspirator damaged due to incorrect packing (per incident report)
		17	6C	P	Slide packing loose, broken laces

Table 8. The EESD Breakdown Showing Initial Incident Type Code and Subsequent Likely Cause Classification, Excluding Normal Deployments and SWAA Incident Type Code 1H (Continued)

Category Total	Percent of Category Total (%)	Subcategory Total	Incident Type Code	Likely Cause	Code Description
59	2.21		6		PACKING (Continued)
		4	6D	P	Repacking needed
214	8.03		7		INCORRECT INSTALLATION, INCORRECT PARTS
		32	7A	TM	Incorrect parts or missing parts
		10	7B	TM	Girt bar/firing mechanism
		76	7C	TM	Cable/lanyard/wiring routing problem
		13	7D	TM	Other identified cause
		83	7E	TM	Reason not given for incorrect installation
103	3.86		8		ELECTRICAL/FAULT MESSAGES
		44	8A	C	Failed emergency light amp/voltage/EPSU failure/pressure indicator LIGHT
		24	8B	C	Emergency lights on slide not working, Fault message for slide
		35	8C	C	Indicator lights/emergency buzzer/door sensor not working, misc.
11	0.41	11	9		DESIGN (no other information)
8	0.30	8	10	TM	MAINTENANCE (no other information)
159	5.96		11		MISCELLANEOUS
		12	11A	U	Slide inoperable, damaged (no stated reason), replaced without stated reason
		8	11B	TM	RII (Required inspection item) not done or not per regulation
		21	11C	TM	Shipping strip or Safety pin not removed/not in position for shipment
		11	11D	TM	Pack received with firing mechanism still armed
		11	11E		Misc.
		96	11F	U	Unknown (Not attributed to maintenance, design, inflation, etc. no other information)
2666	100.0	2666	TOTAL		

*M = Mech attachment; I = Inflation; P = Packing; SM = Slide material; C = Component/part; TM = Maintenance/Training; D = design; U = unknown

Data found using SDRs and NASA databases (limited and voluntary reporting), British CAA, airdisasters.com, various international civil aviation authorities, NASDAC. Concorde data excluded.

Data summarized from 1 January 1999 to 31 August 2006.

Some database reports indicated numerous problems or slides for a single entry. These entries were duplicated as-needed to show a separate record for each slide or problem.

Table 9. The EESD Breakdown Showing Initial Incident Type Code and Subsequent Likely Cause Classification, Excluding Normal Deployments and all SWAA

Category Total	Percent of Category Total (%)	Subcategory Total	Incident Type Code	Likely Cause	Code Description
434	30.26		1		MECHANICAL AND ATTACHMENT ISSUES
		68	1A	M	Slide partially or completely fell out of container. Slide assembly replaced/adjusted
		147	1B	M	Slide fell off of door/out of container. Reattached slide and cover or replaced slide.
		52	1C	M	Slide loose, partially out of container, loose within cover, or loose from housing/support
		3	1D	M	Slide out of position
		7	1E	M	Cover/container loose, Cover detached from housing – mechanical adjustment
		41	1F	M	Slide/arming/girt bar mechanisms hard to engage/disengage, not working properly
		26	1G	M	Girt bar/hook/bracket/lanyard/straps/cable loose or not attached or out of position
		70	1H	M	Girt assembly loose, out of position, excessive play out, "Slide out of adjust"
		9	1J	M	Door opened from inside after disarming. Door did not disarm. Slide fell out of container/partially unpacked/deployed.
		11	1K	M	Door opened from outside. Door did not disarm. Slide fell out of container & partially deployed, or fully deployed.
195	13.60		2		PRESSURE INDICATOR/INFLATION MECHANICS
		169	2B	I	Pressure low/out of limits
		14	2C	C	Aspirator/valve related—broken, leakage, missing O-ring, etc.
		10	2D	C	Squib related
		2	2E	C	Pressure indicator window cracked, dirty, missing
		0	2F		Misc.
22	1.53		3		INADVERTENT DEPLOYMENT (other than accidentally opening armed door)
		8	3A	M	During flight - spontaneous partial/full deployment
		2	3B	M	On ground - spontaneous partial/full deployment
		0	3C	TM	On-ground - during installation or maintenance
		11	3D	M	On-ground - Partial/full deployment while opening door after disarming/closing door, girt related issues
		1	3E		Misc. or no identified reason

Table 9. The EESD Breakdown Showing Initial Incident Type Code and Subsequent Likely Cause Classification, Excluding Normal Deployments and all SWAA (Continued)

Category Total	Percent of Category Total (%)	Subcategory Total	Incident Type Code	Likely Cause	Code Description
190	13.25		4		DEPLOYMENT/INFLATION PROBLEMS - DID NOT DEPLOY/INFLATE CORRECTLY WHEN ACTIVATED
		16	4A	I	Automatic inflation failed but manually inflated
		83	4B	I	Did not deploy, deployed with partial or no inflation, did not inflate within required time
		28	4C	P	Slide twisted or wrong orientation, Deployed partially within door frame
		8	4D	I	Aspirator, actuator, relief valve related
		15	4E	M	Girt bar, release assembly related
		22	4F	M	Cover, lanyard, strap, lacing, cable related
		2	4G	SM	Did not maintain pressure/tear in slide
		7	4H	U	Failed test (no specific cause mentioned)
		3	4J	U	Deployed during accident. Problems indicated in text of accident description.
		6	4K		Misc.
128	8.93		5		MATERIAL/COMPONENT DAMAGE
		14	5A	SM	Slide material punctured, torn, cut, or worn
		19	5B	C	Girt assembly/latch cable/lacing/lanyard frayed or torn.
		2	5C	C	Slide cover punctured or damaged
		1	5D	SM	Slide seam delaminations or blisters (no leak indicated)
		22	5E	SM	Slide seam separation or tear
		10	5F	SM	Slide leaked - failed retention test, pinholes, no reasons given
		6	5G	SM	Aging - no description
		41	5H	C	Broken or worn parts other than slide material - Latch, bracket, pressure switch, hose, tubing, bearings, etc.
		2	5J	P	Leak by aspirator joint or holes opposite aspirator
		11	5K	C	Corrosion on slide support fitting/girt bar mounts
		0	5L	C	Misc. - Girt assembly fabricated from unknown material
44	3.07		6		PACKING
		30	6A	P	Incorrect packing - no identified reason
		3	6B	P	Slide/aspirator damaged due to incorrect packing (per incident report)
		9	6C	P	Slide packing loose, broken laces
		2	6D	P	Repacking needed

Table 9. The EESD Breakdown Showing Initial Incident Type Code and Subsequent Likely Cause Classification, Excluding Normal Deployments and all SWAA (Continued)

Category Total	Percent of Category Total (%)	Subcategory Total	Incident Type Code	Likely Cause	Code Description
163	11.37		7		INCORRECT INSTALLATION, INCORRECT PARTS
		27	7A	TM	Incorrect parts or missing parts
		10	7B	TM	Girt bar/firing mechanism
		34	7C	TM	Cable/lanyard/wiring routing problem
		10	7D	TM	Other identified cause
		82	7E	TM	Reason not given for incorrect installation
95	6.62		8		ELECTRICAL/FAULT MESSAGES
		38	8A	C	Failed emergency light amp/voltage/EPSU failure/pressure indicator LIGHT
		23	8B	C	Emergency lights on slide not working, Fault message for slide
		34	8C	C	Indicator lights/emergency buzzer/door sensor not working, misc.
11	0.77	11	9		DESIGN (no other information)
8	0.56	8	10	TM	MAINTENANCE (no other information)
144	10.04		11		MISCELLANEOUS
		7	11A	U	Slide inoperable, damaged (no stated reason), replaced without stated reason
		8	11B	TM	RII (Required inspection item) not done or not per reg
		14	11C	TM	Shipping strip or Safety pin not removed/not in position for shipment
		11	11D	TM	Pack received with firing mechanism still armed
		9	11E		Misc.
		95	11F	U	Unknown (Not attributed to maintenance, design, inflation, etc. no other information)
1434	100.0	1434	TOTAL		

*M = Mech attachment; I = Inflation; P = Packing; SM = Slide material; C = Component/part; TM = Maintenance/Training; D = design; U = unknown

Data found using SDRs and NASA databases (limited and voluntary reporting), British CAA, airdisasters.com, various international civil aviation authorities, NASDAC. Concorde data excluded.

Data summarized from 1 January 1999 to 31 August 2006.

Some database reports indicated numerous problems or slides for a single entry. These entries were duplicated as-needed to show a separate record for each slide or problem.

3.2.3 Re-Examination of EESD Based on Likely Cause.

The data were re-examined using the likely cause categories. Figure 2 shows a revised graph illustrating the result. As before, mechanical attachment issues are the bulk of the reported incidents. The slide material items comprise only 1.8% of EESD As-is, 2.9% of the EESD without SWAA Incident Type Code 1H, and 3.7% of the EESD without any SWAA entries. The top four problems were related to mechanical attachment, inflation mechanics, maintenance/training, and components, regardless of which database is used. Table 10 summarizes the results.

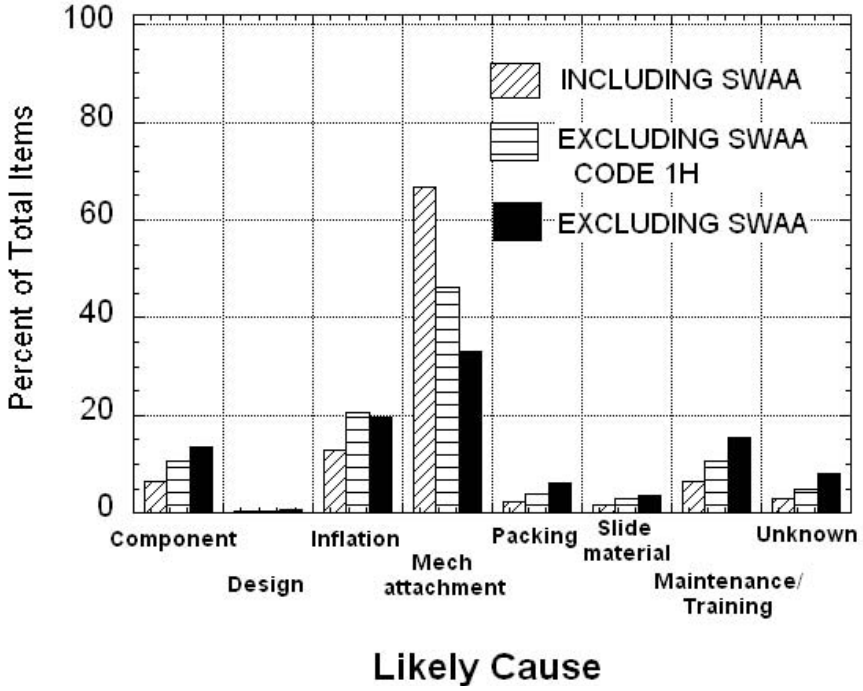

Figure 2. Breakdown of EESD by Likely Cause

Table 10. Summary of EESD Databases Categorized by Likely Causes for Incidents

	EESD As-Is (%)	EESD Without SWAA Entries for Incident Type Code 1H (%)	EESD Without SWAA Entries (%)
Mech attachment	66.8	46.1	32.9
Inflation	12.7	20.6	19.5
Maintenance/training	6.5	10.5	15.3
Component/part	6.5	10.5	13.5
Unknown	3.1	5.0	8.2
Packing	2.4	3.9	6.1
Slide material	1.8	2.9	3.7
Design	0.3	0.4	0.8

Figure 2, again, illustrates the large contribution of the SWAA Incident Type Code 1H entries. The patterns for the databases without SWAA Code 1A and without all SWAA entries were similar. As in the previous analysis, it suggests that the SWAA SDRs for the evacuation slide being out of position (Incident Type Code 1H) are the exception and not the norm, i.e., the other air operators do not consider this type of "repair" procedure an SDR-reportable item.

3.3 GENERAL TRENDS.

The top ten aircraft models with the most listings in the databases are summarized in table 11. The aircraft types remained the same for each database, although the relative ranking changed.

Table 11. Number of Entries for the Top Ten Aircraft Models Listed in Databases

EESD As-Is		EESD Without SWAA Entries for Incident Type Code 1H		EESD Without SWAA Entries	
Base Model	Number of Entries	Base Model	Number of Entries	Base Model	Number of Entries
B-737	3057	B-737	1401	DC-9	269
DC-9	269	DC-9	269	B-757	203
B-757	203	B-757	203	B-737	169
A320	152	A320	152	A320	152
B-747	92	B-747	92	B-747	92
B-767	83	B-767	83	B-767	83
A300	70	A300	70	A300	70
A319	66	A319	66	A319	66
MD-80	57	MD-80	57	MD-80	57
EMB146	39	EMB146	39	EMB146	39

Ranking by the number of entries is affected by the number of planes in service. A better method is to rank the airplanes normalized by operating hours [4]. The operating hour data represents total hours from 1999 through 2006 for U.S.-based carriers, as tracked by the U.S. Department of Transportation. It covers a slightly longer time period than that summarized in the EESD, which covers 1999 through August 2006. Since only 7 of the 1434 entries were from non-U.S. carriers, these entries were kept in the EESD_woSWAA database. Table 12 shows the relative ranking for the three different databases using the normalized data. A summary of the operating hours is in table 13.

Table 12. Ranking for the Top Ten Aircraft Models Normalized by Total Operating Hours

EESD As-Is		EESD Without SWAA Entries for Incident Type Code 1H		EESD Without SWAA Entries	
Base Model	Entries per Million Airborne Hours	Base Model	Entries per Million Airborne Hours	Base Model	Entries per Million Airborne Hours
B-737	97.7	DC-9	66.8	DC-9	66.8
DC-9	66.8	EMB146	51.5	EMB146	51.5
EMB146	51.5	B-737	44.8	A300	44.3
A300	44.3	A300	44.3	B-747	24.3
B-747	24.3	B-747	24.3	A320	19.7
A320	19.7	A320	19.7	B-757	13.6
B-757	13.6	B-757	13.6	A319	12.6
A319	12.6	A319	12.6	B-767	8.82
B-767	8.82	B-767	8.82	B-737	8.08
MD-80	4.40	MD-80	4.40	MD-80	4.40

Table 13. Operating Hours for Aircraft Models for U.S.-Based Carriers

	Year								
Base Aircraft Model	1999	2000	2001	2002	2003	2004	2005	2006	Total
B-737	3,472,128	3,856,883	3,922,595	3,828,891	3,802,122	4,123,368	4,109,379	4,165,195	31,280,561
B-747	460,184	503,419	473,045	438,086	418,274	509,030	500,200	485,795	3,788,033
B-757	1,724,324	1,876,678	1,809,748	1,860,646	1,790,975	1,877,046	1,955,793	2,007,140	14,902,350
B-767	1,089,360	1,136,783	1,159,558	1,187,407	1,050,023	1,238,237	1,294,271	1,259,387	9,415,026
A300	163,444	163,593	177,964	183,240	203,440	221,768	233,160	233,352	1,579,961
A319	177,159	347,603	494,478	639,236	761,168	862,944	955,125	996,857	5,234,570
A320	582,782	703,630	754,090	871,280	1,002,901	1,178,678	1,272,299	1,332,160	7,697,820
A330	-	16,729	42,292	42,511	50,438	88,915	122,376	142,181	505,442
DC-9	913,524	777,330	584,203	476,339	385,706	312,325	322,158	254,361	4,025,946
EMB146	83,645	110,729	108,725	99,803	113,771	108,185	97,721	35,252	757,831
MD-80	1,888,557	1,914,602	1,760,842	1,577,245	1,485,313	1,538,116	1,461,903	1,338,911	12,965,489
Total	10,555,107	11,407,979	11,287,540	11,204,684	11,064,131	12,058,612	12,324,385	12,250,591	92,153,029

Once again, the relative importance of SWAA entries is evident in the ranking. The B-737 tops the list for the databases, which include SWAA, even when normalized by operating hour. The B-737 drops to 9th place when SWAA entries are excluded. This, again, suggests that the EESD database is skewed by the number of SWAA entries. The following analyses focus on the EESD database without SWAA entries (EESD_wo SWAA).

Figures 3 through 12 illustrate the breakdown for the reported entries on the basis of millions of operating hours for different aircraft models. The relevant Airworthiness Directives (AD) for this time period are noted on the graphs. The entries in the EESD did not seem to reflect problems directly addressed by the ADs. However, they may have been found during the procedures required for AD implementation. The graphs are given in the same order as the rank listing from table 12 for the normalized EESD_woSWAA database.

Each aircraft model appears to have different underlying problems. The DC9, Embrear 146, and A300 appear to have the most problems with the EESs.

The mechanical attachment-related EESD entries were a persistent item for the DC9 from 2000 through 2005. However, these problems were practically eliminated in 2006, and the underlying issues related to inflation mechanics and maintenance/training became the major contributors to the normalized EESD data.

The sudden increase in the 2006 EMB146 normalized data in figure 4 reflects the 60% drop in operating hours for that year. The yearly number of EESD entries stayed relatively constant. The component issues in 2006 for the A300 were mainly for warning lights or buzzers and were not related to the slide.

The normalized data for the remaining aircraft showed less than 20 entries per million operating hours. The inflation mechanics problems noted for the B-747 and component entries for the B-767 may have been found during the maintenance required to comply with the various ADs.

The A320 component issues in 2006 were a mixture of corrosion and failed (broken) attachment parts. Both the A319 and the A320 had a high number of mechanical attachment entries in 1999 and 2000. Several ADs were issued related to this area. The overall number has decreased with time.

The graphs for the various aircraft models illustrate the small number of entries that are related to the slide material. The B-737 and B-757 were the two largest contributors of slide material entries into the EESD, with ten entries each. However, even these represented less than two entries per million operating hours. Mechanical attachment, component-related, inflation mechanics, and packing issues were persistent problems over all the years for all aircraft.

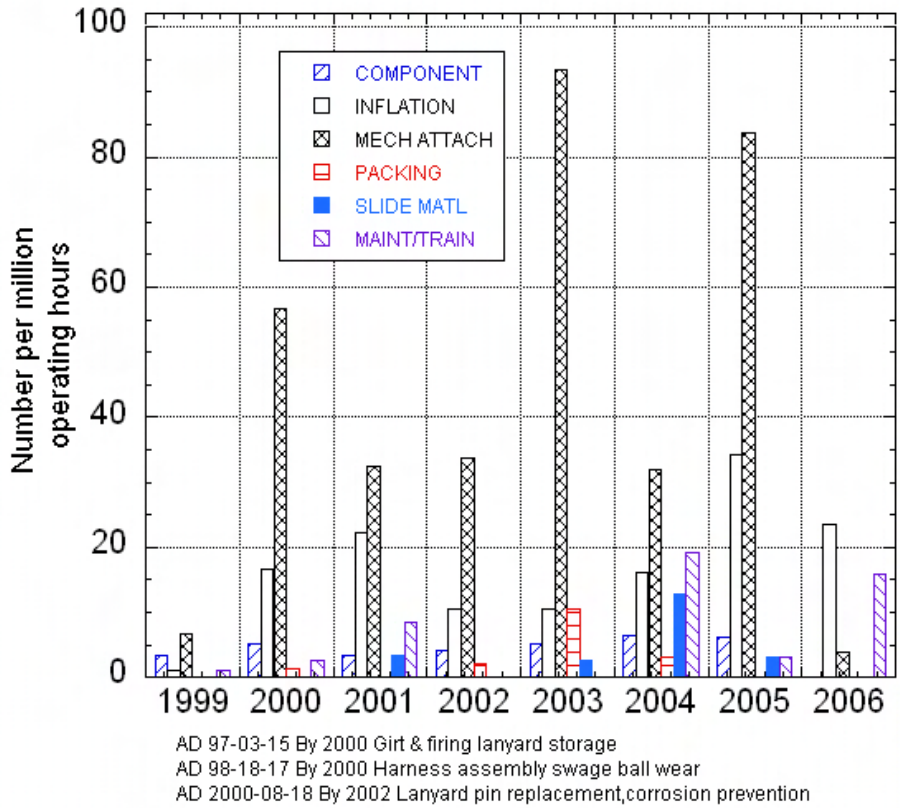

Figure 3. Likely Causes for EESD Entries for DC9

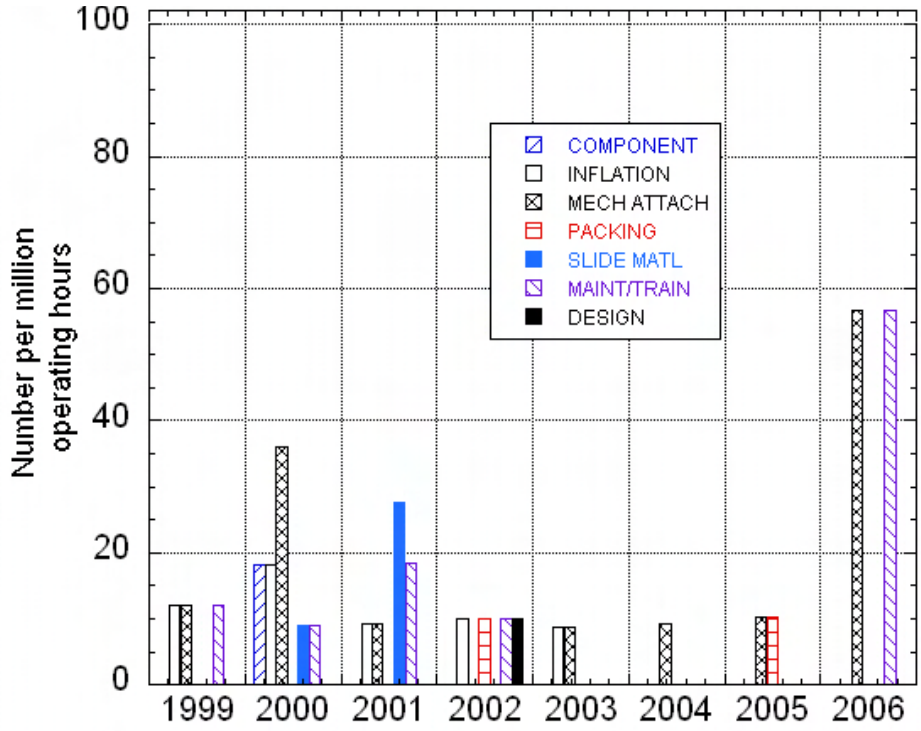

Figure 4. Likely Causes for EESD Entries for EMB146

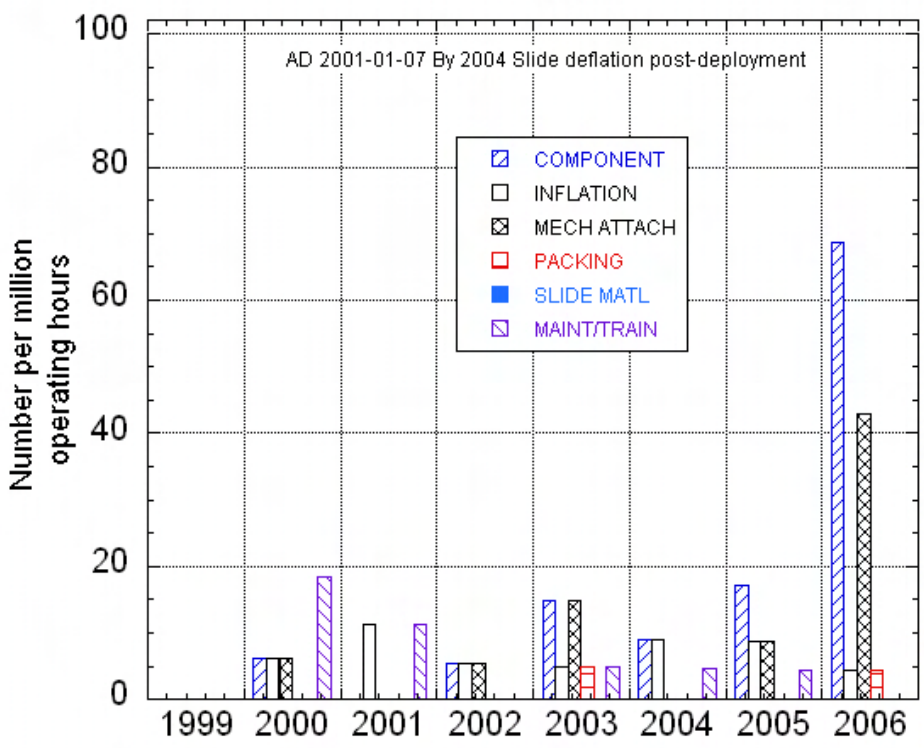

Figure 5. Likely Causes for EESD Entries for A300

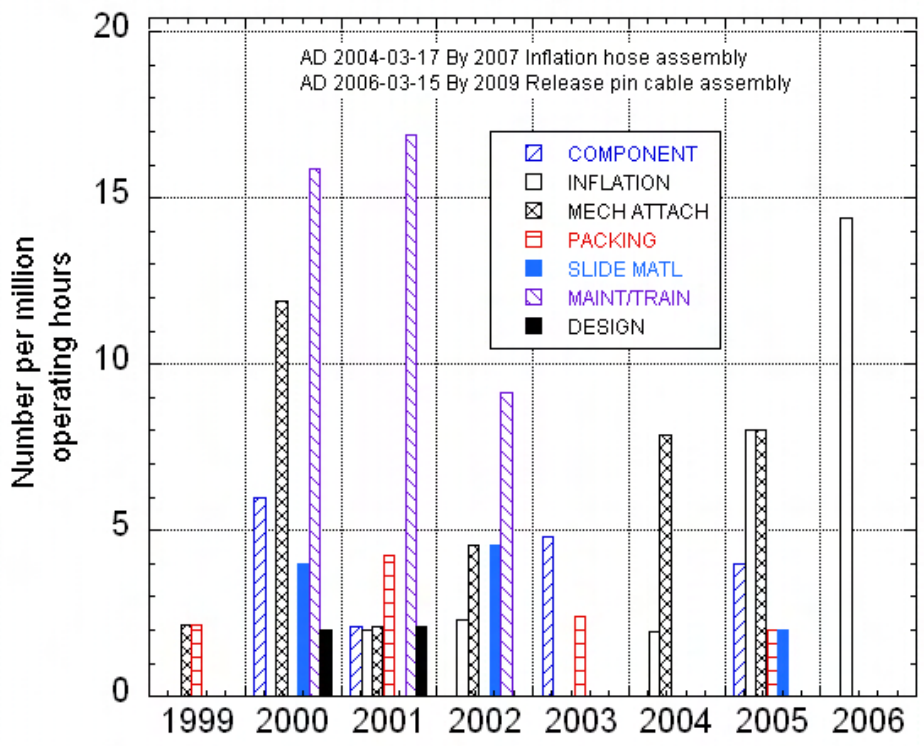

Figure 6. Likely Causes for EESD Entries for B-747

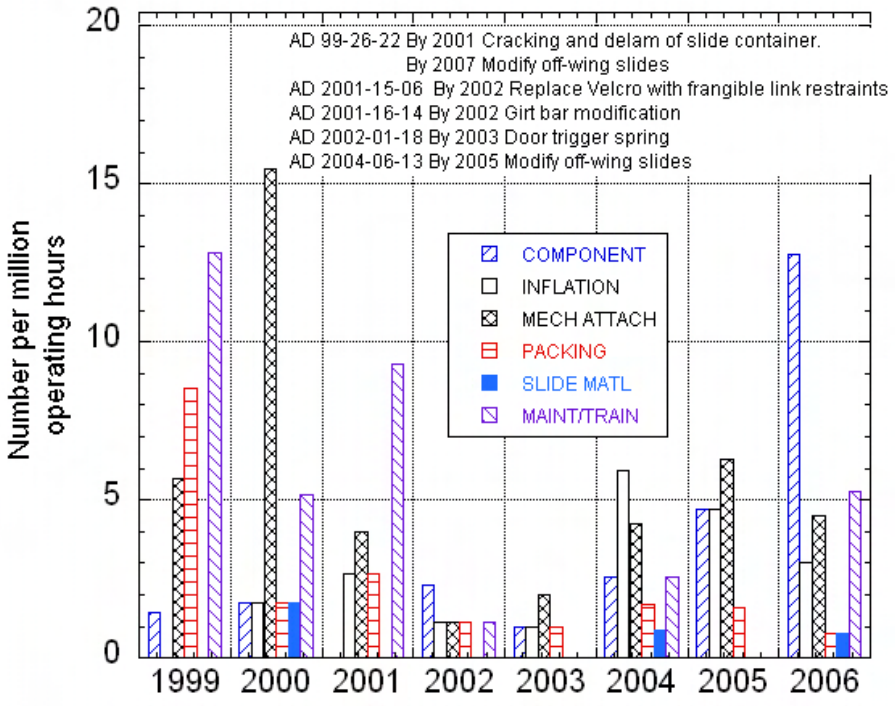

Figure 7. Likely Causes for EESD Entries for A320

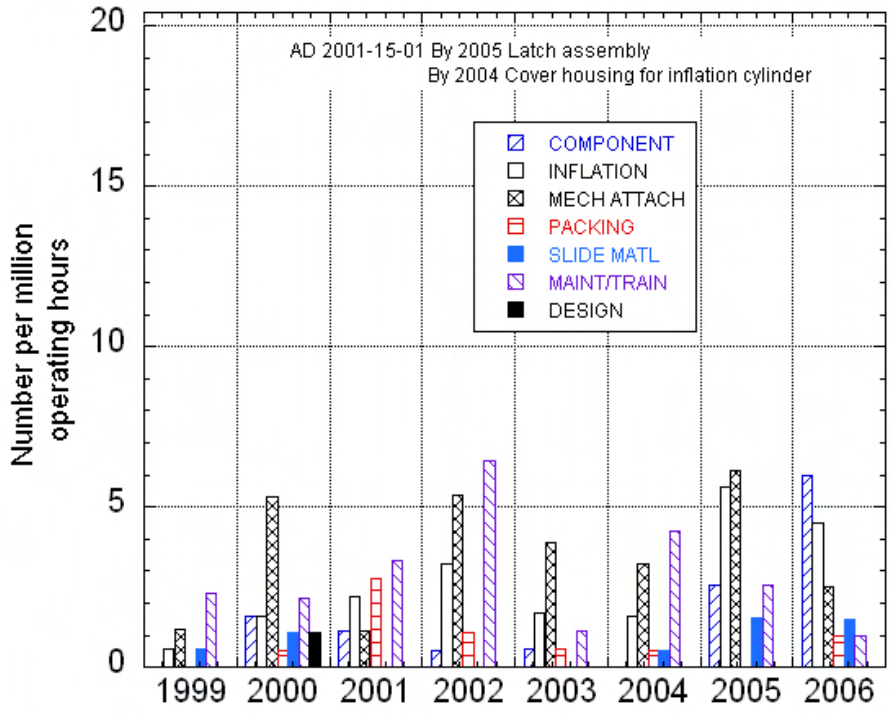

Figure 8. Likely Causes for EESD Entries for B-757

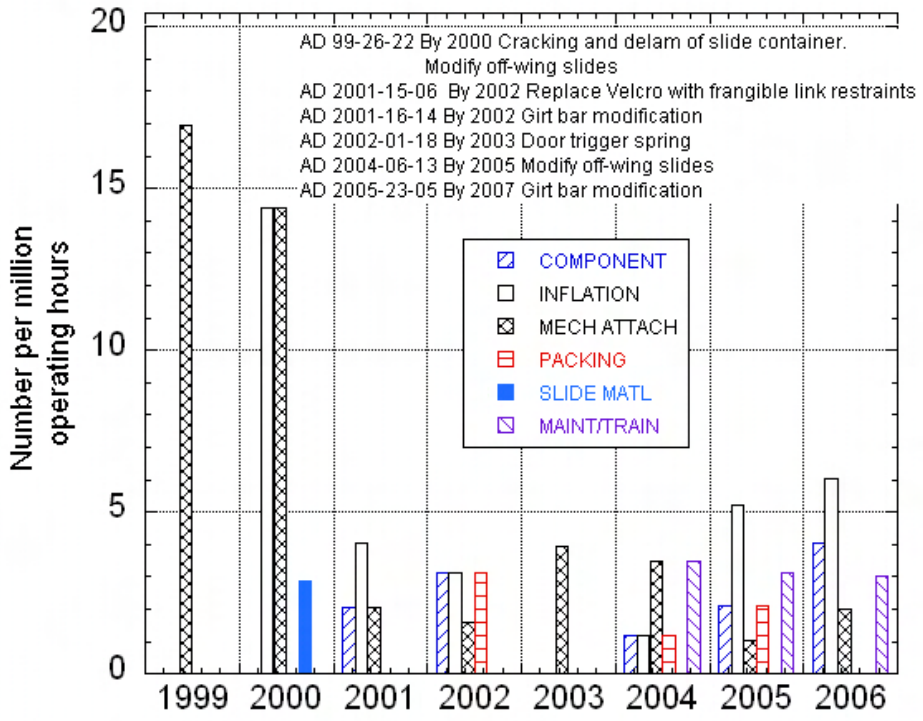

Figure 9. Likely Causes for EESD Entries for A319

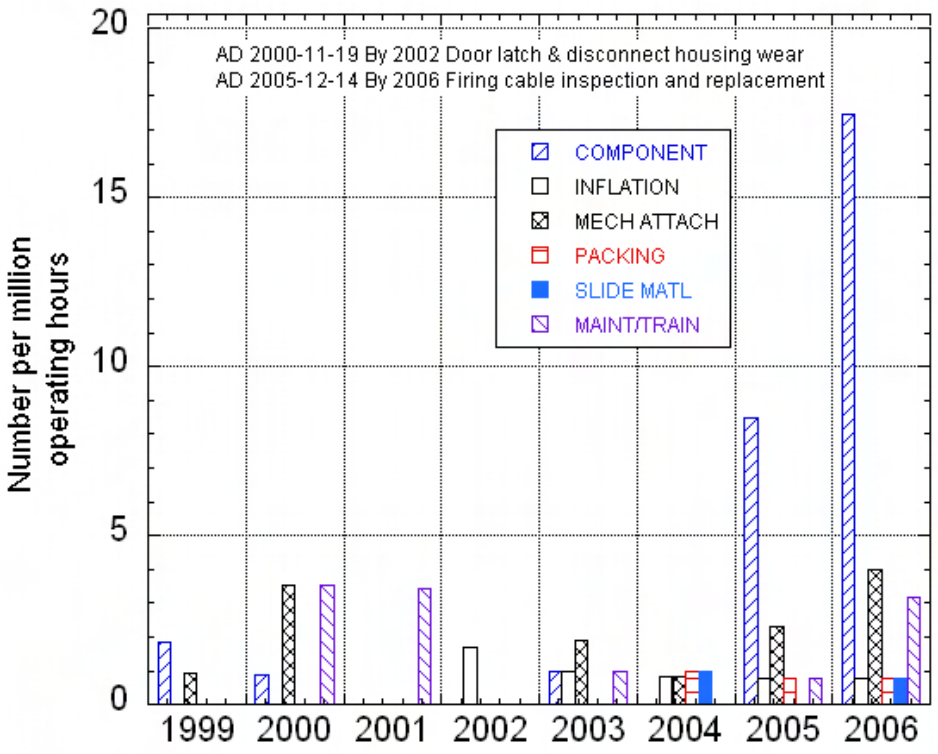

Figure 10. Likely Causes for EESD Entries for B-767

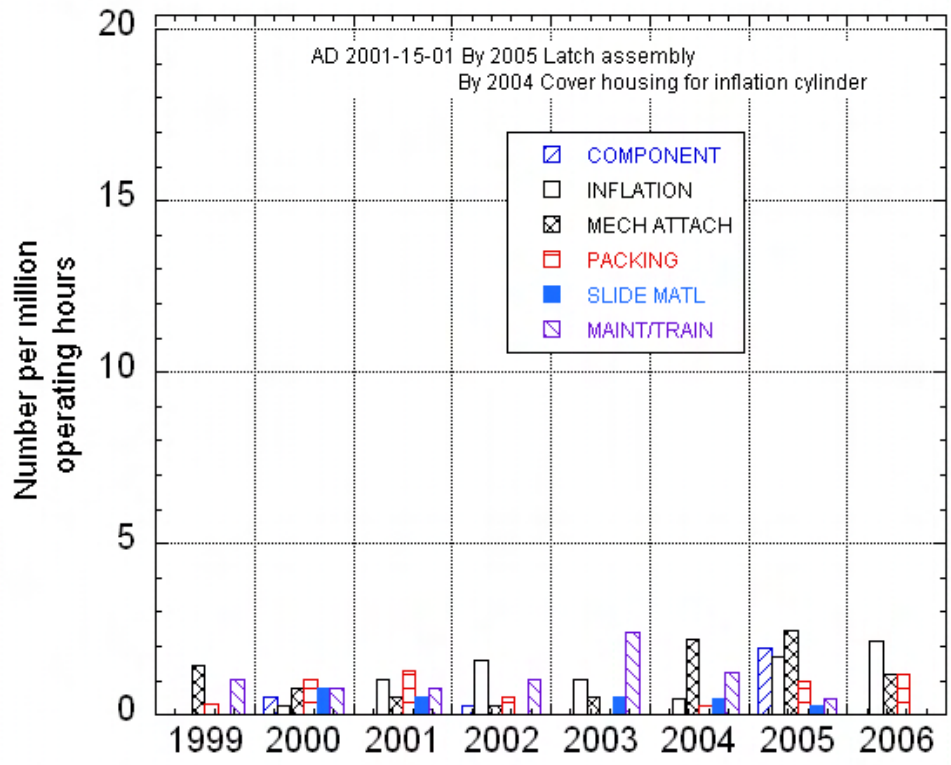

Figure 11. Likely Causes for EESD (Without SWAA) Entries for B-737

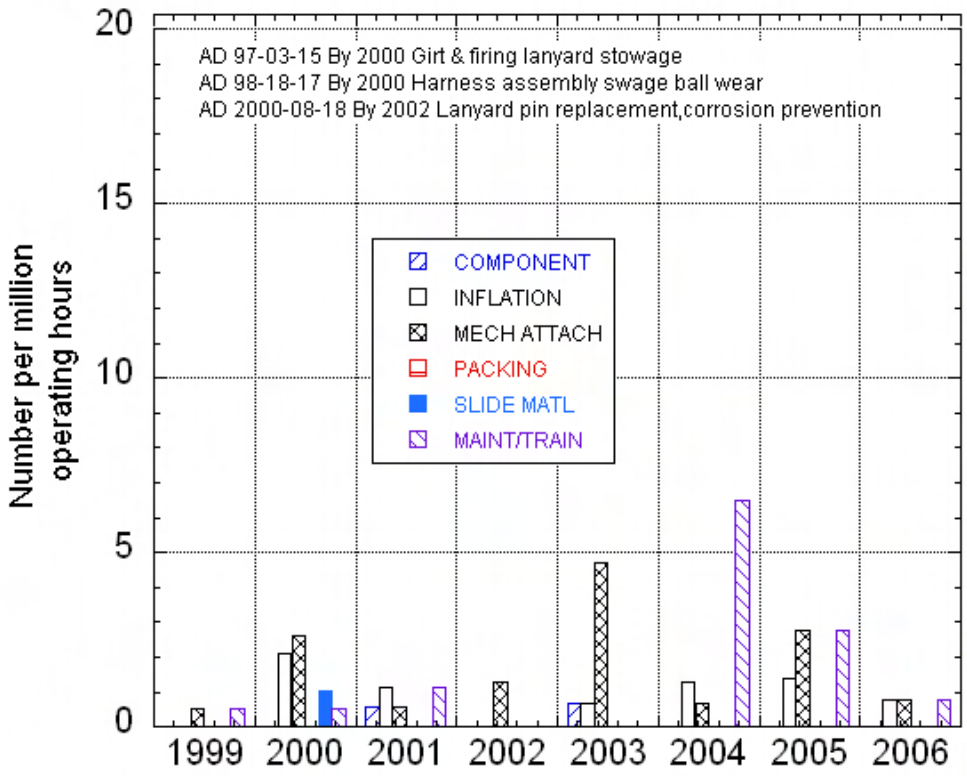

Figure 12. Likely Causes for EESD Entries for MD80

3.4 RECOMMENDATIONS.

The majority of reported EES issues are not due to problems related to slide material integrity or degradation. Reported slide abrasions, seam tears, punctures, or holes were probably due to improper handling during assembly or improper packing. A small and limited number of slide entries can be associated with material degradation or seam separation. Material-related EESD entries were mainly due to corrosion, failure, or wear of mechanical attachment components.

Mechanical attachment problems were the primary source of EESD entries, regardless of the aircraft model. The EES manufacturers do not have design responsibility for this portion of the EES, and the issue must be addressed by the mechanical attachment OEMs (The exception is the B-777, as mentioned in section 2.)

The requirements for the EES qualification tests need to be clarified. Some airlines report an inadvertent deployment as a successful test, meeting the requirement of a minimum of one EES deployment per plane model per fleet every 3 years. While an inadvertent deployment may serve as a go-no-go qualification test, it does not provide sufficient information regarding time of inflation or deflation.

Southwest Airlines' interpretation of 14 CFR 121.703 (17) for a reportable SDR is distinctly different from the rest of the industry. It is recommended that the FAA review the requirements and provide guidance to the airlines and maintenance operations for the correct interpretation of this regulation.

4. REFERENCES.

1. Technical Standard Order TSO-C69c, "Emergency Evacuation Slides, Ramps, Ramp/slides, and Slide/Rafts," DOT, FAA, Aircraft Certification Service, Washington, DC, 1999.

2. Title 14 CFR 121.703

3. Chittenden, P. and Roberts, S., "Escape Slides Continued Airworthiness Review," United Kingdom Civil Aviation Authority, Reference No. 9/40/25-64-01-PC02, 2003.

4. U.S. Department of Transportation Research and Innovative Technology Administration, Bureau of Transportation Statistics for Certified U.S. Air Carriers.

APPENDIX A—APPLICABLE AIRWORTHINESS DIRECTIVES: SUMMARY AND DETAILED DESCRIPTION

Table A-1. Summary of Applicable Airworthiness Directives

AD Number	Aircraft Effected	Purpose	Effective Time	Description of Directive
96-15-08	B-747	To prevent failure of the door 5 evacuation slide/raft to deploy properly.	Within 36 months of Sept. 3, 1996	Modify the door 5 evacuation slide/rafts in accordance with BF Goodrich Service Bulletin 7A1469-25-283, dated November 6, 1995.
97-03-15	DC9, MD81, MD82, MD83, MD87, MD88	To prevent in-cabin inflation of the evacuation slides.	Within 36 months of March 14, 1997	Modify the girt and firing lanyard stowage in accordance with BF Goodrich Service Bulletin 25-280, Revision 2, dated August 15, 1996.
98-18-17	DC9, MD81, MD82, MD83, MD87, MD88, MD90	To prevent failure of the tailcone emergency evacuation slide to deploy automatically due to incorrect diameter of the swaged balls on the wire rope of the harness assembly.	Within 180 days of Oct. 8, 1998	Perform a one-time inspection of the harness assembly of the tailcone emergency evacuation slide to determine the diameter of the swaged balls. If the swaged balls are within the limits specified, prior to further flight, reidentify and reinstall the harness assembly. If the swaged balls are outside the limits specified, prior to further flight, replace the harness assembly with a new harness assembly.
98-19-25	B-777	To prevent evacuee overload of the slide/raft.	Within 180 days of Oct. 22, 1998	Modify the sliding surfaces of the door 1 left and door 1 right evacuation slide/rafts
98-23-17	M300	To prevent the container release cable of the emergency evacuation slide/raft system from jamming.	Within 180 days of Dec. 21, 1998	Modify the emergency evacuation slide/raft system, in accordance with Airbus Service Bulletin A300-25-0465, dated October 31, 1997.
98-26-03	A321	To prevent the loss of the evacuation slides during flight.	Within 36 months of Dec. 31, 1998	Accomplish the modification and re-identification of the evacuation slide systems at left- and right-hand emergency exits 2 and 3, in accordance with Airbus Service Bulletin A320-25-1199, dated March 25, 1998.

Table A-1. Summary of Applicable Airworthiness Directives (Continued)

AD Number	Aircraft Effected	Purpose	Effective Time	Description of Directive
99-17-20	B-757	To prevent separation of the emergency evacuation slide from the airplane.	Within 18 months of Sept. 24, 1999	Modify the left and right off-wing emergency evacuation slide systems as applicable. For airplanes listed in Boeing Service Bulletin 757-25-0182, Revision 1, dated June 12, 1997: Modify in accordance with the service bulletin. For airplanes listed in Boeing Service Bulletin 757-25-0200, dated January 21, 1999: Install a bumper assembly on the bottom of the left and right off-wing escape slide carriers, and install new placards in the area of the maintenance access door, in accordance with the service bulletin.
99-22-07	A330, A340	To prevent improper deployment of the escape slide/raft and blockage of the door in the event of an emergency evacuation.	Within 2000 flight hours or 6 months (whichever later) of March 5, 2003	Perform a one-time detailed visual inspection of the rail release pins and parachute pins of the escape slide/raft pack assembly installed on all passenger/crew doors (type A) and emergency exit doors (type A or type 1) for correct installation. If either is found to be missing or incorrectly installed: Prior to further flight, remove and replace with a new pack assembly of the same part number.
			Within 36 months of March 5, 2003	Modify the escape slides/slide rafts on the passenger, crew, and emergency exit doors, including: replacing-with new or modified parts-the alignment bushing in the release rails, the existing rail release pin lanyards from the girt or girt attachment, and the rail adapters from the packboard.
99-26-22	A319, A320	To prevent the loss of the escape slides during flight.	Within 500 flight hours of Feb. 1, 2000	Perform a detailed visual inspection to detect cracking and delamination of each off-wing escape slide container, including the container door. Repeat the inspection thereafter at intervals not to exceed 18 months, until accomplishment of the actions required. If any crack or delamination is found during any inspection, prior to further flight, replace the discrepant container.
			Within 5 years of Feb. 1, 2002	Modify the off-wing escape slides (i.e., modifications, inspection, repair, and repacking). Modification of the escape slides constitutes terminating action for the repetitive inspections

Table A-1. Summary of Applicable Airworthiness Directives (Continued)

AD Number	Aircraft Effected	Purpose	Effective Time	Description of Directive
2000-08-18	DC9, MD88, MD90	To prevent the improper deployment of the evacuation slide.	Within 180 days of June 13, 2000	Replace the lanyard assembly pins of the evacuation slides with solid corrosion-resistant pins.
2000-11-19	B-767	To prevent non-deployment of an escape slide during an emergency evacuation.	Prior to 6,000 total flight hours or within 18 months (whichever later) of July 18, 2000	Perform a detailed visual inspection to detect wear or damage of the door latches and disconnect housings in the off-wing escape slide compartments. Repeat the inspection thereafter at intervals not to exceed 6,000 flight hours or 18 months, whichever occurs later. If any part is found to be worn or damaged during the inspections performed, prior to further flight, replace the worn or damaged part with a new part, and perform an adjustment of the off-wing escape slide system.
2001-01-07	A300, A310	To prevent deflation of the escape slide after deployment.	Within 34 months of Feb. 22, 2001	Modify the escape slides in accordance to stated Service Bulletin.
2001-15-01	B-727, B-737, B-757	To prevent failure of an escape slide to deploy or inflate correctly.	Within 36 months of Aug. 28, 2001	Modify the escape slide latch assembly in accordance with stated Service Bulletin.
			Within 18 months of Aug. 28, 2002	Install a cover assembly on the trigger housing of the inflation cylinder on the escape slides in accordance with stated Service Bulletin.
2001-15-06	A319, A320, A321	To prevent the ingestion of sill support-log material into the aspirator of the escape slide.	Within 9 months of Aug. 27, 2001	Modify the forward and aft emergency evacuation slides by replacing the Velcro restraints for the support logs with frangible link restraints.
2001-16-14	A319, A320, A321	To prevent failure of the escape slide/raft to deploy correctly.	Within 1500 flight hours [date not provided in file]	Modify the telescopic girt bar of the escape slide/raft assembly installed on all passenger and crew doors and do a functional test to ensure the girt bar does not retract. If the girt bar retracts, before further flight, replace any discrepant parts and do another functional test to ensure the girt bar does not retract.

Table A-1. Summary of Applicable Airworthiness Directives (Continued)

AD Number	Aircraft Effected	Purpose	Effective Time	Description of Directive
2002-01-18	A319, A320, A321	To prevent corrosion of the trigger spring on the slide bar of the forward and aft passenger doors.	Within 18 months of March 6, 2002 or within 30 months of manufactured date	Replace the carbon-steel trigger spring on each of the forward and aft passenger doors with a stainless steel trigger spring.
2002-02-07	A330, A340	To prevent failure of the spring locking function of the slider due to corrosion.	Within 550 flight hours of March 19, 2002 or within 18 months of manufactured date	Perform a detailed visual inspection and an operational check of the spring function of the emergency exit door slider mechanism. If all sliders lock properly: Before further flight, apply corrosion inhibitor to the sliders. If any slider does not lock properly: Before further flight, repair the slider or replace it with a new part, and apply corrosion inhibitor to the sliders.
2004-03-01	B-777	To prevent failure of the slide/raft to properly inflate.	Within 2 months of March 11, 2004	Uninstalled slide/raft systems, repack before installation.
			Within 18 months of March 11, 2004	Repack the slide/raft at the next required normal maintenance schedule of the slide/raft system.
2004-03-17	B-747	To prevent the failure of an emergency slide or slide/raft to fully inflate during an emergency situation.	Within 36 months of March 17, 2004	Perform a one-time inspection of the part number information label on each inflation hose assembly on each emergency evacuation slide or slide/raft to determine the manufacturing/test date of the inflation hose assembly. For any inflation hose assembly having a manufacturing/test date before May 30, 1983, or on which the manufacturing/test date cannot be determined: Before further flight, replace the subject inflation hose assembly with a new or serviceable hose assembly having a manufacturing/test date on or after May 30, 1983.
2004-06-13	A319, A320	To prevent the loss of the emergency evacuation slides during flight.	Within 3 years of April 30, 2004	Modify the left and right off-wing emergency evacuation slides.
			Within 5 years after February 1, 2000	Modify the off-wing emergency evacuation slides (i.e., modifications, inspection, repair, and repacking).

Table A-1. Summary of Applicable Airworthiness Directives (Continued)

AD Number	Aircraft Effected	Purpose	Effective Time	Description of Directive
2005-12-14	B-767	To prevent injury normal operating conditions and to prevent interference with evacuation due to uncommanded inflation of the airplane of a door-mounted escape slide/raft.	Within 30 days of June 30, 2005	Perform a one-time inspection to determine if any Goodrich door-mounted escape slide/raft having P/N 5A3294-1, 5A3294-2, 5A3295-1, or 5A3295-3 is installed. Perform a one-time check of the airplane maintenance records to determine if any specified door-mounted escape slide/raft is installed. If specified equipment is installed, perform a tension check on the firing cable of the slide/raft. If any excessive tension of the firing cable is detected, before further flight, do the applicable corrective actions; in accordance with the Boeing ASB 767-25A0390.
2005-23-05	A319	To prevent failure of the escape slide/raft to deploy correctly.	Within 20 months of Dec. 19, 2005	Accomplish all applicable actions specified in the Accomplishment Instructions of Airbus Service Bulletin A320-52-1112, Revision 05, dated June 25, 2004. Accomplishing these actions terminates the repetitive functional tests required of modification of the telescopic girt bar of the escape slide/raft assembly and install a placard on each modified girt bar.
2006-03-15	B-747	To prevent improper deployment of the escape slide/raft or blockage of the passenger/crew doors in the event of an emergency evacuation	Within 36 months of April 10, 2006	Modify the escape slide/raft pack assembly (includes removing the slide packs, replacing the cover release pin cable assemblies with new assemblies, and removing the cable guard bracket, as applicable). Prior to or concurrently with accomplishment of this AD, modify the outboard cover panel of the cable release sliders of the floor-mounted upper deck slide pack assembly.
2006-04-03	A330, A340	To prevent failure of an emergency evacuation slide raft to deploy and inflate during an emergency situation.	Within 18 months of March 24, 2006	Determine the part number of the emergency slides or slide rafts fitted on the door types and locations listed in the table of this AD. If any affected slides or slide rafts are found installed on the airplane: Modify the regulator valves of the slide and slide raft assemblies at the applicable time specified in this AD.

EES AD's from 1996 to 2006

96-15-08 BOEING: Amendment 39-9698. Docket 95-NM-218-AD.

Model 747-400 series airplanes equipped with BFGoodrich Evacuation Slide/Rafts at door 5; having slide/raft assembly part number 7A1469-1, -2, -3, -4, -7, -8, -9, -10, -11, or -12 (all unit serial numbers); certificated in any category.

To prevent failure of the door 5 evacuation slide/raft to deploy properly, which could contribute to injury of passengers on the slide and could delay or impede the evacuation of passengers during an emergency, accomplish the following:

Within 36 months after the effective date of this AD, modify the door 5 evacuation slide/rafts in accordance with BFGoodrich Service Bulletin 7A1469-25-283, dated November 6, 1995.

This amendment becomes effective on September 3, 1996.

97-03-15 MCDONNELL DOUGLAS: Amendment 39-9920. Docket 96-NM-124-AD.

Model DC-9-10, -20, -30, -40, and -50 series airplanes; Model DC-9-81 (MD-81), DC-9-82 (MD-82), DC-9-83 (MD-83), DC-9-87 (MD-87) series airplanes, Model MD-88 airplanes; and C-9 (military) series airplanes; equipped with BFGoodrich Evacuation Slides, as listed in BFGoodrich Service Bulletin 25-280, Revision 2, dated August 15, 1996; certificated in any category.

To prevent in-cabin inflation of the evacuation slides, which could contribute to injury of passengers and/or flightcrew in the passenger cabin, accomplish the following: Within 36 months after the effective date of this AD, modify the girt and firing lanyard stowage in accordance with BFGoodrich Service Bulletin 25-280, Revision 2, dated August 15, 1996. This amendment becomes effective on March 14, 1997.

98-18-17 MCDONNELL DOUGLAS: Amendment 39-10733. Docket 98-NM-10-AD.

All Model DC-9-81 (MD-81), DC-9-82 (MD-82), DC-9-83 (MD-83), and DC-9-87 (MD-87) series airplanes; and Model MD-88 and MD-90-30 airplanes; certificated in any category.

To prevent failure of the tailcone emergency evacuation slide to deploy automatically due to incorrect diameter of the swaged balls on the wire rope of the harness assembly, accomplish the following:

Within 180 days after the effective date of this AD, perform a one-time inspection of the harness assembly of the tailcone emergency evacuation slide to determine the diameter of the swaged balls; in accordance with McDonnell Douglas Alert Service Bulletin MD80-25A364 [for Model DC-9-81 (MD-81), DC-9-82 (MD-82), DC-9-83 (MD-83), and DC-9-87 (MD-87) series airplanes, and Model MD-88 airplanes]; or MD90-25A030 (for Model MD-90-30 airplanes); both dated October 30, 1997.

If the swaged balls are within the limits specified in the applicable alert service bulletin, prior to further flight, reidentify and reinstall the harness assembly in accordance with the applicable alert service bulletin.

If the swaged balls are outside the limits specified in the applicable alert service bulletin, prior to further flight, replace the harness assembly having part number (P/N) 8370024-3 with a new harness assembly having P/N 8370024-9 or 8370024-3H, as applicable, in accordance with the applicable alert service bulletin.

As of the effective date of this AD, no person shall install a harness assembly, (P/N) 8370024-3, on any airplane.

This amendment becomes effective on October 8, 1998.

98-19-25 BOEING: Amendment 39-10766. Docket 97-NM-95-AD.

Model 777-200 series airplanes, line positions 2 through 48 inclusive, excluding line positions 10, 41, 43, and 47; equipped with Air Cruisers evacuation slide/rafts, as identified in Air Cruisers Service Bulletin S.B. 777-107-25-02, dated October 29, 1996; certificated in any category.

To prevent evacuee overload of the slide/raft, and consequent impeded evacuation and injury to the evacuees, accomplish the following:

Within 180 days after the effective date of this AD, modify the sliding surfaces of the door 1 left and door 1 right evacuation slide/rafts, in accordance with Boeing Alert Service Bulletin 777-25A0035, dated December 2, 1996.

This amendment becomes effective on October 22, 1998.

98-23-17 AIRBUS INDUSTRIE: Amendment 39-10885. Docket 98-NM-234-AD.

Model A300 series airplanes equipped with Air Cruisers emergency evacuation slide/rafts having part numbers (P/N) D30457-Series, serial numbers (S/N) 1001 through 2268 inclusive, or P/N D30477-Series, S/N 4001 through 4211 inclusive, on which the actions described in Air Cruisers Service Bulletin S.B. 25-88, Revision 3, dated May 4, 1983, have been not accomplished; certificated in any category.

To prevent the container release cable of the emergency evacuation slide/raft system from jamming, which could result in the inability to open the emergency exit doors or to correctly deploy the emergency evacuation slide/rafts, and consequent delay, or impedance of passengers exiting the airplane during an emergency, accomplish the following:

Within 36 months after the effective date of this AD, modify the emergency evacuation slide/raft system, in accordance with Airbus Service Bulletin A300-25-0465, dated October 31, 1997.

As of the effective date of this AD, no person shall install an evacuation slide/raft system having Air Cruisers P/N D30457-Series, S/N 1001 through 2268 inclusive, or P/N D30477-Series, S/N 4001 through 4211 inclusive, on any airplane, unless the slide/raft system has been modified in accordance with this AD.

This amendment becomes effective on December 21, 1998.

98-26-03 AIRBUS INDUSTRIE: Amendment 39-10944. Docket 98-NM-302-AD.

Model A321 series airplanes, except those on which Airbus Modification 27036 has been installed; or on which the action described in Airbus Industrie Service Bulletin A320-25-1199, dated March 25, 1998, has been accomplished; certificated in any category.

To prevent the loss of the evacuation slides during flight, which could result in damage to the empennage, or inability of airplane occupants to use certain exit doors during an emergency; accomplish the following:

Within 36 months after the effective date of this AD: Accomplish the modification and re-identification of the evacuation slide systems at left- and right-hand emergency exits 2 and 3, in accordance with Airbus Service Bulletin A320-25-1199, dated March 25, 1998.

As of the effective date of this AD, no person shall install on any airplane, an evacuation slide system having part number 62292-101, 62292-102, 62293-101, 62293-102, 62292-103, 62292-104, 62293-103, or 62293-104.

This amendment becomes effective on December 31, 1998.

99-17-20 BOEING: Amendment 39-11266. Docket 99-NM-06-AD.

Model 757-200 and -300 series airplanes equipped with off-wing emergency evacuation slides, as listed in Boeing Service Bulletin 757-25-0182, Revision 1, dated June 12, 1997, or Boeing Service Bulletin 757-25-0200, dated January 21, 1999; certificated in any category.

To prevent separation of the emergency evacuation slide from the airplane, which could result in damage to the fuselage and unavailability of an escape slide during an emergency evacuation, accomplish the following:

Within 18 months after the effective date of this AD: Modify the left and right off-wing emergency evacuation slide systems by accomplishment of this AD, as applicable.

For airplanes listed in Boeing Service Bulletin 757-25-0182, Revision 1, dated June 12, 1997: Modify the door latch system of the left and right off-wing emergency evacuation slide systems in accordance with the service bulletin.

For airplanes listed in Boeing Service Bulletin 757-25-0200, dated January 21, 1999: Install a bumper assembly on the bottom of the left and right off-wing escape slide carriers, and install new placards in the area of the maintenance access door, in accordance with the service bulletin.

This amendment becomes effective on September 24, 1999.

99-22-07 AIRBUS INDUSTRIE: Amendment 39-11385. Docket 99-NM-181-AD.

Model A330 series airplanes, certificated in any category, serial numbers 12 through 223 inclusive, except serial numbers 181, 195, 209, and 222; and Model A340 series airplanes, certificated in any category, serial numbers 2 through 233 inclusive, except serial number 204.

To prevent improper deployment of the escape slide/raft and blockage of the door in the event of an emergency evacuation, accomplish the following:

Within 2,000 flight hours or 6 months after the effective date of this AD, whichever occurs later: Perform a one-time detailed visual inspection of the rail release pins and parachute pins of the escape slide/raft pack assembly installed on all passenger/crew doors (type A) and emergency exit doors (type A or type 1) for correct installation, in accordance with Airbus Industrie Service Bulletin A330-25-3086 (for Model A330 series airplanes) or A340-25-4115 (for Model A340 series airplanes), both Revision 01, both dated June 11, 1999.

During the inspection performed in accordance with this AD, if a rail release pin of the escape slide/raft pack assembly is found to be missing or incorrectly installed: Prior to further flight, re-install the rail release pin into the release rail or, if re-installation is not possible, remove the discrepant escape slide/raft pack assembly and replace with a new pack assembly of the same part number; in accordance with the applicable service bulletin.

During the inspection performed in accordance with of this AD, if a parachute pin of the escape slide/raft pack assembly is found to be missing or incorrectly installed: Prior to further flight, remove the discrepant escape slide/raft pack assembly and replace with a new pack assembly of the same part number; in accordance with the applicable service bulletin.

For the purposes of this AD, a detailed inspection is defined as: "An intensive visual examination of a specific structural area, system, installation, or assembly to detect damage,

failure, or irregularity. Available lighting is normally supplemented with a direct source of good lighting at intensity deemed appropriate by the inspector. Inspection aids such as mirror, magnifying lenses, etc., may be used. Surface cleaning and elaborate access procedures may be required."

Within 36 months after the effective date of this AD: Modify the escape slides/slide rafts on the passenger, crew, and emergency exit doors. The modification includes replacing-with new or modified parts-the alignment bushing in the release rails, the existing rail release pin lanyards from the girt or girt attachment, and the rail adapters from the packboard. Do the modification in accordance with Airbus Service Bulletin A330-25-3126 (for Model A330 series airplanes) or A340-25-4152 (for Model A340 series airplanes), both dated August 7, 2001. If the modification is done within the compliance time for the inspection specified in this AD, the inspection is not required.

This amendment becomes effective on March 5, 2003.

99-26-22 AIRBUS INDUSTRIE: Amendment 39-11481. Docket 96-NM-92-AD.

Model A319 and A320 series airplanes,

To prevent the loss of the escape slides during flight, which could make the emergency exits located over each wing unusable and result in damage to the fuselage, accomplish the following:

Within 500 flight hours after the effective date of this AD. Perform a detailed visual inspection to detect cracking and delamination of each off-wing escape slide container, including the container door, in accordance with Airbus Service Bulletin A320-25-1161, Revision 01, dated February 2, 1999. Repeat the inspection thereafter at intervals not to exceed 18 months, until accomplishment of the actions required this AD.

Within 90 days after detection of the crack or delamination, repair in accordance with the service bulletin, and continue inspecting in accordance with this AD. If any crack or delamination is found during any inspection required by this AD that exceeds the limits specified in Airbus Service Bulletin A320-25-1161, Revision 01, dated February 2, 1999: Prior to further flight, replace the discrepant container with a serviceable container in accordance with the service bulletin, and continue inspecting in accordance with this AD.

Within 5 years after the effective date of this AD, modify the off-wing escape slides (i.e., modifications, inspection, repair, and repacking) in accordance with Airbus Service Bulletin A320-25-1156, Revision 01, dated February 2, 1999. Modification of the escape slides constitutes terminating action for the repetitive inspections required by this AD.

This amendment becomes effective on February 1, 2000.

2000-08-18 MCDONNELL DOUGLAS: Amendment 39-11704. Docket 97-NM-244-AD.

Model DC-9 series airplanes, and Model MD-88 airplanes, as listed in McDonnell Douglas Alert Service Bulletin DC9-25A357, Revision 02, dated May 28, 1998; and Model MD-90-30 airplanes, as listed in McDonnell Douglas Alert Service Bulletin MD90-25A019, dated February 11, 1997; certificated in any category.

To prevent the improper deployment of the evacuation slide, which could delay or impede evacuation of passengers during an emergency, accomplish the following:

Within 180 days after the effective date of this AD, replace the lanyard assembly pins of the evacuation slides with solid corrosion-resistant pins, in accordance with McDonnell Douglas Alert Service Bulletin MD80-25A357, dated February 11, 1997, Revision 01, dated March 16,

1998, or Revision 02, dated May 28, 1998 (for Model DC-9 series airplanes and Model MD-88 airplanes); or McDonnell Douglas Alert Service Bulletin MD90-25A019, dated February 11, 1997 (for Model MD-90-30 airplanes); as applicable.

As of the effective date of this AD, no lanyard assembly, part number (P/N) 3961899-1 or P/N 3956939-501, shall be installed on any airplane unless that assembly has been modified in accordance with the requirements of this AD.

This amendment becomes effective on June 13, 2000.

2000-11-19 BOEING: Amendment 39-11767. Docket 98-NM-313-AD.

Model 767-200 and -300 series airplanes, as listed in Boeing Alert Service Bulletin 767-25A0260, dated July 9, 1998; certificated in any category; except Model 767 series airplanes that have undergone conversion to freighter configurations, and on which the off-wing escape system has been removed or deactivated.

To prevent non-deployment of an escape slide during an emergency evacuation, which could slow down the evacuation of the airplane and result in injury to passengers or flightcrew; and to detect damaged disconnect housings in the off-wing escape slide compartments, which could result in unexpected deployment of an escape slide during maintenance, and consequent injury to maintenance personnel; accomplish the following:

Prior to the accumulation of 6,000 total flight hours, or within 18 months after the effective date of this AD, whichever occurs later, perform a detailed visual inspection to detect wear or damage of the door latches and disconnect housings in the off-wing escape slide compartments, in accordance with Boeing Alert Service Bulletin 767-25A0260, dated July 9, 1998. Repeat the inspection thereafter at intervals not to exceed 6,000 flight hours or 18 months, whichever occurs later.

If any part is found to be worn or damaged during the inspections performed in accordance with this AD, prior to further flight, replace the worn or damaged part with a new part, and perform an adjustment of the off-wing escape slide system, in accordance with Boeing Alert Service Bulletin 767-25A0260, dated July 9, 1998.

This amendment becomes effective on July 18, 2000.

2001-01-07 AIRBUS INDUSTRIE: Amendment 39-12077. Docket 2000-NM-72-AD. The following airplanes, certificated in any category:

Model	Equipped With Any BF Goodrich Slide Having Part Number	Excluding Airplanes Modified In Accordance With
A300 B2 Series A300 B4 Series	7A1296-001 7A1298-001 7A1296-002 7A1298-002 7A1296-003 7A1298-003 7A1296-004 7A1298-004	Airbus Service Bulletin A300-25-0466, Revision 01, dated December 1, 1999; or BF Goodrich Service Bulletin 7A1296/7A1298-25-298, dated January 15, 1999.
A300 B4-600 Series A300 B4-600R Series A300 F4-600R Series	7A1296-001 7A1298-001 7A1296-002 7A1298-002 7A1296-003 7A1298-003 7A1296-004 7A1298-004	Airbus Service Bulletin A300-25-6146, Revision 01, dated December 1, 1999; or BF Goodrich Service Bulletin A1296/7A1298-25-298, dated January 15, 1999.
A310 Series	7A1298-001 7A1298-003 7A1298-002 7A1298-004	Airbus Service Bulletin A310-25-2133, dated June 21, 1999; BF Goodrich Service Bulletin or 7A1296/7A1298-25-298, dated January 15, 1999.

To prevent deflation of the escape slide after deployment, which could result in a delay during an emergency evacuation, accomplish the following:

Within 34 months after the effective date of this AD, modify the escape slides in accordance with the applicable Airbus service bulletin listed in Table 1 of this AD, as follows:

Model	Service Bulletin	Revision Level	Date
A300	A300-25-0466	01	December 1, 1999
A300-600	A300-25-6146	01	December 1, 1999
A310	A310-25-2133	Original	June 21, 1999

As of the effective date of this AD, no person shall install, on any airplane, a BFGoodrich escape slide having a part number listed in Table 2 of this AD, unless that slide has been modified in accordance with this AD:

7A1296-001	7A1298-003	7A1298-002
7A1296-003	7A1296-002	7A1298-004
7A1298-001	7A1296-004	

This amendment becomes effective on February 22, 2001.

2001-15-01 Boeing: Amendment 39-12335. Docket 2000-NM-159-AD.

The following airplanes, certificated in any category:

Model	As listed in	Service bulletin date
727-100 and 727-200 series	Boeing Service Bulletin 727-25-0294	May 25, 2000.
737-100, -200, -200C, -300, -400, and -500 series.	Boeing Service Bulletin 737-25-1405	May 25, 2000.
737-600, -700, and -800 series	Boeing Special Attention Service Bulletin 737-25-1403.	May 4, 2000.
737-600, -700, and -800 series	Boeing Service Bulletin 737-25-1404	May 25, 2000.
757-200 and -200CB series	Boeing Service Bulletin 757-25-0217	May 25, 2000.
757-300 series	Boeing Service Bulletin 757-25-0218	May 25, 2000.

To prevent failure of an escape slide to deploy or inflate correctly, which could result in the slide being unusable during an emergency evacuation and consequent injury to passengers or airplane crewmembers, accomplish the following:

At the schedule specified in the following table, do the actions in the "Do these actions" column, per the service bulletin specified in the "As listed in" column:

For model	As listed in	Dated	Do these actions	No later than
727-100 and 727-200 series	Boeing Service Bulletin 727-25-0294.	May 25, 2000	Modify the escape slide latch assembly.	36 months after the effective date of this AD.
737-100, -200, -200C, -300, -400, and -500 series.	Boeing Service Bulletin 737-25-1405.	May 25, 2000	Modify the escape slide latch assembly.	36 months after the effective date of this AD.
737-600, -700, and -800 series.	Boeing Special Attention Service Bulletin 737-25-1403.	May 4, 2000	Install a cover assembly on the trigger housing of the inflation cylinder on the escape slides.	18 months after the effective date of this AD.
737-600, -700, and -800 series.	Boeing Service Bulletin 737-25-1404.	May 25, 2000	Modify the escape slide latch assembly.	18 months after the effective date of this AD.
757-200 and -200CB series.	Boeing Service Bulletin 757-25-0217.	May 25, 2000	Modify the escape slide latch assembly.	36 months after the effective date of this AD.
757-300 series	Boeing Service Bulletin 757-25-0218.	May 25, 2000	Modify the escape slide latch assembly.	36 months after the effective date of this AD.

This amendment becomes effective on August 28, 2001.

2001-15-06 Airbus Industrie: Amendment 39-12340. Docket 2000-NM-415-AD. Supersedes AD 2000-04-06, Amendment 39-11588.

Model A319, A320, and A321 series airplanes; certificated in any category; equipped with any emergency evacuation slide having a part number (P/N) listed as: D31516-103, D31516-105, D31516-107, D31516-109, D31517-103, D31517-105, D31517-107, D31517-109.

This AD applies to each airplane identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For airplanes that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

To prevent the ingestion of sill support-log material into the aspirator of the escape slide which could result in failure of the escape slide to inflate, accomplish the following:

Within 9 months after the effective date of this AD, modify the forward and aft emergency evacuation slides by replacing the Velcro restraints for the support logs with frangible link restraints, in accordance with Airbus Service Bulletin A320-25-1215, dated April 29, 1999.

As of the effective date of this AD, no person shall install on any airplane an emergency evacuation slide having P/N D31516-103, D31516-105, D31516-107, D31516-109, D31517-103, D31517-105, D31517-107, or D31517-109.

This amendment becomes effective on August 27, 2001.

2001-16-14 Airbus Industrie: Amendment 39-12383. Docket 2001-NM-138-AD.

Model A319, A320, and A321 series airplanes equipped with telescopic girt bars of the escape slide/raft assembly, as listed in Airbus Industrie All Operators Telex (AOT) A320-52A1111, Revision 01, dated July 23, 2001; certificated in any category.

To prevent failure of the escape slide/raft to deploy correctly, which could result in the slide being unusable during an emergency evacuation and consequent injury to passengers or airplane crewmembers, accomplish the following:

Within 1,500 flight hours after the effective date of this AD: Modify the telescopic girt bar of the escape slide/raft assembly installed on all passenger and crew doors and do a functional test to ensure the girt bar does not retract, per Airbus Industrie AOT A320-52A1111, Revision 01, dated July 23, 2001.

If the girt bar retracts, before further flight, replace any discrepant parts and do another functional test to ensure the girt bar does not retract, per the AOT. Repeat the functional test thereafter at intervals not to exceed 18 months until paragraph (g) of this AD is accomplished.

If the girt bar does not retract, repeat the functional test thereafter at intervals not to exceed 18 months.

2002-01-18 Airbus Industrie: Amendment 39-12612. Docket 2001-NM-71- AD.

Model A319, A320, and A321 series airplanes; all serial numbers having received Airbus Modification 20234 (Airbus Service Bulletin A320-25-1055) (installation of telescopic girt bar for slide raft), but NOT having received Airbus Modification 28212 (Airbus Service Bulletin A320-52-1102, Revision 01, dated November 25, 1999); certificated in any category.

To prevent corrosion of the trigger spring on the slide bar of the forward and aft passenger doors, which could result in incorrect locking of the slide bar during deployment of the escape slide and lead to a delay in evacuating passengers in an emergency, accomplish the following:

Within 18 months of the effective date of this AD or within 30 months after the date of manufacture of the airplane, whichever occurs later: Replace the carbon-steel trigger spring having part number (P/N) D5211046420000 on each of the forward and aft passenger doors with a stainless steel trigger spring having P/N D5211046420200, in accordance with Airbus Service Bulletin A320-52- 1102, Revision 01, dated November 25, 1999.

As of the effective date of this AD, no person shall install a carbon-steel trigger spring having P/N D5211046420000, on any airplane.

This amendment becomes effective on March 6, 2002.

2002-02-07 Airbus Industrie: Amendment 39-12635. Docket 2001-NM- 153-AD.

All Model A330 and A340 series airplanes, certificated in any category.

To prevent failure of the spring locking function of the slider due to corrosion, which could result in the escape slide detaching from the airplane in an emergency evacuation, accomplish the following:

Within 18 months since date of manufacture, or within 550 flight hours after the effective date of this AD, whichever occurs later: Perform a detailed visual inspection and an operational check of the spring function of the emergency exit door slider mechanism, in accordance with Airbus All Operators Telex (AOT) A330-52A3063 (for Model A330 series airplanes) or A340-52A4075 (for Model A340 series airplanes), as applicable, both Revision 01, both dated January 3, 2001.

If all sliders lock properly: Before further flight, apply corrosion inhibitor to the sliders, in accordance with the applicable AOT. Thereafter, repeat the inspection and operational check at least every 18 months.

If any slider does not lock properly: Before further flight, repair the slider or replace it with a new part, and apply corrosion inhibitor to the sliders; in accordance with the applicable AOT. Thereafter, repeat the inspection and operational check at least every 18 months. This amendment becomes effective on March 19, 2002.

2004-03-01 Air Cruisers Company: Amendment 39-13445. Docket No. 99- NE-31-AD. Supersedes AD 2003-03-11, Amendment 39-13035.

This AD supersedes AD 2003-03-11, Amendment 39-13035.

This AD applies to all dash numbers of Air Cruisers Company Emergency Evacuation Slide/Raft System, part number (P/N) 62774. These Emergency Evacuation Slide/Raft Systems are installed on, but not limited to Boeing 777-200 and -300 series airplanes.

This AD is prompted by recent information received that Air Cruisers Company has made modifications which have added new dash numbers to the slide/raft system basic P/N. This has

affected some of the SN slide/raft systems listed in AD 2003-03-11. In addition, this AD is prompted by the requirement to reduce the number of affected slide/raft systems to only the SNs identified this AD. We are issuing this AD to prevent failure of the slide/raft to properly inflate, which could impede the emergency evacuation of passengers in the event of an airplane emergency. For slide/raft systems that have a SN listed in this AD, do the following:

0203	0207	0220	0234	0235	0239	0241	0245	0250	0255
0267	0277	0280	0302	0305	0306	0310	0312	0316	0318
0320	0330	0332	0333	0335	0339	0342	0343	0344	0345
0348	0349	0350	0351	0354	0355	0356	0358	0364	0365
0366	0368	0369	0372	0373	0374	0376	0378	0379	0380
0381	0384	0385	0388	0389	0390	0391	0392	0394	0395
0396	0397	0398	0399	0402	0403	0404	0406	0408	0409
0411	0413	0415	0417	0418	0419	0420	0421	0422	0423
0425	0426	0427	0428	0429	0430	0431	0433	0438	0443
0445	0455	0456							

For slide/raft systems currently installed on airplanes, repack the slide/raft system within 2 months after the effective date of this AD.

For uninstalled slide/raft systems, repack before installation.

For slide/raft systems SN 0558 and lower that are not included in the above table of this AD, repack the slide/raft at the next required normal maintenance schedule of the slide/raft system, but no later than 18 months after the effective date of this AD.

Slide/raft systems with a SN listed above or identified in this AD that have already been repacked in accordance with Air Cruisers Company Folding Procedures P-12054, Revision F, dated March 12, 1999, or P-12064, Revision F, dated March 12, 1999, as applicable, before the effective date of this AD, are considered in full compliance with the requirements this AD.

Slide/raft systems with a SN listed in above table or identified in this AD that were repacked under AD 2003-03-11 are considered in compliance with the requirements of this AD.

Document No.	Page Nos. shown on the page	Revision level shown on the page	Date shown on the page
SB 777-107-25-06 Total Pages: 3.	All	Original	February 19, 1999.
Folding procedure P-12054 Total Pages: 159.	All	G	February 1, 2002.
Folding procedure P-12064 Total Pages: 159.	All	G	February 1, 2002.

This AD becomes effective March 11, 2004.

2004-03-17 Boeing: Amendment 39-13461. Docket 2003-NM-84-AD

All Model 747-100, 747-100B, 747-100B SUD, 747- 200B, 747-200C, 747-200F, 747-300, 747SP, and 747SR series airplanes; certificated in any category; and equipped with BFGoodrich slides or slide/rafts having part number 7A1238-()(), 7A1239-()(), 7A1248-()(), 7A1261-()(), 7A-1255-()(), 7A-1256-()(), or 7A-1257-()(), where "()()" represents any dash number of those part numbers.

To prevent the failure of an emergency slide or slide/raft to fully inflate during an emergency situation, which could impede an evacuation and result in injury to passengers or airplane crewmembers, accomplish the following:

Within 36 months after the effective date of this AD, perform a one-time inspection of the part number information label on each inflation hose assembly on each emergency evacuation slide or slide/raft to determine the manufacturing/test date of the inflation hose assembly. Do this inspection per BFGoodrich Service Bulletin 25-241, dated September 30, 1991. If the manufacturing/test date is May 30, 1983, or later, no further action is required for that inflation hose assembly.

For any inflation hose assembly having a manufacturing/test date before May 30, 1983, or on which the manufacturing/test date cannot be determined: Before further flight, replace the subject inflation hose assembly with a new or serviceable hose assembly having a manufacturing/test date on or after May 30, 1983, per BFGoodrich Service Bulletin 25-241, dated September 30, 1991.

As of the effective date of this AD, no person shall install an inflation hose assembly having a manufacturing/test date before May 30, 1983, or on which the manufacturing/test date cannot be determined, on an emergency evacuation slide or slide/raft on any airplane.

This amendment becomes effective on March 17, 2004.

2004-06-13 Airbus: Amendment 39-13539. Docket 2001-NM-339-AD. Supersedes AD 99-26-22, Amendment 39-11481.

Model A319 and A320 series airplanes, certificated in any category; except airplanes that have Airbus Modifications 24850 and 25844 and 27275 installed in production; or that have Airbus Service Bulletin A320-25-1156, Revision 01, dated February 2, 1999; or Revision 02, dated October 26, 1999; and Airbus Service Bulletin A320-25-1265, dated June 6, 2001; accomplished.

To prevent the loss of the emergency evacuation slides during flight, which could result in damage to the fuselage, and to prevent incorrect inflation of the emergency evacuation slides, which could result in the emergency exits being unusable during an emergency evacuation, accomplish the following:

For airplanes on which Airbus Modifications 24850 and 25844; or Airbus Service Bulletin A320-25-1156, Revision 01, dated February 2, 1999; or Revision 02, dated October 26, 1999; have not been accomplished: Within 5 years after February 1, 2000 (the effective date of AD 99-26-22, amendment 39-11481), modify the off-wing emergency evacuation slides (i.e., modifications, inspection, repair, and repacking) in accordance with Airbus Service Bulletin A320-25-1156, Revision 01, dated February 2, 1999; or Revision 02, dated October 26, 1999. After the effective date of this AD, only Revision 02 may be used.

For airplanes listed in Airbus Service Bulletin A320-25- 1265, dated June 6, 2001: Within 3 years after the effective date of this AD, modify the left and right off-wing emergency evacuation slides in accordance with the Accomplishment Instructions of that service bulletin.

As of the effective date of this AD, no person may install, on any airplane, an off-wing emergency evacuation slide having part number D31865-101, -102, -103, -104, -105, -106, -107, or -108.

This amendment becomes effective on April 30, 2004.

2005-12-14 Boeing: Amendment 39-14130. Docket No. FAA-2005-21240; Directorate Identifier 2005-NM-104-AD.

This AD applies to Boeing Model 767-200, -300, and -400ER series airplanes; certificated in any category; equipped with door- mounted escape slide/rafts.

This AD was prompted by reports of uncommanded inflation inside the airplane of a door-mounted escape slide/raft located in the passenger compartment. The FAA is issuing this AD to prevent injury to maintenance personnel, passengers, and crew during otherwise normal operating conditions and to prevent interference with evacuation of the airplane during an emergency, due to uncommanded inflation of the airplane of a door-mounted escape slide/raft.

Within 30 days after the effective date of this AD, accomplish the actions in this AD.

Perform a one-time inspection to determine if any Goodrich door-mounted escape slide/raft having P/N 5A3294-1, 5A3294-2, 5A3295-1, or 5A3295-3 is installed. If no slide/raft having any of those P/Ns is installed, no further action is required by this paragraph, except for the requirements of this AD.

Perform a one-time check of the airplane maintenance records to determine if any Goodrich door-mounted escape slide/raft having P/N 5A3294-1, 5A3294-2, 5A3295-1, or 5A3295-3 is installed. If it can be conclusively determined from the airplane maintenance records that no slide/raft having any of those P/Ns is installed, no further action is required by this AD, except for the requirements of the last paragraph of this AD.

If any door-mounted escape slide/raft with any P/N specified in this AD is installed: Within 30 days after the effective date of this AD, perform a tension check on the firing cable of the slide/raft, in accordance with Boeing Alert Service Bulletin (ASB) 767-25A0390, dated May 13, 2005. If no excessive tension is detected, no further action is required by this AD, except for the requirements of the last paragraph of this AD.

If any excessive tension of the firing cable is detected, before further flight, do the applicable corrective actions; in accordance with the Boeing ASB 767-25A0390, dated May 13, 2005.

Inspections of the firing cables for excessive tension in accordance with Boeing ASB 767-25A0390, dated May 13, 2005, that were accomplished before the effective date of this AD are acceptable for compliance with the requirements of this AD, provided that any applicable corrective was completed.

As of the effective date of this AD, no person may install on any airplane any Goodrich door-mounted escape slide/raft having P/N 5A3294-1, 5A3294-2, 5A3295-1, or 5A3295-3, unless the tension of the firing cable has been checked and the applicable corrective action completed in accordance with Boeing ASB 767-25A0390, dated May 13, 2005, or the escape slide/raft has been repacked in accordance with Goodrich Packing Instructions, Evacuation Slide/ Raft, Document 501636, Revision G, dated May 16, 2005; Goodrich Packing Instructions, Evacuation Slide/Raft, LH, Document 501637, Revision E, dated May 16, 2005; or Goodrich Packing Instructions, Evacuation Slide/Raft, RH, Document 501638, Revision D, dated May 16, 2005; as applicable.

This AD becomes effective June 30, 2005.

2005-23-05 Airbus: Amendment 39-14363. Docket No. FAA-2004-19863; Directorate Identifier 2003-NM-29-AD. This AD supersedes AD **2001-16-14**.

This AD applies to Airbus Model A319-111, -112, -113, -114, -115, -131, -132, and -133; A320-211, -212, -214, -231, -232, and - 233; and A321-111, -112, -131, -211, and -231 airplanes; certificated in any category; equipped with telescopic girt bars of the escape slide/raft assembly installed per Airbus Modification 20234, or Airbus Service Bulletin A320-25-1055 or A320-25-1218 in service; except those airplanes with Airbus Modification 31708.

This AD was prompted by development of a new, improved modification of the telescopic girt bar of the escape slide/raft assembly. We are issuing this AD to prevent failure of the escape slide/raft to deploy correctly, which could result in the slide being unusable during an emergency evacuation and consequent injury to passengers or airplane crewmembers.

Within 20 months after the effective date of this AD: Accomplish the actions specified this AD by doing all the applicable actions specified in the Accomplishment Instructions of Airbus Service Bulletin A320-52-1112, Revision 05, dated June 25, 2004. Accomplishing these actions terminates the repetitive functional tests required by this AD.

Modify the telescopic girt bar of the escape slide/raft assembly. Install a placard on each modified girt bar.

As of the effective date of this AD, no person may install on any airplane a telescopic girt bar of the escape slide/raft assembly unless it has been modified as required by this AD.

This AD becomes effective December 19, 2005.

2006-03-15 Boeing: Amendment 39-14479. Docket 2001-NM-213-AD.

Model 747SP, 747SR, 747-100, -100B, -100B SUD, - 200B, -200C, -200F, and -300 series airplanes; certificated in any category; equipped with an escape slide/raft pack assembly; as identified in Boeing Service Bulletin 747-25-3274, Revision 4, dated February 23, 2006.

To prevent improper deployment of the escape slide/raft or blockage of the passenger/crew doors in the event of an emergency evacuation, which could result in injury to passengers or crewmembers, accomplish the following:

Within 36 months after the effective date of this AD: Accomplish the actions specified in this AD, as applicable.

Modify the escape slide/raft pack assembly (includes removing the slide packs, replacing the cover release pin cable assemblies with new assemblies, and removing the cable guard bracket, as applicable). Do the modification in accordance with Boeing Service Bulletin 747-25-3274, Revision 4, dated February 23, 2006. Previously accomplishing the modification in accordance with Boeing Special Attention Service Bulletin 747-25-3274, Revision 1, dated January 9, 2003; Revision 2, dated August 26, 2004; or Revision 3, dated December 16, 2004; is acceptable for compliance with this paragraph, except as specified in paragraph 1.D, "Description", of Revision 4 of the service bulletin.

For airplanes on which the modification of Door 3, as specified in Boeing Special Attention Service Bulletin 747-25-2666, Revision 2; and Goodrich Service Bulletin 25-238, Revision 1; has been accomplished: No further action is required for Door 3 only.

For Groups 2, 5, 6, 7, 8, 11, 12, 13, 14, and 15 airplanes: Prior to or concurrently with accomplishment of this AD, modify the outboard cover panel of the cable release sliders of the floor-mounted upper deck slide pack assembly, as specified in figure 2 of Boeing Service Bulletin 747-25-3307, Revision 2, dated July 8, 2004.

This amendment becomes effective on April 10, 2006.

2006-04-03 Airbus: Amendment 39-14484. Docket 2003-NM-211-AD.

Model A330-201, -202, -203, -223, and -243 airplanes; Model A330-301, -321, -322, -323, -341, -342, and -343 airplanes; Model A340-211, -212, and -213 airplanes; Model A340-311, -312, and -313 airplanes; Model A340-541 airplanes; and Model 340- 642 airplanes; certificated in any category; except Model A330-200 and -300 and A340-200 and -300 series airplanes on which both Airbus Modifications 52708 and 52811 were done during production, or only Airbus Modification 52708 was done during production, and Model A340-541 and -642 airplanes on which Airbus Modification 52708 was done during production, and on which no slide or slide raft has been removed since delivery from the manufacturer.

To prevent failure of an emergency evacuation slide raft to deploy and inflate during an emergency situation, which could impede an evacuation and result in injury to passengers or crewmembers, accomplish the following:

The following information pertains to the service information referenced in this AD:

The term "service bulletin" as used in this AD, means the Accomplishment Instructions of Airbus Service Bulletins A330-25- 3225, Revision 01 (for Model A330-200 and -300 series airplanes), and A340-25-4228, Revision 01 (for Model A340-200 and -300 series airplanes), both dated September 30, 2004; and A340-25-5054 (for Model A340-541 and -642 airplanes), dated August 2, 2004.

The service bulletins refer to Goodrich Alert Service Bulletin 25A341, Revision 1, dated May 21, 2003; and Goodrich Service Bulletin 25-347, Revision 1, dated August 30, 2004; as

additional sources of service information for accomplishment of the modification specified in the service bulletins.

Accomplishing the modification before the effective date of this AD in accordance with Airbus Service Bulletin A330-25-3225 or A340-25-4228, both dated August 2, 2004; is considered acceptable for compliance with the modification required by this AD.

Within 18 months after the effective date of this AD: Determine the part number of the emergency slides or slide rafts fitted on the door types and locations listed in Table 1 of this AD. If no affected slides or slide rafts are found installed on the airplane, then no further action is required by this paragraph. If any affected slides or slide rafts are found installed on the airplane: Modify the regulator valves of the slide and slide raft assemblies at the applicable time specified in this AD, in accordance with the applicable service bulletin.

For airplanes on which the regulator valves have not been modified as of the effective date of this AD per Goodrich Alert Service Bulletin 25A341, Revision 1, dated May 21, 2003: Before further flight.

For airplanes on which the regulator valves have been modified as of the effective date of this AD per Goodrich Alert Service Bulletin 25A341, Revision 1, dated May 21, 2003: Within 18 months after the effective date of this AD.

Door type	Door location	Goodrich slide/slide raft part number
A	1 and 4, left-hand (LH) and right-hand	7A1508–001, –003, –005, –007, –013, –015, –017, –101, –103, –105, –107, –109, –113, –115, or –117.
A	2, LH	7A1539–001, –003, –005, –007, –013, –015, –017, –101, –103, –105, –107, –109, –113, –115, or –117.
A	2, RH	7A1539–002, –004, –006, –008, –014, –016, –018, –102, –104, –106, –108, –110, –114, –116, or –118.
A	3, LH	7A1510–001, –003, –005, –007, –013, –015, –017, –101, –103, –105, –107, –109, –113, –115, or –117; or 4A3934–1 or –3.
A	3, RH	7A1510–002, –004, –006, –008, –014, –016, –018, –102, –104, –106, –108, –110, –114, –116, or –118; or 4A3934–2 or –4.
1	3, LH and RH	7A1509–001, –003, –005, –101, –103, –105, –107, –109, –111, –115, or –117.
1	3, LH	4A3928–1.
1	3, RH	4A3928–2.

As of the effective date of this AD, no person may install a regulator valve having a part number listed in the old part number column specified in Paragraph 1.L. of the applicable service bulletin on any airplane, unless that regulator valve has been modified in accordance with this AD.

This amendment becomes effective on March 24, 2006.

APPENDIX B—PARTIAL LIST OF EMERGENCY EVACUATION SYSTEM SLIDE OR SLIDE/RAFT PART NUMBERS REFERENCED IN SERVICE DIFFICULTY REPORTS

Table B-1. The EES Slide Part Numbers for Boeing Aircraft Referenced in Service Difficulty Reports

Aircraft Designation	Multiple Door Applications?	Part Number	Door Designation
B-727-2S7	L1=L2?	116110015	R2, L1, L2,
	R2=L1?		
B-737-2H4	R2=L2?	22D22900131	L1, R2
	R1=L1?	22D22901151 or 22D22901157or 22D22901 or 23022991 or 22D220 or 22022900131	L2, L1
	L1=L2?	D31354	L1
	R2=R1?	D31355117	L1
B-737-2K6	L1=R1?, R2=R1?	156112106 or 22D22901	L2
B-737-2L9		D22901	RW
B-737-2T4	L1=L2	D31354 or 156110162	L1, L2
	L1=L2=R2?	D31354 or 22022900131 or 106123167 or 156110162	L1, L2
	L1=R2?, L2=R2?	D31354-525 or 1061323(182)	L1, R1, R2
B-737-2Y5		22D22900139	R1
B-737-3A4		1061323	L2 slide assembly?
	L2=R2?	1061323469	L1
		61620468 or 1061323469	R1 slide assembly?
		D31050-105 or 1061323478	L1, TC
		D31354	L1, L2, R2
		D31354	RW part number?
		D31591	
		PN 7A14124	

Table B-1. The EES Slide Part Numbers for Boeing Aircraft Referenced in Service Difficulty Reports (Continued)

Aircraft Designation	Multiple Door Applications?	Part Number	Door Designation
B-737-3B7		0432A	R1
	L1=R1?	D31591478	L1, R1, R2
B-737-3G7	L1=R1?	63562	L1 and R1
		1061323	
		61620466	R2, L1
		61621469	R1, R2
		63550101	LW
		D31354	L1, L2, R2, R1
		D31591	pax door
B-737-3H4	L1=R2?	61621	L1
		1061323	L1, R2, L2
		61620468	L1
		61620468	L1, L2
		61621469	L1, L2, R2
		63550101	R1, R2
		1061323433	R2, L2, RW
		1061323468	L1
		1061323469	L1
		1061323478	L1, L2
		D31354	L1, R2, LW, R1
		D31354418	L2, R2
		D31591	R1 or R2
		D31591474	L1
		D31591475	L1
		D31591478	R1, R2, RW
		D3159147B	L2,R2
B-737-3K2		D31354	L1, L2, R1, R2
B-737-3L9		1061323541	L1, R1
		D31354	L1, L2, R1, R2
B-737-3M8		61621-469	L2

Table B-1. The EES Slide Part Numbers for Boeing Aircraft Referenced in Service Difficulty Reports (Continued)

Aircraft Designation	Multiple Door Applications?	Part Number	Door Designation
B-737-3Q8		61620468	L1
		D31354	L1, L2, R1, R2
		D31354125	R2
		D31591	R2
		D31591475	L1
B-737-3T0		61620468	R1
		D31354	L1, R1, R2
		D31354418	R1, L2
B-737-3T5		D31354	L1, L2, R1, R2
B-737-3TO		D31354	L1, R1, R2
B-737-3Y0		61323478	L2
		61620468	R1
		61621469	L1
		101660105	R1, RW
		5C318411	L1, R2
		D31354	L1, L2, R1, R2
		D31591478	L2
B-737-4Q8		61620468	R1
		61621469	L2, R1, R2
		D31354	
B-737-5H4		61620	L1
		1061323	L1, L2, R1, R2
		61620468	L1, L2
		61621468	LW
		61621469	L1, L2
		61621469	TAILCONE?
		1061323433	L1
		D31354	L1, L2, R1, R2
		D31354433	R2, R1
		D31591478	R1
B-737-73A		SA33071	R1

Table B-1. The EES Slide Part Numbers for Boeing Aircraft Referenced in Service Difficulty Reports (Continued)

Aircraft Designation	Multiple Door Applications?	Part Number	Door Designation
B-737-7H4		63550	L1, L2, R1, R2, LW, R4 (?)
		6556681	L3 (?)
		63550101	L1 ,L2, R1, R2
		63550101	L3 (?)
		63551101	L1
		63562101	L1
		416A2200	L1, L2, R1, R2
		5A33075	L1, R2
		D31354	L1
		D63551101	R1
B-73783N		5A33073	R1,L1
B-7378Q8		5A30863	R1
		5A30883	TAILCONE?
B-747-212B		7A1218-34	R4
		7A124836	TAILCONE?
		7A14124	R1
B-747-238B		7A125210	R2
B-747-249F		60B50072	L1
		7A1248-25	R1 (COCKPIT?)
		7A124836	MAIN CABIN
B-747-251B		30440103	L1
		7A123856	R1
		D30440103	L1, L2, R2
B-747-2D7B		7A14124	L1, L2, R1
B-747-47UF		7A14124	L1, L2, R1
B-747-SP38		7A124836	L1, R1
		7A126130	
B-757-2B7		130104-233	R2
		D30654122	R1, R3
		D30656126	R1, L4 (?), R4 (?)
B-757-2Q8		80330035	L3

Table B-1. The EES Slide Part Numbers for Boeing Aircraft Referenced in Service Difficulty Reports (Continued)

Aircraft Designation	Multiple Door Applications?	Part Number	Door Designation
B-757-2S7		D31038186	R1
		D31041146	L1, L3
		D31042190	L2, L4
B-757-33N		D31393109	L2?
B-767-2B7		101651303	L1
		130104233	rt off wing(?)
B-767-3P6		251009201	L3
B-767-424E R		5A32951	R1, R4

Table B-2. The EES Slide Part Numbers for Douglas/McDonnel Douglas Aircraft Referenced in Service Difficulty Reports

Aircraft Designation	Part Number	Door Designation
DC-10-15	5WD260100 201	L1
DC-10-30	24D3005331	TAILCONE, L1 ,R1
	5WD230100101	L1, R1, TAILCONE
	5WD230102300	TAILCONE, L3
	5WP230100201	R1
	SWD230300201	L1
DC8-871F	51561007	L4
	51561004DGDME	L1
DC9-14	113317	R4 (?)
	13621228	L1, TAILCONE
	B19867-105	
DC9-31	11331780	R1, R3, LEFT OVERWING
	13621224	L1, R4,TAILCONE
	13621228	R1, L1, L4, R2, TAILCONE
DC9-32	113317	L1, L2, R1, R2
DC9-51	113317	L1, R1

Table B-2. The EES Slide Part Numbers for Douglas/McDonnel Douglas Aircraft Referenced in Service Difficulty Reports (Continued)

Aircraft Designation	Part Number	Door Designation
DC9-81	113311	L1, R2
	113317	L1, R1, R2
	100502121	R1, L2
	100503117	L1,R1,L2
	100503119	L1,R2
	100503121	L1, TAILCONE
	7A127516	L2
	D29985103	L1, L2, R1, R2
DC9-82	113317	R1, L1
	100502115	L2
	100502121	R2, R1
	100503111	TAILCONE, L1
	100503117	L3?
	100503119	R1, R2
	100505107	L2, R2
	5951782509	TAILCONE, L2
	100504 201	R1
	100506 201	TAILCONE, L2
	D29982	L2
	D29982107	R1, R2
	D29982113	L1, R1, R2
	D29982121	R1, L1
	D29982125	L1, L2, R2
	D29984109	TAILCONE
	D29984113	L1, TAILCONE
	D29984211	L1, TAILCONE
	D29984213	TAILCONE, L1
	D29985103	L1, L2, R2, R1
	D29985107	L1, L2, R2
	D31038201	L2, R2

Table B-2. The EES Slide Part Numbers for Douglas/McDonnel Douglas Aircraft Referenced in Service Difficulty Reports (Continued)

Aircraft Designation	Part Number	Door Designation
DC9-83	29985103	L1, L2
	100505201	L2, R2
	D29982107	L1, R1, R2, R5?
	D29982113	R1, L2, L1
	D29982121	R1, L2, L1
	D29982125	R2
	D29983113	L1
	D29984103	L2, R1, R1, TAILCONE
	D29984119	L1
	D29985103	L1, L2, R2
	D29985107	L1, L2, R2
	SL11041	R2
DC9-87	D29982125	R1
	D29982113	R2
	100503-121	R1, R2, TAILCONE
MD11F	AWD9831503	L1, R4
	AWD9822-503	L2, L3
	60289117	L1
	MS25237369	L1
	60289117	L1
	AWD9830-507	L4, R1
MD83	D29984211	R1, TAILCONE
	D29982113	L1, R1
MD88	D29985103	L1, L2
	D29982125	L2, R2
	D29984213	R1, L1, TAILCONE
	D29982113	R1
	D29985107	L1
	113317	L1
	D29985107	R1, L1, L2
MD90-30	D29982113	R1, L2
	D29982125	L2

APPENDIX C—AIRLINE OPERATORS IN EMERGENCY EVACUATION SYSTEM DATABASE

Table C-1. Air Operators in Emergency Evacuation Systems Database

Air Operator DSGN Code	Name
A6WA	Air Wisconsin Airlines
AALA	American airlines, Inc.
ABXA	ABS Air, Inc.
AJLF	Air Jamaica, Ltd.
AMTA	ATA Airlines, Inc.
ASAA	Alaska Airlines, Inc.
ASMF	Aerovias de Mexico S A De C V
AWXA	America West Airlines, Inc.
B16A	Boston-Marine Airway Corp.
BEFA	Primaris Airlines, Inc.
C1HA	Grand Holdings, Inc.
CALA	Continental Airlines, Inc.
CHQA	Chautauqua Airlines, Inc.
CLCA	Centurion Air Cargo, Inc.
CNMA	Omni Air international, Inc.
DALA	Delta Airlines, Inc.
DHLA	Astar Air Cargo, Inc.
EIAA	Evergreen International Airlines, Inc.
F3LA	Frontier Airlines, Inc.
FDEA	Federal Express Corp.
G5SA	Not identified
GAIA	Kitty Hawk Air Cargo, Inc.
GTIA	Spirit Airlines, Inc.
HALA	Hawaiian Airlines, Inc.
I6XR	Not identified
IPXA	United Parcel Service Co.
KCSA	Kalitta Charters LLC
L43A	Maxjet Airways, Inc.
M56B	MSG Flight Operations LLC
MALA	Mesaba Aviation, Inc.
MWEA	Midwest Airlines, Inc.
NOCA	North America Airlines
NP1Y	Not identified
NWAA	Northwest Airlines, Inc.
P5CA	Polar Air Cargo, Inc.
P9RA	Prime Air, Inc.
PIDA	Pace Airlines, Inc.

Table C-1. Air Operators in Emergency Evacuation Systems Database (Continued)

Air Operator DSGN Code	Name
R61A	Republic Airlines
RAAA	Reeve Aleutian Airways
RYNA	Ryan international Airlines, Inc.
SAJF	China Airlines Ltd.
SCNA	MN Airlines LLC
SPAA	Sierra Pacific Airlines, Inc.
SROM	ConocoPhillips Alaska, Inc.
SWAA	Southwest Airlines Co.
TSAA	Aloha Airlines, Inc.
TWAA	TransWorld Airlines, Inc.
U30A	Brendan Airways LLC
UALA	United Airlines, Inc.
UHLA	Shuttle America Corp.
UIEA	Atlas Air, Inc.
USAA	US Airways, Inc.
WRLA	World Airways, inc.
WRNA	Tradewinds Airlines, Inc.
WX0A	Allegiant Air LLC
YENA	JetBlue Airways Corp.
ZW0A	TWA, LLC
ZZDA	Airtran Airways, Inc.

Table C-2. Frequency of Entries for Air Operators in Emergency Evacuation Systems Database

	EESD As-Is			EESD Excluding SWAA Code 1H			EESD Excluding SWAA	
Air Operator	Frequency	Percentage	Air Operator	Frequency	Percentage	Air Operator	Frequency	Percentage
A6WA	4	0.09	A6WA	4	0.15	A6WA	4	0.28
AALA	80	1.85	AALA	80	3.00	AALA	80	5.58
ABXA	7	0.16	ABXA	7	0.26	ABXA	7	0.49
AJLF	1	0.02	AJLF	1	0.04	AJLF	1	0.07
AMTA	6	0.14	AMTA	6	0.23	AMTA	6	0.42
ASAA	34	0.79	ASAA	34	1.28	ASAA	34	2.37
ASMF	5	0.12	ASMF	5	0.19	ASMF	5	0.35
AWXA	46	1.06	AWXA	46	1.73	AWXA	46	3.21
B16A	1	0.02	B16A	1	0.04	B16A	1	0.07
BEFA	1	0.02	BEFA	1	0.04	BEFA	1	0.07
C1HA	9	0.21	C1HA	9	0.34	C1HA	9	0.63
CALA	27	0.62	CALA	27	1.01	CALA	27	1.88
CHQA	2	0.05	CHQA	2	0.08	CHQA	2	0.14
CLCA	2	0.05	CLCA	2	0.08	CLCA	2	0.14
CNMA	5	0.12	CNMA	5	0.19	CNMA	5	0.35
DALA	51	1.18	DALA	51	1.91	DALA	51	3.56
DHLA	3	0.07	DHLA	3	0.11	DHLA	3	0.21
EIAA	2	0.05	EIAA	2	0.08	EIAA	2	0.14
F3LA	6	0.14	F3LA	6	0.23	F3LA	6	0.42
FDEA	5	0.12	FDEA	5	0.19	FDEA	5	0.35
G5SA	2	0.05	G5SA	2	0.08	G5SA	2	0.14
GAIA	1	0.02	GAIA	1	0.04	GAIA	1	0.07
GTIA	119	2.75	GTIA	119	4.46	GTIA	119	8.30
HALA	3	0.07	HALA	3	0.11	HALA	3	0.21

Table C-2. Frequency of Entries for Air Operators in Emergency Evacuation Systems Database (Continued)

	EESD As-Is	
Air Operator	Frequency	Percentage
I6XR	1	0.02
IPXA	101	2.34
KCSA	1	0.02
L43A	1	0.02
M56B	1	0.02
MALA	17	0.39
MWEA	60	1.39
NOCA	8	0.19
NP1Y	1	0.02
NWAA	36	0.83
P5CA	3	0.07
P9RA	8	0.19
PIDA	5	0.12
R61A	1	0.02
RAAA	1	0.02
RYNA	8	0.19
SAJF	1	0.02
SCNA	5	0.12
SPAA	2	0.05
SROM	1	0.02
SWAA	2888	66.82
TSAA	3	0.07
TWAA	5	0.12
U30A	2	0.05

	EESD Excluding SWAA Code 1H	
Air Operator	Frequency	Percentage
I6XR	1	0.04
IPXA	101	3.79
KCSA	1	0.04
L43A	1	0.04
M56B	1	0.04
MALA	17	0.64
MWEA	60	2.25
NOCA	8	0.30
NP1Y	1	0.04
NWAA	36	1.35
P5CA	3	0.11
P9RA	8	0.30
PIDA	5	0.19
R61A	1	0.04
RAAA	1	0.04
RYNA	8	0.30
SAJF	1	0.04
SCNA	5	0.19
SPAA	2	0.08
SROM	1	0.04
SWAA	1232	46.21
TSAA	3	0.11
TWAA	5	0.19
U30A	2	0.08

	EESD Excluding SWAA	
Air Operator	Frequency	Percentage
I6XR	1	0.07
IPXA	101	7.04
KCSA	1	0.07
L43A	1	0.07
M56B	1	0.07
MALA	17	1.19
MWEA	60	4.18
NOCA	8	0.56
NP1Y	1	0.07
NWAA	36	2.51
P5CA	3	0.21
P9RA	8	0.56
PIDA	5	0.35
R61A	1	0.07
RAAA	1	0.07
RYNA	8	0.56
SAJF	1	0.07
SCNA	5	0.35
SPAA	2	0.14
SROM	1	0.07
SWAA	0	0.00
TSAA	3	0.21
TWAA	5	0.35
U30A	2	0.14

Table C-2. Frequency of Entries for Air Operators in Emergency Evacuation Systems Database (Continued)

	EESD As-Is	
Air Operator	Frequency	Percentage
UALA	161	3.73
UHLA	2	0.05
UIEA	4	0.09
USAA	142	3.29
WRLA	6	0.14
WRNA	3	0.07
WX0A	4	0.09
YENA	6	0.14
ZW0A	4	0.09
ZZDA	21	0.49
Unknown	387	8.95
Total	4322	100.00

	EESD Excluding SWAA Code 1H	
Air Operator	Frequency	Percentage
UALA	161	6.04
UHLA	2	0.08
UIEA	4	0.15
USAA	142	5.33
WRLA	6	0.23
WRNA	3	0.11
WX0A	4	0.15
YENA	6	0.23
ZW0A	4	0.15
ZZDA	21	0.79
Unknown	387	14.52
Total	2666	100.00

	EESD Excluding SWAA	
Air Operator	Frequency	Percentage
UALA	161	11.23
UHLA	2	0.14
UIEA	4	0.28
USAA	142	9.90
WRLA	6	0.42
WRNA	3	0.21
WX0A	4	0.28
YENA	6	0.42
ZW0A	4	0.28
ZZDA	21	1.46
Unknown	387	26.99
Total	1434	100.00

Table C-3. Air Operators in Emergency Evacuation Systems Database in Decreasing Ranking of Number of Entries

	EESD As-Is	
Air Operator	Frequency	Percentage
SWAA	2888	66.82
Unknown	387	8.95
UALA	161	3.73
USAA	142	3.29
GTIA	119	2.75
IPXA	101	2.34
AALA	80	1.85
MWEA	60	1.39
DALA	51	1.18
AWXA	46	1.06
NWAA	36	0.83
ASAA	34	0.79
CALA	27	0.62
ZZDA	21	0.49
MALA	17	0.39
C1HA	9	0.21
RYNA	8	0.19
P9RA	8	0.19
NOCA	8	0.19
ABXA	7	0.16
YENA	6	0.14
WRLA	6	0.14
F3LA	6	0.14
AMTA	6	0.14

	EESD Excluding SWAA Code 1H	
Air Operator	Frequency	Percentage
Unknown	1232	46.21
UALA	387	14.52
USAA	161	6.04
GTIA	142	5.33
IPXA	119	4.46
AALA	101	3.79
MWEA	80	3.00
DALA	60	2.25
AWXA	51	1.91
NWAA	46	1.73
ASAA	36	1.35
CALA	34	1.28
ZZDA	27	1.01
MALA	21	0.79
C1HA	17	0.64
NOCA	9	0.34
P9RA	8	0.30
RYNA	8	0.30
ABXA	8	0.30
AMTA	7	0.26
F3LA	6	0.23
WRLA	6	0.23
YENA	6	0.23
ASMF	6	0.23

	EESD Excluding SWAA	
Air Operator	Frequency	Percentage
SWAA	387	26.99
Unknown	161	11.23
UALA	142	9.90
USAA	119	8.30
GTIA	101	7.04
IPXA	80	5.58
AALA	60	4.18
MWEA	51	3.56
DALA	46	3.21
AWXA	36	2.51
NWAA	34	2.37
ASAA	27	1.88
CALA	21	1.46
ZZDA	17	1.19
MALA	9	0.63
C1HA	8	0.56
NOCA	8	0.56
P9RA	8	0.56
RYNA	7	0.49
ABXA	6	0.42
AMTA	6	0.42
F3LA	6	0.42
WRLA	6	0.42
YENA	5	0.35

Table C-3. Air Operators in Emergency Evacuation Systems Database in Decreasing Ranking of Number of Entries (Continued)

	EESD As-Is	
Air Operator	Frequency	Percentage
ASMF	5	0.12
FDEA	5	0.12
TWAA	5	0.12
SCNA	5	0.12
PIDA	5	0.12
CNMA	5	0.12
ZW0A	4	0.09
WX0A	4	0.09
UIEA	4	0.09
A6WA	4	0.09
HALA	3	0.07
P5CA	3	0.07
WRNA	3	0.07
TSAA	3	0.07
DHLA	3	0.07
CLCA	2	0.05
G5SA	2	0.05
EIAA	2	0.05
UHLA	2	0.05
SPAA	2	0.05
CHQA	2	0.05
U30A	2	0.05
I6XR	1	0.02
KCSA	1	0.02

	EESD Excluding SWAA Code 1H	
Air Operator	Frequency	Percentage
CNMA	5	0.19
FDEA	5	0.19
PIDA	5	0.19
SCNA	5	0.19
TWAA	5	0.19
A6WA	5	0.19
UIEA	4	0.15
WX0A	4	0.15
ZW0A	4	0.15
DHLA	4	0.15
HALA	3	0.11
P5CA	3	0.11
TSAA	3	0.11
WRNA	3	0.11
CHQA	3	0.11
CLCA	2	0.08
EIAA	2	0.08
G5SA	2	0.08
SPAA	2	0.08
U30A	2	0.08
UHLA	2	0.08
AJLF	2	0.08
B16A	1	0.04
BEFA	1	0.04

	EESD Excluding SWAA	
Air Operator	Frequency	Percentage
ASMF	5	0.35
CNMA	5	0.35
FDEA	5	0.35
PIDA	5	0.35
SCNA	5	0.35
TWAA	4	0.28
A6WA	4	0.28
UIEA	4	0.28
WX0A	4	0.28
ZW0A	3	0.21
DHLA	3	0.21
HALA	3	0.21
P5CA	3	0.21
TSAA	3	0.21
WRNA	2	0.14
CHQA	2	0.14
CLCA	2	0.14
EIAA	2	0.14
G5SA	2	0.14
SPAA	2	0.14
U30A	2	0.14
UHLA	1	0.07
AJLF	1	0.07
B16A	1	0.07

Table C-3. Air Operators in Emergency Evacuation Systems Database in Decreasing Ranking of Number of Entries (Continued)

	EESD As-Is	
Air Operator	Frequency	Percentage
R61A	1	0.02
B16A	1	0.02
SROM	1	0.02
NP1Y	1	0.02
AJLF	1	0.02
GAIA	1	0.02
M56B	1	0.02
L43A	1	0.02
SAJF	1	0.02
BEFA	1	0.02
RAAA	1	0.02
Total	4322	100.00

	EESD Excluding SWAA Code 1H	
Air Operator	Frequency	Percentage
GAIA	1	0.04
I6XR	1	0.04
KCSA	1	0.04
L43A	1	0.04
M56B	1	0.04
NP1Y	1	0.04
R61A	1	0.04
RAAA	1	0.04
SAJF	1	0.04
SROM	1	0.04
SWAA	1	0.04
Total	2666	100.00

	EESD Excluding SWAA	
Air Operator	Frequency	Percentage
BEFA	1	0.07
GAIA	1	0.07
I6XR	1	0.07
KCSA	1	0.07
L43A	1	0.07
M56B	1	0.07
NP1Y	1	0.07
R61A	1	0.07
RAAA	1	0.07
SAJF	1	0.07
SROM	0	0.00
Total	1434	100.00