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PRELIMINARY REGULATORY EVALUATION, INITIAL REGULATORY FLEXIBILITY DETERMINATION, AND ANALYSIS, TRADE IMPACT ASSESSMENT, AND UNFUNDED MANDATES ACT DETERMINATION

FOR

PROPOSED RULE:

TRANSPORT AIRPLANE FUEL TANK SYSTEM DESIGN REVIEW, AND INSPECTION AND MAINTENANCE REQUIREMENTS

OFFICE OF AVIATION POLICY AND PLANS
AIRCRAFT REGULATORY ANALYSIS BRANCH, APO-320
Allen A. Mattes

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EXECUTIVE SUMMARY

The proposed Special Federal Aviation Regulation (SFAR), proposed operational rules changes, and proposed part 25 change would reduce the potential for a fuel tank explosion due to an ignition source in the fuel tank. In the past 10 years there have been two fuel tank explosions that appear to have been caused by an internal ignition source: (1) the July 17, 1996, B-747 TWA Flight 800 explosion involving 230 fatalities; and (2) a May 11, 1990, B-737 Philippine Airlines airplane explosion on the ground in Manila involving 8 fatalities and 30 injuries of the 120 passengers and crew.

The proposal would require design approval holders and operators of the affected airplanes to complete two separate but interrelated actions. The first action, the proposed SFAR, would require all design approval holders of type certificates (TC) and supplementary type certificates (STC) involving fuel tank systems: (1) to complete a design fuel tank system assessment that may generate future service bulletins and to provide data to support any needed Federal Aviation Administration (FAA) fuel tank system Airworthiness Directives (AD); and, (2) on the basis of the assessment, to provide operators with recommendations and instructions for fuel tank system inspections, testing, and maintenance within 12 months of the proposal's effective date. The second action, the proposed operational rules changes, would require that operators incorporate these recommendations and instructions (or their equivalents) into their fuel tank system inspection and maintenance manuals within 18 months of the effective date of the proposal.

The proposed part 25 change would require the holders of future new type certificated transport category airplanes and holders of future new supplemental type certificates for fuel tank systems in transport category airplanes to design the fuel tank system to minimize the amount of time the fuel tank would have an explosive atmosphere.

The proposal would affect all turbine-powered transport category airplanes with a TC issued after January 1, 1958, and a maximum certificated passenger capacity of 30 or more, or a maximum certificated payload capacity of 7,500 pounds or more operated under parts 91, 121, 125, or 129. Based on 1996 data, the proposal would affect 12 manufacturers holding 36 TCs and 26 manufacturers and airlines holding 58 fuel tank system STCs. It would affect 6,006 airplanes operated by 154 air carriers. Of these airplanes, 5,700 are operated by 114 air carriers under part 121 service, 193 are operated by 7 air carriers under both part 121 and 135 service, 91 are operated by 23 air carriers operating U.S. -registered airplanes under part 129, and 22 are operated by 10 air carriers under part 125 service.

Based on the previous 10 years of fuel tank explosion history world-wide, the FAA anticipates that one to two fuel tank explosions (the statistical expected value is 1.25) from an internal ignition source would occur in the United States during the next 10 years, if nothing is done to address the problem. The FAA estimates that compliance with the proposal would prevent between 75 percent and 90 percent of these potential accidents. Using the Department of Transportation's estimate of a $2.7 million willingness to pay to prevent a fatality, a value of a destroyed airplane of $20 million, and an average cost of $30 million for an FAA accident investigation, the FAA estimates that, depending upon the underlying assumptions and using the 1.25 value for the number of expected explosions, the proposal could have potential undiscounted benefits of $380 million to $725 million over the next 10 years. The FAA also estimates that, similarly, the potential present value of the benefits discounted over 10 years at 7 percent would be between $260 million and $520 million.

At this time, the FAA cannot quantify the potential benefits from the proposed part 25 change. These benefits are not expected to be considerable in the immediate future, but would increase over time as new part 25 type certificated airplanes would replace the older part 25 type certificated airplanes in the fleet and as new STC fuel tank systems are granted over time.

The FAA primarily relied upon existing service bulletins, discussions with airline maintenance chief engineers, and extrapolations from those estimates for the time required to complete the fuel tank system assessments and the increased time to perform the fuel tank system inspections and equipment and wiring testing. On that basis, the FAA determined that the discounted present value of the compliance costs over the next 10 years would be about $170 million ($9.5 million for TC holders, $5 million for STC holders, and $155.5 million for operators). The annualized discounted cost for these 10 years would be about $24 million ($1.4 million for TC holders, $1 million for STC holders, and $21.6 million for operators).

Three considerations need to be noted. The first consideration is that the compliance costs do not include the compliance costs for an airplane model whose fuel tanks are subject to an existing or proposed AD. The second consideration is that, consistent with the approach in the aging aircraft rule and the proposed corrosion rule, the compliance costs do not include the costs to repair and replace equipment and wiring that is found to need repair or replacement during the inspection. Although these costs are likely to be substantial, they are attributable to existing FAA regulations that require such repairs and replacements be made to assure the airplane's continued airworthiness. The third consideration is that, although the FAA believes that these costs would be minimal, at this time the FAA is unable to estimate the compliance costs for: (1) holders of STCs that are not for the fuel tank system STC; or (2) for holders of field approvals for fuel tank system modifications to comply with the proposed SFAR.

Although the FAA cannot precisely predict the cost impact on future part 25 type certificated airplanes due to the proposed change, the FAA anticipates that the proposed design change would impose minimal costs on future airplane fuel tank system designs. The FAA also anticipates that the proposed part 25 changes would impose minimal costs on future fuel tank STCs issued under part 25.

Based on its analysis, the FAA believes that the expected benefits ($260 million to $520 million) would be greater than the expected costs of compliance ($170 million). Even using the most conservative benefits estimate ($260 million) is 50 percent greater than the compliance costs.

Although the FAA does not have quantified costs and benefits from the proposed part 25 changes at this time, the FAA believes that the future benefits would likely be greater than the future costs.

The FAA's Regulatory Flexibility Analysis of three alternatives to the proposal indicated that this proposal would provide the necessary level of safety in the most cost-effective manner. On a per airplane basis, the annualized costs to a small operator would be between $1,200 and $4,150. Thus, the proposal could have a significant impact on a substantial number of small operators. However, the average per airplane cost would be about $1,000 less for operators with fewer than 50 airplanes than for operators with 50 or more airplanes. The proposal would have little or no impact on international trade. Finally, it would not contain a significant intergovernmental or private sector mandate as defined by the Unfunded Mandates Reform Act.

I. INTRODUCTION

A. BACKGROUND

In the past 10 years, there have been two fuel tank explosions whose probable ignition sources were internal to the fuel tank. On May 11, 1990, a Philippines Air Lines B-737 exploded on the ground in Manila, causing 8 fatalities and injuring 30 of the 120 passengers and crew. Six years later, on July 17, 1996, Trans World Airlines (TWA) Flight 800, a B-747, exploded, causing the deaths of all 230 aboard.

During the past 40 years, there have been 15 fuel tank explosions (including the 2 mentioned in the preceding paragraph). Of the eight explosions that occurred during operations, six were caused by outside ignition sources (i.e., lightning, engine separation, or a bomb). The seven non-operational explosions occurred during refueling or maintenance activities. The FAA reacted to these explosions with rules to prevent these types of ignition sources from causing other fuel tank explosions.

Briefly, there are two necessary conditions for a fuel tank explosion. The first condition is that the fuel tank have an explosive atmosphere. The second condition is that there be an ignition source.

With respect to preventing the first condition, an explosive atmosphere in the fuel tank, an Aviation Rulemaking Advisory Committee (ARAC) Fuel Tank Harmonization Working Group has studied airplane fuel tank system design and associated airplane operating issues and provided its recommendations to the Federal Aviation Administration (FAA) on July 21, 1998. These recommendations are being incorporated into this rulemaking as the proposed part 25 changes that would require future type certificated airplanes and future fuel tank systems supplemental type certificate holders to minimize the potential for a flammable atmosphere in the fuel tank or to ensure continued safe flight and landing should the fuel vapors ignite in the fuel tank.

With respect to preventing the second condition, an internal ignition source, the FAA has taken the conservative position that fuel tanks are considered to be explosive at all times and, therefore, no ignition event can ever be allowed in the fuel tank. However, the two recent explosions that were probably caused by an unknown internal fuel tank ignition event indicate the potential for a future fuel tank explosion caused by an internal source. Further, the recent inspections of the B-737 boost fuel pump wiring have uncovered 2 instances when arcing through the cable occurred. Thus, the FAA has undertaken this rulemaking to further minimize the possibility of such an ignition event.

B. PROPOSED SPECIAL FEDERAL AVIATION REGULATION, OPERATIONAL RULE CHANGES, AND PART 25 TYPE CERTIFICATE CHANGE

Based on its evaluation of these accidents, the proposed Special Federation Aviation Regulation (SFAR) and proposed operational rules changes would apply to all turbine-powered transport category airplanes with a TC issued after January 1, 1958, and a maximum certificated passenger capacity of 30 or more, or a maximum certificated payload capacity of 7,500 pounds or more operated under parts 91, 121, 125, or 129. The proposal would require design approval holders and operators to complete two separate but interrelated actions. The first action, the proposed SFAR, would require all design approval holders of type certificates (TC) and supplementary type certificates (STC) involving fuel tank systems: (1) to complete a design fuel tank system assessment that may generate future service bulletins and to provide data to support any needed FAA fuel tank system Airworthiness Directives (AD); and, (2) on the basis of the assessment, provide operators with recommendations and instructions for fuel tank system inspections, testing, and maintenance within 12 months of the proposal's effective date. The second action, the proposed operational rules changes, would require that operators incorporate these recommendations and instructions (or their equivalents) into their fuel tank system inspection and maintenance manuals within 18 months of the proposal's effective date.

The proposed part 25 change would apply only to future new TC airplanes and would affect no existing airplanes or airplanes currently produced under an existing part 25 type certificate. The FAA cannot predict the number of new part 25 type certificates that would be affected by the proposed part 25 change because most current part 25 airplanes would comply with the proposed change. The FAA is unable to determine the number of future airplane models whose designs would not have met the proposed change. The proposed part 25 change would also apply only to future new STCs. Based on the previous 10 years, the FAA anticipates that about 17 new STCs for fuel tank systems would be annually issued and that these 17 STCs would represent about 7 individual systems.

II. INDUSTRY PROFILE

A. INTRODUCTION

The proposed SFAR would affect design approval holders (both TC holders and STC holders) under parts 21 and 25. The proposed operational rules changes would affect all turbine-powered transport category airplanes with a TC issued after January 1, 1958, and a maximum certificated passenger capacity of 30 or more or for a maximum certificated payload capacity of 7,500 pounds or more and operated under parts 91, 121, 125, or 129. The proposed part 25 change would affect holders of future new TCs and holders of future new STCs for fuel tank systems.

B. DATA BASE LIMITATIONS

The data source used for this analysis has been constructed from 3 different sources because no single data base available to the FAA contained all of the necessary data. As a substantial investment in time was required to reconcile the differences between these 3 data sources, the latest available data are from 1996. Consequently, this data base would not capture recent changes in number of airplanes, number of operators, etc. In addition, whenever large data sets are merged, there is the potential for error to enter. For example, some operators may have been misclassified as operating under part 135 on-demand when they currently operate under part 121, the type of airplane may have been misreported, etc. However, the FAA believes that these data provide a sufficiently accurate base from which to complete a valid analysis. Nevertheless, the FAA requests the public to provide any additional information and data that can help to increase the accuracy of these estimates.

C. DESIGN APPROVAL HOLDERS AFFECTED BY THE PROPOSED SFAR

The FAA evaluated the current airplane fleet that would be affected by the proposal in order to establish the number of different fuel tank system assessments that would be needed to comply with the proposed SFAR. Table II-1 provides the FAA's determination of which airplane model would require an independent fuel tank system assessment. As can be seen in that Table, the FAA believes that the proposed SFAR would require type certificate holders to complete 36 individual fuel tank system assessments.

The FAA requests comments on its evaluation and that these comments be accompanied with clear supporting data.

The proposed SFAR would also affect 168 fuel tank system STCs held by manufacturers and airlines. However, for the purposes of performing a fuel tank system assessment, these 168 STCs actually represent 68 different STCs because an STC may be granted for each individual airplane rather than for all airplanes in that model. For example, one STC holder has received 9 individual STCs for 9 nearly identical DC-10 fuel tank modifications to install an additional 1,000 gallon to 1,250 gallon fuel tank in each of the 9 airplanes. Clearly, that STC holder would not need to complete 9 different fuel tank system assessments because one assessment would, effectively, affect all 9 STCs. A list of the current part 25 fuel tank STCs is contained in Appendix A. Although the proposed SFAR would also affect holders of STCs for other than fuel tank system modifications, at this time, the FAA is unable to

TABLE II-1
NUMBER OF AIRPLANES BY MODEL

Airplane Model	No. of Airplanes
A300	51
A310	37
A320	145
A330	0
A340	0
EB7'B707 series	8
	878
	1097
B747-200,-300	206
B747-400	30
B757	487
B767	214
B777	12
DC8	181
DC9	472
DC10	204
MD11	66
MD80 series	617
MD90	19
L 1011	112
BAE ATP	10
BAE 41	53
BAE 146	26
DHC 7	26
DHC 8	152
F 27	41
F 28	67
F100	89
SAAB 340	234
ATR72	51
ATR42	112
EMB 145	5
Shorts 360	59
Dornier 328	37
Brad CRJ	2
EMB 120	226
TOTAL	6006

determine how or whether each of these STCs could potentially affect the fuel tank system.

Similarly, the proposed SFAR would also affect holders of fuel tank system field approvals, but, the FAA is unable to estimate their numbers or determine who holds them primarily because they are entered into the FAA data system on an individual airplane basis. It would be extremely time-consuming to read each individual file of 6,006 airplanes.

The FAA requests comments on these estimates and that these comments be accompanied with clear supporting data. The FAA also requests additional information on those topics for which it does not have data at this time.

D. AIRPLANES AND OPERATORS AFFECTED BY THE PROPOSED OPERATIONAL RULES CHANGES

As seen in Table II-Z, the FAA determined that the proposal would affect 154 operators operating 6,006 airplanes. As can be derived from Table II-2, the FAA determined that 114 part 121 operators have at least one airplane that would be affected by this proposal. It needs to be noted that the 12 operators classified as operating under part 135 on-demand in this 1996 data base are, in fact, currently operating under part 121. Of these 114 operators, 40 have 5 or fewer airplanes that would be affected by the proposal and of these 40, 18 have only 1 such airplane. The FAA also determined that 7 operators flying under both parts 121 and 135 have at least one airplane affected by the proposal. Of these 7 operators, 2 have 5 or fewer airplanes that would be affected by the proposal. The FAA further determined that 10 part 125 operators have

TABLE II-2

NUMBER OF AFFECTED AIRPLANES AND AIRPLANE MODELS BY OPERATOR

PART	OPERATOR	NUMBER OF AIRPLANES	NUMBER OF DIFFERENT AIRPLANE MODELS
121	AIR SOUTH Inc. Count	7	1
121	AIR TRANSPORT INTERNATIONAL Count	29	1
121	AIR WISCONSIN Count	23	2
121	AIRTRAN AIRWAYS Count	10	1
121	ALASKA AIRLINES Count	76	2
121	ALLEGHENY AIRLINES INC Count	41	2
121	ALOHA AIRLINES Count	21	1
121	ALOHA ISLAND AIR Count	2	1
121	AMERICA WEST AIRLINES Count	107	3
121	AMERICAN AIRLINES Count	677	9
121	AMERICAN EAGLE Count	120	3
121	AMERICAN INTERNATIONAL AIRWAYS Count	55	5
121	AMERICAN TRANS AIR Count	52	3
121	AMERIJET INTERNATIONAL Count	10	1
121	ARRIVA AIR INTERNATIONAL Count	1	1
121	ARROW AIR Inc. Count	7	2
121	ATLANTIC SOUTHEAST AIRLINES INC Count	83	4
121	ATLAS AIR INC Count	20	1
121	BUFFALO AIRWAYS Count	3	2
121	CAPITAL CARGO AIRLINES Count	2	1
121	CAPITOL AIR EXPRESS Count	6	1
121	CARNIVAL AIR LINES Inc. Count	27	3
121	CHALLENGE AIR CARGO Count	4	2
121	COMAIR ACQUISITIONS INC Count	56	2
121	CONTINENTAL AIRLINES Count	355	11
121	CONTINENTAL MICRONESIA Inc. Count	12	1
121	CORPORATE AIRCRAFT inc.	3	1
121	DELTA AIR LINES Inc. Count	557	8
121	EAGLE CANYON AIRLINES Count	3	1
121	EASTWIND AIRLINES Inc. Count	4	1
121	EMERY WORLDWIDE AIRLINES Count	50	2
121	ERA AVIATION INC Count	2	1
121	EVERGREEN INTERNATIONAL Count	27	4
121	EXECUTIVE AIRLINES	8	1
121	EXPRESS AIRLINES INC Count	41	1
121	EXPRESS ONE INTERNATIONAL Count	20	1
121	FALCON AIR EXPRESS Inc. Count	1	1
121	FEDERAL EXPRESS Count	310	8
121	FINE AIRLINES Count	14	1
121	FLORIDA WEST AIRLINES Count	1	1
121	FRONTIER AIRLINES Inc. Count	10	1
121	GLOBAL INTERNATIONAL AIRWAYS CORP Cou	1	1
121	GRAND HOLDINGS Count	4	1
121	HAWAIIAN AIRLINES Count	15	3
121	HOLIDAYAIR Count	1	1
121	HORIZON AIR INDUSTRIES Count	47	3
121	KITTY HAWK AIR CARGO Count	12	1
121	KIWI INTERNATIONAL AIR LINES Count	16	1
121	LAKER AIRWAYS INC Count	5	2
121	MAHALO AIR INC Count	11	2
121	MESABA AIRLINES Count	25	1

121 MIAMI AIR INTERNATIONAL Count		8	1
121 MIDWAY AIRLINES Count		13	2
121 MIDWEST EXPRESS Count		26	2
121 MILLON AIR Inc. Count		3	1
121 MOUNTAIN AIR CARGO INC Count		1	1
121 NATIONS AIR EXPRESS Count		3	1
121 NAVCOM AVIATION INCORPORATED Count		1	1
121 NORTH AMERICAN AIRLINES Inc. c m		3	2
121 NORTHERN AIR CARGO c m		1	1
121 NORTHWEST AIRLINES c m		415	7
121 OMNI AIR EXPRESS Count		3	1
121 PACIFIC COAST AVIATION		2	1
121 PACIFIC INTERNATIONAL AIRLINES Count		1	1
121 PARADISE ISLAND AIRLINES Count		9	1
121 PIEDMONT AVIATION INC. Count		57	2
121 POLAR AIR CARGO Count		IS	1
121 REEVE ALEUTIAN AIRWAYS Count		2	2
121 RENO AIR Inc. Count		24	1
121 RICH INTERNATIONAL AIRWAYS Inc. Count		16	2
121 ROSS AVIATION INC Count		4	2
121 RYAN INTERNATIONAL AIRLINES Count		36	3
121 SIERRA PACIFIC AIRLINES Inc. Count		1	1
121 SIMMONS AIRLINES c m		13	3
121 SKYWEST AVIATION		52	2
121 SOUTHERN AIR TRANSPORT Count		7	2
121 SOUTHWEST AIRLINES Count		248	1
121 SPIRIT AIRLINES Count		13	1
121 SUN COUNTRY AIRLINES cm		20	2
121 SUN JET INTERNATIONAL Inc. cm		6	2
121 SUN PACIFIC INTERNATIONAL Count		4	1
121 SUNBIRD AIRWAYS Count		1	1
121 SUNWORLD INTERNATIONAL AIRLINES Inc. Co		1	1
121 TARGET AIRWAYS LIMITED Count		4	2
121 TEM ENTERPRISES INCORPORATED Count		2	1
121 TOWER AIR INC Count		19	1
121 TRANS CONTINENTAL AIRLINES Count		6	1
121 TRANS WORLD AIRLINES Count		204	7
121 TRANS WORLD EXPRESS Count		44	4
121 UFS INCORPORATED Count		5	1
121 UNITED AIR LINES INC Count		562	8
121 UNITED PARCEL SERVICE Count		192	5
121 USA JET AIRLINES, INC Count		8	1
121 USAIR INC Count		397	7
121 USAIR SHUTTLE Count		11	1
121 VALUJET AIRLINES Count		51	2
121 VANGUARD AIRLINES Inc. Count		8	1
121 VISCOUNT AIR SERVICE Inc. Count		7	1
121 WESTERN PACIFIC AIRLINES Count		IS	1
121 WINGS WEST AIRLINES		39	1
121 WORLD AIRWAYS Count		IS	2
121 ZANTOP INTERNATIONAL AIRLINES Count		4	1
121 Count	102.	5596	
121/135 BUSINESS EXPRESS		38	1
121/135 CONTINENTAL EXPRESS Count		49	3
121/135 DHL AIRWAYS INCORPORATED Count		20	2
121/135 EAGLE JET CHARTER Inc. Count		3	1
121/135 FLAGSHIP AIRLINES Count		46	2
121/135 GULFSTREAM INTERNATIONAL AIRLINES Inc.		5	1
121/135 PSA AIRLINES		32	2

121/135 Cou	7	193	
125 AMWAY CORPORATION Count		1	1
125 CALCUTTA AIRCRAFT LEASING INCORPORATE		1	1
125 CHAMPIONSHIP AIRWAYS Inc. Count		1	1
125 CONTINENTAL AVIATION SERVICES Count		1	1
125 INTERNATIONAL AIR LEASES INCORPORATED		11	4
125 NOMADS INC c m		1	1
125 RELIANCE INSURANCE COMPANY Count		1	1
125 SUMMIT AVIATION CORPORATION Cm		3	1
125 TRACINDA CORP c m		1	1
125 WEDGE AVIATION INCORPORATED Count		1	1
125 Count	10	22	
129N AERO CALIFORNIA Count		4	1
129N AERO COSTA RICA Count		2	1
129N AEROLINEAS ARGENTINAS Count		2	1
129N AEROMEXPRESS C m		2	1
129N AIR ARUBA C m		2	1
129N AIR ATLANTIC Count		1	1
129N AUSTRAL LINEAS AEREAS Count		2	1
129N CHINA AIRLINES Count		3	1
129N CHINA SOUTHERN A - Count		3	1
129N EVA AIRWAYS CORPORATION Count		10	3
129N GUYANA AIRWAYS CORP Count		2	2
129N JAPAN AIRLINES Count		3	1
129N KRAS AIR Count		2	1
129N LINEAS AEREAS SURAMERICANAS Count		1	1
129N LUFTHANSA CARGO AIRLINES Count		4	1
129N MANDARIN AIRLINES Ltd Count		2	1
129N MIDDLE EAST AIRLINES Count		2	1
129N PACIFIC COASTAL AIRLINES		2	1
129N PHILIPPINE AIRLINES Count		13	2
129N SEAGREEN AIR TRANSPORT Count		3	2
129N SINGAPORE AIRLINES C m		5	1
129N SURINAM AIRWAYS Count		1	1
129N TACA INTERNATIONAL A - Count		19	3
129N VOYAGEUR AIRWAYS Count		1	1
129N Count	23	91	
135OD AIR CARGO CARRIERS		1	1
135OD ATLANTIC COAST AIRLINES		28	1
135OD AVIOR TECHNOLOGIES Count		1	1
135OD CHAUTAUQUA A I -		12	1
135OD CHICAGO EXPRESS AIRLINES		1	1
135OD COLGAN AIRWAYS		1	1
135OD EXECUTIVE AIR NEW ORLEANS		18	1
135OD EXECUTIVE AIR TRANSPORT (USA)		1	1
135OD GREAT LAKES AVIATION		12	1
135OD MOUNTAIN WEST AIRLINES		9	1
135OD PENINSULA AIRWAYS		1	1
135OD WESTAIR COMMUTER AIRLINES		19	1
135OD Coun	12	104	
rand Count	154	6086	285

airplanes that would be affected by the proposal. Of these 10 operators, 1 has 11 airplanes, 1 has 3 airplanes, and 8 have only 1 airplane that would be affected by the proposal. In addition, 23 foreign air carriers operating U.S.-registered airplanes under part 129 would be affected by this proposal. Three of these carriers have between 10 and 19 airplanes, while the remaining 20 air carriers have 5 or fewer airplanes that would be affected by the proposal.

At this time, the FAA has no direct data on the number of part 91 operators and the number of airplanes that would be affected by the proposal. However, the FAA believes that the lack of information concerning part 91 operators would have a minimal effect on this analysis because it is unlikely that many airplanes with 30 or more seats operate under part 91.

The FAA also requests comment on these estimates and requests additional information.

As seen in Table II-2, the number of different airplane models used by an individual operator can widely vary across operators. The number of these different models will affect the number of inspection manuals that each individual operator would need to revise. As can be derived from Table II-2, one operator has a fleet consisting of 11 different airplane models, one operator has a fleet consisting of 9 different airplane models, three operators have a fleet consisting of 8 different airplane models, three operators have a fleet consisting of 7 different airplane models, two operators have a fleet consisting of 5 different airplane models, five operators have a fleet consisting of 4 different airplane models, ten operators have a fleet consisting of 3 different models, 30 operators have a fleet consisting of 2 different models, and 99 operators have a fleet consisting of 1 airplane model. Thus, in total, operators would need to obtain 285 different recommendations and instructions from the design approval holders.

E. TYPE CERTIFICATE HOLDERS AFFECTED BY THE PROPOSED PART 25 CHANGE

Although the FAA cannot predict the number of applications for new par-, 25 TCs that would be made in the future, it is unlikely that there would be a substantial number of them. However, based on the average number of STCs that have been granted over the last 10 years, the FAA estimates that an average of 17 new STCs would be granted per year but that these 17 STCs would actually reflect 7 new fuel tank system designs.

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At this time, the FAA has no direct data on the number of part 91 operators and the number of airplanes that would be affected by the proposal. However, the FAA believes that the lack of information concerning part 91 operators would have a minimal effect on this analysis because it is unlikely that many airplanes with 30 or more seats operate under part 91.

The FAA also requests comment on these estimates and requests additional information.

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III. BENEFITS

A. INTRODUCTION AND BACKGROUND

The benefits associated with the proposal would arise from reducing the probability of a fuel tank explosion and the ensuing losses. There are 2 necessary conditions for a fuel tank explosion. The first condition is that the fuel tank have an explosive atmosphere. The second condition is that there be a source (either external to the fuel tank or internal to the fuel tank) to ignite that explosive atmosphere.

B. PROPOSED PART 25 CHANGE

With respect to preventing the first condition of an explosive atmosphere in the fuel tank, the FAA is evaluating methods of altering fuel tank system design and airplane operating procedures. An Aviation Rulemaking Advisory Committee (ARAC) Fuel Tank Harmonization Working Group has studied airplane fuel tank system design and airplane operating issues and provided its recommendations to the FAA on July 21, 1998.

These recommendations are being incorporated into this proposed rulemaking as the proposed part 25 changes that would require future part 25 type certificated airplanes to minimize the potential for a flammable atmosphere in the fuel tank or to ensure continued safe flight and landing should the fuel vapors ignite in the fuel tank. The FAA anticipates that minimizing the potential for a flammable atmosphere in future part 25 type certificated airplanes would most likely involve the developments of designs to prevent outside heat sources from raising fuel tank temperature. By reducing the temperature of the fuel in the fuel tank, the rate of fuel evaporation would be reduced and, therefore, reduce the amount of time a fuel tank would have an explosive atmosphere. If that were to be impractical, the proposed part 25 change would allow the future part 25 type certificate holder to develop alternative methods to suppress the explosion or to minimize the potential for an ignition to cause an explosion. The FAA believes that the potential benefits from this proposed part 25 change would occur in the future as new airplane models are type certificated and produced. As a result, these potential benefits would be minimal in the immediate future. Thus, as the FAA cannot precisely predict the number of future part 25 type certificates or predict the number of airplanes of each model that would be sold or predict when they would be sold, the FAA cannot quantify benefits from this proposed part 25 change.

The FAA similarly believes that the proposed part 25 change would help to minimize the potential for a flammable atmosphere in future part 25 STC fuel tank systems. Although several types of fuel tank system STCs would not be affected by the proposed changes (e.g., changing the model of a fuel boost pump), there would be other STCs that would be affected (e.g., adding one or more auxiliary fuel tanks). In discussions with industry sources, the FAA determined that current industry practice is such that the proposed part 25 change is being met. On that basis, the FAA believes that the potential benefits from this proposed part 25 change would be minimal.

C. PROPOSED SFAR AND OPERATIONAL RULES CHANGES

Preventing an ignition event from occurring in the fuel tank is the purpose of this proposed SFAR and proposed operational rules changes. The approach taken in the proposal closely follows recent cooperative, multinational industry efforts, some recent service bulletins, and some recent ADs to evaluate the potential for fuel tank systems and equipment and wiring to create an ignition event in the fuel tanks.

During the past 10 years, there have been 2 fuel tank explosions in the world-wide fleet in which an internal fuel tank ignition event was the probable cause of the explosion. The first, a May 11, 1990, Philippine Airline on the ground B-737 explosion in Manila resulted in 8 fatalities and 30 injuries out of 120 passengers and crew. The second was the July 17, 1996, B-747 TWA Flight 800 explosion in which there were 230 fatalities. The fact that there have been two explosions probably caused by an unknown internal fuel tank ignition event indicates the potential for such an event. In addition, the inspections of the B-737 boost fuel pump wiring made to comply with an FAA Airworthiness Directive (AD) uncovered two instances in which arcing through the cable occurred. Thus, the goal of the proposal is to minimize the probability of an ignition event ever occurring by enhancing the fuel tank system inspections and the equipment and wiring testing.

The proposed SFAR would require the design approval holder to complete a fuel tank system assessment to determine means to reduce the probability of an ignition event. This proposed requirement would result in the design approval holder providing recommendations and instructions concerning fuel tank system inspections, equipment and wiring testing, and other fuel tank maintenance as well as future service bulletins and possibly, data for the FAA issuing future ADs.

The proposed operational rules changes would require that these recommendations (or their equivalents) be incorporated into the operator's inspection manuals and procedures within 18 months of the proposal's effective date. As is true of any inspection program, the inspection itself would not directly prevent a future accident. The accident would be directly prevented by the corrective actions taken pursuant to the inspection. Nevertheless, without the inspection, the corrective action may not be taken. Consequently, it is difficult to precisely allocate the benefits from preventing an accident between those attributable to the inspection and those attributable to the corrective actions. As a further complicating factor, any future fuel tank design and associated airplane operational rules would also reduce the risk of a potential fuel tank explosion and, therefore, would also claim a share of the potential benefits. The basic situation is that there is a finite number of potential accidents and a resulting finite amount of benefits to be allocated among the three different preventative actions of: (1) enhanced inspection and testing; (2) proposed corrective actions; and (3) retrofitting changes in fuel tank system designs in concert with changes in current airplane operations. However, as the FAA has not proposed the third preventative action, this analysis allocates a substantial percentage of the potential benefits from preventing fuel tank explosions to this proposal. Nevertheless, the FAA recognizes that should the third preventative action be proposed, the allocation of benefits in this proposal would not preclude the FAA from allocating benefits to the third preventative action.

D. METHODOLOGY USED TO QUANTIFY BENEFITS FROM THE PROPOSED SFAR AND THE PROPOSED OPERATIONAL RULES CHANGES

The methodology used to estimate the potential benefits that would arise from the proposed SFAR and proposed operational rules changes is based on the following defining assumptions:

(1). The world-wide fuel tank explosion rate for the past 10 years provides an accurate model for the future fuel tank explosion rate if no additional actions are taken to prevent these explosions. Given the recent fuel tank wiring problems found in B-737s and the likely wear of wiring in the aging fleet, the FAA believes that this accident rate assumption would likely result in a conservative estimate.

(2). This observed explosion rate is based on only the accidents which were likely caused an internal fuel tank ignition event. Fuel tank explosions that have been ignited by lightning strikes, engine separations, bombs, fueling accidents, etc. are not included. Consequently, the TWA Flight 800 and the Philippine Airline explosions are the universe of past explosions. In other words, the estimated potential benefits from preventing future explosions would not include explosions that would have been prevented by compliance with other FAA safety standards or security requirements.

(3). The average annual rate of growth in U.S. commercial airplane operations will be 4.3 percent over the next 10 years.

(4). Based on the Department of Transportation's latest estimate, the amount that society would pay to prevent a potential fatality is $2.7 million.

(5). The average value of a destroyed airplane would be about $20 million - noting that this is an average value that includes both new and older airplanes of different sizes that would be susceptible to a fuel tank explosion.

(6). Based on the Lockerbie, Scotland investigation updated to 1997 dollars, the FAA estimates that an in-flight airplane explosion investigation would cost the U.S. government about $30 million. Although the cost of the TWA Flight 800 accident investigation will be considerably greater than $30 million, that accident investigation cost was compounded by its location in the Atlantic Ocean.

(7). The period of time covered by the analysis is limited to the next 10 years because, as time proceeds, the above assumptions used to make benefits predictions become less tenable or reliable.

However, in order to quantify potential benefits, two critical and potentially controversial assumptions need to be made. The first assumption is the expected number of fatalities from a fuel tank explosion. The second assumption is whether or not to discount the quantified benefits.

With respect to the first of these two critical assumptions, there are a variety of different approaches that can be used but, given the time and resource constraints, the FAA concentrated on two approaches. The first approach is to use the TWA Flight 800 as the model for the potential number of lives that can be lost in a fuel tank explosion. The second approach is to construct an "average" air carrier flight as the model for the potential number of lives that can be lost in a fuel tank explosion. With respect to the second of these two critical assumptions, one approach is to leave total future benefits undiscounted. Specifying a specific date for a rare event when fatalities would be prevented would directly influence the quantified potential benefits. The other approach is that if future compliance costs are discounted, then quantified future benefits should be similarly discounted. In order to present a complete picture, the potential benefits are quantified using both approaches and provide both undiscounted and discounted benefits estimates.

E. ESTIMATED ACCIDENT RATE AND EXPECTED NUMBER OF U.S. ACCIDENTS

There have been about 149,000,000 world-wide commercial airplane departures during the past 10 years. Dividing that number into the 2 fuel tank explosions generates a likely internal ignition fuel tank explosion rate of 1.34 E-8.

Over the previous 10 years, there have been about 61,000,000 commercial airplane departures in the U.S. Applying the growth rate of 4.3 percent results in a total of 93,000,000 commercial airplane departures in the U.S. during the next 10 years. Multiplying the calculated fuel tank explosion rate by the number of total departures generates an estimate of between 1 and 2 (the statistical estimated number would be 1.25) such fuel tank explosions in the U.S. during the next 10 years if no additional preventive action were to be taken.

F. ESTIMATED QUANTIFIED BENEFITS FOR THE PROPOSED SFAR AND THE PROPOSED OPERATIONAL RULES CHANGES

1. Number of Fatalities

Using the TWA estimate of 230 fatalities, the 1 to 2 explosions are projected to cause between 230 and 460 fatalities. If the statistically expected number of 1.25 explosions is used, the projected estimate is 288 fatalities.

The estimated number of "average" air carrier passengers is based on the FAA Aviation Forecasts Fiscal Years 1998-2009 in which the average number of air carrier passenger seats per airplane is projected (p. IX-

8) to be 175 over the next 10 years. Using the projected load factor of 70 percent (p. IX-16) and a 7 member crew results in an average of 130 passengers and crew per flight. On that basis, the 1 to 2 explosions are projected to cause between 130 and 260 fatalities. If the statistically expected value of 1.25 explosions is used, the projected estimate is 163 fatalities.

2. Total Quantified Losses

Using the TWA estimated number of fatalities, the total cost of the fatalities would be between $621 million and $1.242 billion over the 10-year period. Thus, adding the expected value ($20 million) of the destroyed airplane and of the accident investigation ($30 million) would result in a total expected loss of $671 million to $1.342 billion over the lo-year period.

Using the "average" estimated number of fatalities, the total cost of the fatalities would be between $351 million and $702 million over the lo-year period. Thus, adding the expected value ($20 million) of the destroyed airplane and of the accident investigation ($30 million) would result in a total expected loss of $401 million to $802 million over the lo-year period.

3. Discounted Quantified Losses

The impact of discounting critically depends upon when the prevented explosion would have occurred. For example, the impact of discounting would be minimal if the prevented explosion would have occurred within a year or two. Similarly, the impact of discounting is at its greatest if the prevented explosion would have occurred in 9 years.

The appropriate statistical approach is to estimate the year of an expected explosion is to determine the year in which the cumulative probability of a fuel tank explosion reaches 0.5. By way of illustration, assume there are 10 blue marbles and 1 red marble in a jar. The odds on selecting the red marble at some point during a sequence of selections are against the individual doing the selecting until the sixth selection. Using that theoretical approach and remembering that the number of flights is increasing by 4.3 percent every year, if there were to be 1 explosion during the lo-year time period, it would occur in the sixth year. If the statistically expected value of 1.25 explosions is used, it would occur in the fifth year. Finally, if there were to be 2 explosions, the first explosion would occur in the fourth year and the second explosion would occur in the eighth year.

Thus, as seen in Table III-l, the present value of the potential losses over 10 years discounted at 7 percent can range from $270 million to $900 million, depending upon the assumptions.

TABLE III-1

POTENTIAL LOSSES FROM A FUEL TANK EXPLOSION
(in $ millions)

CATEGORY	NUMBER OF ACCIDENTS		
UNDISCOUNTED LOSSES	ONE ACCIDENT	1.25 ACCIDENTS	2 ACCIDENTS
1. TWA	670	840	1,340
2. Average	400	500	800
DISCOUNTED LOSSES			
1. TWA	450	600	900
2. Average	270	360	540

4. Rate of Effectiveness of the Proposal

In order to calculate the proposal's expected benefits, the FAA needs to establish the extent to which it would be effective in preventing future fuel tank explosions. Once a rate of effectiveness is determined, it is then applied to the expected quantified losses from the expected fuel tank explosions to estimate the proposal's quantified benefits. However, as described on p. 16., it is difficult to precisely determine the potential effectiveness of an inspection program in preventing future accidents.

Nevertheless, one way of illustrating the potential effectiveness of an enhanced fuel tank system inspection program and equipment and wiring testing is to use a recent example of an inspection program. On May 7, 1988, the FAA issued an AD requiring the inspection of fuel boost pump wires in the center wing tank of all B-737s with more than 30,000 flight hours. Of the 599 airplanes inspected as of July 29, 1998, 273 had noticeable chafing to wire insulation, 33 had significant (>50 percent) insulation chafing, 8 had arcing on the cable but not through the conduit, while 2 had arcing through the conduit.

Based on this inspection program experience in finding potential and actual ignition events, the FAA believes that an enhanced fuel tank system inspection and equipment and wiring testing would be a significant factor in discovering potential fuel tank ignition sources before they create an ignition event in the fuel tank. The FAA recognizes that no inspection program would be 100 percent effective because an unforeseen incident in the fuel tank between scheduled inspections may create an ignition hazard. Based on its experience and the results seen from the B-737 wiring inspection, the FAA believes that compliance with the proposal may prevent between 75 percent and 90 percent of the future potential fuel tank explosions.

The values in Table III-2 are calculated by multiplying the values in Table III-1 by 75 percent (for lower bound) or by 90 percent (for upper bound) and then multiplying each of those resulting values by 96 percent (with modest rounding) because the B-747 airplane models have been covered by various ADs and are not included in the estimated cost of compliance (see Chapter V). As seen in that table, the FAA calculates that the total value of the benefits over the lo-year period from the proposal would be between $300 million and $1.161 billion. The FAA also calculates that the present value of the benefits discounted over 10 years at 7 percent would be between $190 million and $780 million.

TABLE III-2

POTENTIAL BENEFITS FROM THE PROPOSAL
(in $ millions)

CATEGORY	NUMBER OF ACCIDENTS		
UNDISCOUNTED BENEFITS	ONE ACCIDENT	1.25 ACCIDENTS	2 ACCIDENTS
1. TWA	480 - 580	600 - 725	970 - 1,160
2. Average	300 - 370	380 - 460	610 - 740
DISCOUNTED BENEFITS			
1. TWA	325 - 390	430 - 520	650 - 780
2. Average	190 - 230	260 - 310	390 - 470

F. CONCLUSION

The FAA concludes that the proposed SFAR and the proposed operational rules changes would help to prevent future fuel tank explosions by revealing fuel tank, equipment, and wiring conditions that need to be repaired or replaced before they present a potential fuel tank ignition source. The FAA estimates that these benefits discounted over 10 years can be quantified, using an "average" number of passengers, and the statistical value of 1.25 explosions during the next 10 years, to be between $260 million for the low estimate based on the average and $520 million for the high estimate based on the TWA accident. In addition, the FAA concludes that the proposed part 25 change would reduce the potential for future fuel tank explosions but that these benefits cannot be quantified at this time.

IV. COMPLIANCE COSTS

A. INTRODUCTION

There are three components of the proposal that would impose compliance costs. The first component, the proposed change in the part 25 type certificate, would be incurred by future type designs. The other two distinct but interrelated components of the proposal that would impose compliance costs would be: (1) the costs to comply with the proposed SFAR; and (2) the costs to comply with the proposed operations rules changes. These component costs are discussed and estimated and then summed to obtain a total estimated compliance cost.

The proposed change to part 25 could impose some compliance costs on future part 25 type designs. The FAA, however, determined that these costs would be minimal because incorporating changes in the design – before any airplanes would be manufactured – would not be in this case. In addition, because these costs would be incurred in the future by airplane models yet to be designed, the expected discounted costs would be minimal. The FAA requests comments on this determination and that these comments be accompanied with clear supporting data.

The proposed change to part 25 could impose some compliance costs on future part 25 fuel tank system STCs. Based on discussions with FAA field personnel and holders of existing fuel tank system STCs for auxiliary fuel tanks, the FAA determined that the proposed change reflects current industry practices. On that basis, the FAA believes that the compliance costs to future fuel tank system STC designs would be minimal.

The proposed SFAR would impose compliance costs on current and future design approval holders (both Type Certificate (TC) holders and Supplemental Type Certificate (STC) holders). Within one year of the effective date of the proposed SFAR, the design approval holder would be required to complete a comprehensive assessment of the fuel tank system assessment and to then develop recommended changes to the airplane operators' fuel tank inspections. The design approval holder would also generate service bulletins and provide data, as necessary, to the FAA for it to issue ADs to correct any unsafe fuel tank conditions discovered during the assessment. Thus, the cost of compliance with the proposed SFAR would be the TC and STC holders personnel time to complete the fuel tank system assessment and to develop the recommended changes.

In addition, the proposed operational rule changes would impose compliance costs on the operators of the affected airplanes. Within 18 months of the effective date of the proposed operational rule changes, operators of the affected airplanes would evaluate these recommended fuel tank system changes and incorporate them into their fuel tank system inspection and equipment and wiring testing programs. The operator's cost of complying with the proposed operational rule changes would be due to the increased time to perform fuel tank system inspections and equipment and wiring testing.

It should be noted that the attributed costs of the proposed operational rule changes do not include the expense of making repairs or replacing equipment that may be found to be necessary during the fuel tank inspections and equipment and wiring testing. While the FAA recognizes that such repairs and equipment replacements may constitute a significant expense, these costs are not attributed to this proposed operational rule changes because existing FAA regulations require that such repairs and equipment replacements be made to assure the airplane's continued airworthiness.

Finally, the future costs of complying with any service bulletins or ADs issued subsequently to the fuel tank system assessment are not included as a cost of complying with the proposed SFAR. Those future costs would be estimated for each individual AD when it would be proposed by the FAA.

B. REQUEST FOR COMMENTS AND DATA

The estimated costs in this analysis critically depend upon the underlying methodology and assumptions. Many of the estimates are based on the principle of similarity. In other words, the FAA have data for a particular airplane model, which is then extrapolated to a different manufacturer's model on the FAA's determination that the fuel tank system assessment and the resultant impact on operator fuel tank system inspections and equipment testings are similar. The FAA requests comments on the methodology, assumptions, and estimates made in this analysis. The FAA also requests that commenters provide data to correct any errors in its methodology, assumptions, and estimates.

It is also noted that the analysis focuses on existing airplanes and does not directly address the costs that the proposed SFAR would impose on future TC holders, primarily because the present value of such future costs would constitute an insignificant proportion of the costs estimated in this analysis. However, due to the greater number of future fuel tank system STC holders, other holders of future STCs that may affect the fuel tank system, and future fuel tank field approval holders, the FAA provides an estimate of their potential compliance costs.

C. COMPLIANCE COSTS FOR THE PROPOSED FUEL SYSTEM ASSESSMENTS

This section provides the analysis of the estimated costs to comply with the proposed SFAR's requirement for a design approval holder or an operator to complete a fuel tank system assessment. This section first discusses those parties who would perform these assessments, the methodology, assumptions, and unit hours and costs that are used to calculate the total compliance costs, and finally, the estimates themselves.

1. Responsibility for Compliance

The TC or STC holder would be required to perform the fuel tank system assessment in order to maintain the TC or STC. However, some design approval holders may have gone out of business or may decide that there would be an insufficient economic payoff (e.g., older STCs that cover only a few airplanes in operation) for performing a fuel tank system assessment and would rather surrender the TC or STC. If the design approval holder would not perform the fuel tank system assessment, then it would be the operator's responsibility to demonstrate that the airplane meets the airworthiness standards. Consequently, in that case, the operator would either perform the fuel tank system assessment, or hire an outside engineering firm to perform the fuel tank system assessment, or sell the airplane. Clearly, it would be difficult to sell an airplane that would not qualify for a U.S. registration until the fuel tank system assessment were performed. However, the FAA believes that few, if any, design approval holders would not perform the assessment. As a result, the FAA has calculated the compliance cost to perform a fuel tank system assessment on the assumption that each TC or STC holder would, in fact, complete the assessment.

The proposed SFAR would also require a fuel tank system assessment for each STC that may have an affect on the fuel tank system. For nearly all of these STCs, the STC holder would qualitatively evaluate the STC's impact on the fuel tank system and submit a statement to the FAA that the fuel tank system would not be affected by the STC. As is consistent with the logic described in the previous paragraph, the FAA assumes that each of these STC holders would complete the assessment.

Finally, the proposed SFAR would require that a recipient of a field approval of a fuel tank system modification would also be required to perform a fuel tank system assessment.

2. Methodology and Assumptions for Estimating Compliance Costs of Fuel Tank System Assessment

a. Type Certificate (TC) Holders

As seen in Table IV-l, the FAA has determined that 34 TC airplane models (excluding the two Boeing 747 models) would each require an individual fuel tank system assessment (i.e., in general, one fuel tank assessment per TC). Thus, after discussion with the industry, FAA assumes that one TC fuel tank system assessment is reasonably appropriate or all of the airplanes covered by that TC. For example, the fuel tank systems in the Boeing 737 series (including such models as the B737-200, B737-300, ... B737-700, etc.) or the MD 80 series (including such models as the MD81,

TABLE IV-1

FUEL TANK SYSTEM ASSESSMENT COSTS

\irplane Model	Time to Complete Initial Assessment (Years)	Maintenance Manual and Service Bulletin (Years)	Industry FAA Discussion (Hours)	FAA Review (Hours)	First-Year Assessment Cost	FAA Review Costs	Total First-Year Assessment Cost	Annual Assessment Cost	Discounted Present Value of Assessment Cost	Annualized Cost
\300	0.75	0.25	40	24	$204,000	$2,400	$206,400	$0	$206,400	$29,38
\310	0.75	0.25	40	24	$204,000	$2,400	$206,400	$0	$206,400	$29,38
\320	0.75	0.25	40	24	$204,000	$2.400	$206,400	$0	$206,400	$29,38
\330	1.5	0.25	80	40	$358,000	$4,000	$362,000	$0	$362,000	$51,54
\340	1.5	0.25	80	40	$358,000	$4,000	$362,000	[illegible]	$362.000	$51,54
3727	1	0.50	40	24	$304,000	[illegible]	[illegible]	$0	$306.400	$43,62
					$304,000	$2,400	$306,400	$0	$306,400	$43,62
3737 series	1.5	0.75	80	40	$458,000	$4,[illegible]	$462,000	$0	$462,000	$65,77
3747	2	1.00	80	40	$608,000	$4,000	$612,000	$0	$612,000	$87,13
47-400	2	1.00	80	40	$608,000	$4,000	$612,000	$0	$612.000	$87,13
3757	1	0.50	40	24	$304,000	$2,400	$306,400	$0	$306,400	$43,62
3767	1	0.50	40	24	$304,000	$2,400	$306,400	$0	$306,400	$43,62
3777	1	0.50	40	24	$304,000	$2,400	$306,400	$0	$306,400	$43,62
)C8	0.75	0.25	24	16	$202,400	$1,600	[illegible]	$20 $0	$204,000	$29,04
)C9	0.75	0.25	24	16	$202,400	$1,600	$204,000	$0	$204,000	$29,04
)C10	1.5	0.50	80	40	$408,000	$4,000	$412,000	$0	$412,000	$58,66
ЛD11	1.5	0.50	80	40	$408,000	$4,000	$412,000	$0	$412,000	$58,66
ЛD80 series	1.5	0.50	48	24	$404,800	$2,400	$407,200	$0	$407,200	$57,97
ЛD90	0.75	0.25	24	16	$202,400	$1,600	$204,000	$0	$204,000	$29,04
1011	1.5	0.50	80	40	$408,000	$4,000	$412,000	$0	$412,000	$58,66
3AE ATP	0.5	0.20	8	8	$140,800	$800	$141,600	$0	$141 600	$20,16
3AE 41	0.5	0 20	8	8	$140,800	$800	$141,600	$0	$141,600	$20,16
3AE 146	0.5	0.20	8	8	$140,800	$800	$141,600	$0	$141,600	$20,16
)HC 7	0.5	0.20	8	8	$140,800	$800	$141,600	$0	$141,600	$20,16
)HC 8	0.5	0.25	16	8	$151,600	$800	$152,400	$0	$152,400	$21,69
= 27	0.5	0.20	8	8	$140,800	$800	$141,600	$0	$141,600	$20,16
= 28	0.75	0.25	24	16	$202,400	$1,600	$204,000	$0	$204,000	$29,04
=100	0.75	0.25	24	16	$202,400	$1,600	$204,000	$0	$204,000	$29,04
3AAB 340	0.5	0.20	8	8	$140,800	$800	$141,600	$0	$141,600	$20,16
ATR72	0.75	0.25	16	16	$201,600	$1,600	$203,200	$0	$203,200	$28 93
ATR42	0.5	0.20	8	8	$140,800	$800	$141,600	$0	$141,600	$20,161
EMB 145	0 5	0.20	8	8	$140,800	$800	$141,600	$0	$141,600	$20 161
Shorts 360	0 5	0 20	8	8	$140,800	$800	$141,600	$0	$141,600	$20,161
Dornier 328	0 5	0 20	8	8	$140,800	$800	$141,600	$0	$141 600	$20 161
Brad CRJ	0 5	0.20	8	8	$140,800	$800	$141,600	$0	$141,600	$20,161
EMB 120	0 5	0 20	8	8	$140,800	$800	$141,600	$0	$141,600	$20 161
Consultation	0 004	0 00	0	0	$231,200	$0	$231,200	$0	$231,200	$32 918
TC TOTAL					$9,436,800	$73,600	$9,510,400	$0	$9,510,400	$1 354 067
Fuel Tank STCs	0.25	0.10	8	8	$4,868 800	$46,400	$4,915,200	$214,800	$6,423,865	$914 614
TOTAL					$14 305,600	$120,000	$14,425,600	$214,800	$15,934 265	$2 268 681

the MD82, etc.) are sufficiently similar with other models in that series, so that one general fuel tank system assessment can suffice for the entire series. However, as each model in the series would require some individual, additional assessment, the FAA estimated that it would take more time to perform a fuel tank system assessment for the B-737 series and MD-80 series than for other similar-sized airplane models with fewer variations.

As has been described, some of the TC holders have performed a fuel tank system assessment for some of the areas that would be addressed by the proposed SFAR. However, most TC holders that would be affected by the proposed SFAR have not performed such an assessment and, at this time, are not able to provide an estimate of the amount of time it would take them to perform this assessment. Therefore, the FAA has preliminarily determined that in estimating the amount of time to perform a fuel tank system assessment, these 36 TCs can be classified into the following 7 general categories: (1) the two Boeing 747 models; (2) other large jet transport category airplanes (examples, DC-10, L-1011, etc.); (3) airplane models with several types in a series (examples, B-737 series and the MD-80 series); (4) medium and small Boeing jet transport category airplanes (examples, B-767, B727, etc.); (5) medium and small jet transport category airplanes of other manufacturers (examples, A-320, DC-9, etc.); (6) large turboprops - those with 50 or more seats (example, ATR-72); and (7) small turboprops - those with 30 to 50 seats (examples, ATR-42, DHC-8, BAE-41, etc.).

The FAA used the same methodology and classifications of airplane models to estimate the number of engineer hours needed by the TC holder to develop any recommended changes to the operators' fuel tank inspection manuals and procedures or to create any necessary service bulletins.

Until the fuel tank system assessments are completed, however, the FAA cannot accurately determine the amount of engineering time that would be required for these tasks. Consequently, as seen in Table IV-l, the FAA estimated that the engineering hours needed would be roughly proportional to the engineering hours to perform the fuel tank system assessment.

b. Fuel Tank System Supplemental Type Certificate (STC) Holders

The fuel tank system STC holders, however, cannot be as conveniently classified into a finite number of groups as was done for the analysis of the TCs. As an illustration, many individual STCs have been issued on an individual airplane basis. As a result, one STC holder may have several STCs for, basically, the same fuel tank system modification made to different airplanes of the same model. For example, a company adding a supplementary fuel tank to a B-747 freighter can, using the same basic design, receive a different STC for each modified airplane. Thus, in that example, the FAA would determine that those several STCs would, effectively, require only one fuel tank system assessment. On the other hand, an STC holder may have received one STC for a fuel tank system modification for several different models within one airplane series. Consequently, the FAA reviewed the 139 fuel tank system STCs and determined that the proposed SFAR would require a fuel tank system assessment for 68 of the fuel tank system related STCs.

On average, an STC holder would take less time than a TC holder to complete a fuel tank system assessment. In general, an STC modification involves the addition of one or more fuel tanks, or the substitution of a different fuel quantity indicator system, or fuel booster pump for the one approved in the original TC. As a result, many STC holders would be able to incorporate a large proportion of a TC holder's fuel tank system assessment into its assessment. Nevertheless, some STC holders would be required to perform a substantial fuel tank system assessment. As the FAA cannot evaluate the extent of effort required by each STC holder, the FAA has chosen to use an average amount of time for the 68 individual fuel tank system assessments. Thus, as seen in Table IV-l, the FAA assigned one average value of 0.25 engineering hours to complete a fuel tank system assessment for each of the 58 fuel tank STCs.

The FAA used the same methodology to estimate an average number of 0.1 engineer years that would be used by all fuel tank STC holders to develop any recommended changes to the operators' fuel tank inspection manuals and procedures or to create any necessary service bulletins.

c. Other STC Holders

The proposed SFAR would require other STC holders to determine the impact of their STC on the fuel tank system. The FAA anticipates that only a small number of these other STC holders would need to perform such an assessment because most STCs would not affect the fuel tank system. For those that would need to perform the assessment, the FAA anticipates that the assessment would be much simpler than that performed by a fuel tank system STC holder.

Although the FAA believes that the individual STC holder would incur minimal compliance costs, at this time, the FAA is unable to determine the number of these STC holders that would be affected and cannot provide an cost of compliance estimate for these parties.

d. Field Approval of Fuel Tank Modifications

The proposed SFAR would require holders of field approvals of fuel tank modifications to determine the impact of that field approval on the fuel tank system. Although the FAA believes that the individual STC holder would incur minimal compliance costs, at this time, the FAA is unable to determine the number of these STC holders that would be affected and cannot provide an cost of compliance estimate for these parties.

3. Fuel Tank System Assessment Unit Costs

The FAA assumes that an appropriate level of technical, engineering competence would be required to complete an acceptable assessment regardless of who performs it. The FAA does not have the resources to visit each design approval holder and evaluate its salary and internal review structures to determine the potential individual design approval holder compliance cost. Rather, the FAA takes the approach that the hourly total compensation rate (salary plus fringe benefits) of a design engineer is adjusted to account for the associated supervisory, clerical, administrative, and legal time that is not separately included in the FAA-estimated time to complete a fuel tank system assessment. On that basis, the adjusted engineer hourly total compensation rate is $100. Further, the average engineer work year is assumed to be 2,000 hours, for an adjusted engineer year cost of $200,000. These rates are then multiplied by the FAA-estimated number of engineer hours to complete the fuel tank system assessment.

4. Fuel Tank System Assessment Costs to a TC Holder

The FAA evaluated the following potential areas of cost to TC holders for a fuel tank system assessment: (1) the time to complete the initial fuel tank system assessment (including computer simulations or other modeling costs); (2) any physical testing needed for the design review; (3) the time to create and develop the revised inspection and testing procedures that would be incorporated into an operator's inspection manual; and (4) the time to interact with the FAA to obtain FAA approval. All of these would all be one-time costs incurred by existing and future design approval holders.

As seen in Table IV-1 (p. 30), the FAA estimated that the initial fuel tank system assessment would require two engineer years for each of the two B-747 models, 1.5 engineer years for another manufacturer's large jet, 1.5 engineer years for the B-737 or MD-80 series, 1 engineer year for other Boeing jets, 0.75 engineer years for other manufacturer's jets, 0.75 engineer years for large turboprops, and 0.5 years for small turboprops. Although much of the work on the center wing tank for the B-747 has already been completed by Boeing Service bulletins and FAA ADs, the B-747 fuel tank system is more complicated than the fuel tank systems in other affected models. Thus, in order not to underestimate the potential cost of a B-747 fuel tank system assessment, the FAA believes that the 2 engineer year estimate is appropriate. A similar FAA intention to avoid underestimating the potential compliance costs applies to other models (e.g., the B-737 SB on Boost Fuel Pump Wiring Inspections and the resultant FAA AD, the recently issued B-757 and B-767 Service bulletins, etc.) for which TC holders have developed Service bulletins.

The FAA determined that there would be little or no materials costs associated with this proposed SFAR because it would require a design analysis for which minimal physical testing of the system and equipment would be required.

After the FAA review of the initial assessment, the FAA estimates that the TC holders responses would require about 10 engineer days for a large turbojet or a B-737 series, about 6 engineer days for the MD-80 series, about 5 engineer days for other Boeing medium sized or small turbojets, about 3 days for McDonnell Douglas or Fokker turbojets, about 2 engineer days for a large turboprop, and about 1 day for a small turboprop.

After FAA review and approval, the FAA estimates that the development of revised inspections, testing, and maintenance procedures would take about 1 engineer year for each of the two B-747 models, about 0.75 engineer years for the B-737 series, about 0.5 engineer years for a non-Boeing large turbojet, MD-80 series, and other Boeing turbojets, about 0.25 engineer years for other manufacturer's smaller turbojets and large turboprops, and about and 0.2 years for small turboprops.

Thus, as seen in Table IV-l, the FAA has estimated that the initial fuel tank system assessment would cost about $608,000 for a B-747 model, about $408,000 for another manufacturer's large turbojet, about $458,000 for the B-737 series, about $408,000 for the MD-80 series, about $304,000 for a different Boeing turbojet, about $204,000 for a non-Boeing small turbojet, about $151,000 for a large turboprop, about $141,000 for a small turboprop, and a total of $231,000 for engineering consultation.

The FAA estimated that FAA review and approval of the fuel tank system assessment would take about 5 engineer days for a B-747 or another manufacturer's large jet or for the B-737 series, about 3 engineer days for the MD-80 series or other Boeing turbojet, about 2 engineer days for another manufacturer's medium or small turbojet, and about 1 engineer day for a large or small turboprop.

Thus, the estimated costs to the FAA would be about $4,000 for a B-747 or another manufacturer's large jet or for the B-737 series, about $2,400 for the MD-80 series or other Boeing turbojet, about $1,600 for another manufacturer's medium or small turbojet, and about $800 for a large or small turboprop.

Finally, the FAA believes that it is likely that the operator receiving the TC holder's recommendations and service bulletins would likely call the TC holder for additional instructions and clarification of these documents. The FAA cannot predict this time for each of the individual airplane models but, it is likely that this TC holder consultation time would be relatively constant for each operator. Thus, the FAA assumes that each TC holder would spend one engineer day on this consultation with each operator that operates that airplane model.

As reported in chapter 2, there would be 154 operators, 99 of which operate 1 airplane model, 30 of which operate 2 airplane models, 10 of which operate 3 airplane models, 5 of which operate 4 airplane models, 2 of which operate 5 airplane models, 3 of which operate 7 airplane models, 3 of which operate 8 airplane models, 1 of which operates 9 airplane models, and 1 of which operates 11 airplane models, for a total of 285 airplane models that would require the TC holder to provide this consultation service. Based on the one engineer day cost of $800, the total one-time cost of providing these consultation services would be about $231,000.

Thus, as seen in Table IV-1, the total one-time cost of the fuel tank system assessment for a TC would be about $9.5 million of which the TC holder would incur about $9.4 million ($9.2 million for the assessment and $200,000 for the consultation) and the FAA would incur about $73,600.

5. Fuel Tank System Assessment Costs to STC Holders

As reported in Section IV.C.2.b., the FAA determined that an STC holder fuel tank system assessment would take an average of 0.25 engineer years. On that basis, the FAA estimates that the average STC holder would spend about 0.25 engineer years to perform a fuel tank system assessment, about 0.1 engineer years to develop revised inspection and testing procedures, and about one engineer day to respond to FAA review concerns. Thus, the average one-time cost for an STC of a fuel system assessment would be about $71,000. The total one-time costs for all STCs would be about $4.9 million.

The FAA estimates that it would spend about 8 hours reviewing the STC holder's fuel system assessments, for a one-time cost of about $800 per STC and a total one-time cost of about $46,400 for all STCs.

In addition to the current STC holders, the proposed SFAR would require future STC holders to complete a fuel tank system assessment. Using the historical average of 3 different fuel tank system STCs annually granted and assuming that the amount of STC holder engineer time and FAA-review time would be the same for an existing fuel tank system STC as for a new fuel tank system STC, the FAA estimates that there would be an annual compliance cost of about $214,800 to future STC holders and an annual FAA review cost of about $2,400. The present value of this $215,400 annualized payment discounted at 7 percent over 10 years would be about $1.5 million.

6. Fuel Tank System Assessment Cost of Compliance

Thus, as seen in Table IV-l, the FAA estimates that the one-time cost of performing the fuel tank system assessments would be about $14.4 million of which about $14.3 million would be borne by the fuel tank design approval holders (about $9.4 million by TC holders and about $4.9 million by STC holders), and about $120,000 would be borne by the FAA. In addition, the FAA estimates that the annual cost of performing future fuel tank system assessments would be about $215,000, of which $212,000 would be for fuel tank system STC holders and about $2,400 would be borne by the FAA.

D. COMPLIANCE COST OF PROPOSED OPERATIONAL RULES CHANGES

This section provides the analysis of the estimated costs to comply with the proposed operational rules changes for the operator to perform enhanced fuel tank inspections and equipment and wiring testing. This section first discusses the methodology, assumptions, and unit hours and costs that are used to calculate the total compliance costs, and, finally, the estimates themselves.

a. Methodology and Assumptions

The proposal would require operators of the affected airplanes to incorporate the fuel tank system assessment recommendations into their inspection manuals. The FAA anticipates that these recommendations, in turn, would likely require the operator to perform more extensive fuel tank inspections and to inspect and test equipment and wiring that may have only been visually examined in previous fuel tank inspections. Thus, the costs to operators of complying with the proposal would be the time to incorporate these recommendations into the inspection manual and the additional (incremental) labor hours, materials costs, and additional airplane out of service time to perform the enhanced fuel tank inspection and equipment and wiring testing.

Current industry practices is the FAA baseline from which the incremental compliance costs were estimated. However, current industry practices are changing quickly in an environment in which operator and manufacturer beliefs as to what constitutes the acceptable level of inspection and testing are changing and would continue to change whether or not the FAA promulgates this proposal as a final rule. That is, many in the industry are increasing the scope and the rigor of these fuel tank system inspections and equipment and wiring testing.

Currently, there is a cooperative, multinational industry fuel system inspection program involving about 2,000 transport airplanes that is projected to take 2.5 years, at which point a final report will be issued - although interim reports will be issued as deemed appropriate. This inspection program is essentially a data gathering program that is focused primarily on one individual airplane model at a time. However, there is overlap on the inspections of different models because the program is not waiting to complete the inspections of one model before beginning the inspections of other models.

Despite this changing industry environment and voluntary acceptance of additional inspection costs, the FAA determined that the compliance costs with the proposal are estimated on the basis of the type of fuel tank inspections that have been traditionally performed. The FAA is uncomfortable about projecting future industry fuel tank inspection practices, particularly because the program's recommendations are not expected to be completed for another 1.5 years to 2 years. As a result, the FAA's use of traditional industry practices would ensure that the compliance cost estimates would not underestimate the actual costs of this proposal.

An additional consideration is that the FAA has proposed an AD that would, effectively, enact a fuel tank system inspection program for the B-747 that would go beyond the proposed operational rules changes. Based on the methodology, assumptions, and estimated unit costs, this analysis estimates that the present value of the costs for the B-747 fleet to comply with the proposal discounted at 7 percent over the next 10 years would be about $27.4 million, which would generate an annualized cost of about $3.9 million. These costs are not included in the costs of complying with the proposal but, they would need to be included if the proposed AD is not issued as a final AD.

The FAA also issued an AD for the B-737 that requires all of these airplanes with more than 30,000 flight hours to pull and inspect the fuel boost pump wiring. Although not all B-737 were immediately affected, it is likely that every B-737 would eventually reach 30,000 hours in service and, thus, be subject to the AD. As a result, the potential costs to inspect the B-737 fuel boost pump wiring are not included as a cost of this proposal.

The estimated cost of compliance with the proposal is critically based on the assumption that the proposal would allow these enhanced fuel tank system inspections and equipment and wiring testing to be performed during an airplane's regularly scheduled major maintenance (C and D) checks. For example, if an operator's maintenance schedule is such that only one fuel tank is opened at each maintenance check, the proposal would allow the air carrier to continue that schedule. It would not require that every fuel tank be opened and inspected in compliance with the proposal at the first maintenance check after the proposal's effective date. As a result, the FAA concludes that the proposal's structure would allow an individual operator the flexibility to comply in the most cost-effective way for that operation. However, a fuel tank system assessment may discover a fuel tank hazard that would require immediate corrective action and force the airplane to be taken out-of-service. The FAA cannot predict the number, if any, of these immediate corrective actions that would be required, but it believes that there would be few, if any, such instances. Regardless, the safety benefits would likely exceed the cost and lost net revenue of such action. In any case, the FAA anticipates that few or no airplanes would be pulled from service solely for the purpose of compliance with the proposal.

Although the costs- of new and replacement equipment and wiring are not attributed to the proposal, the labor time to reinstall equipment and wiring is a cost of compliance with the proposal. For example, inspecting fuel boost pump wiring requires it to be pulled from the fuel tank, inspected and tested, and then reinstalled in the fuel tank. Regardless of whether the original wiring is reinstalled or replacement wiring is installed, the reinstallation time is a cost of complying with the proposal, but, the cost of any new wiring is attributed to maintaining the airplane in an airworthy condition and is not a cost of complying with the proposed operational rules changes. The same logic also applies to any future changes in equipment life limits (e.g., more frequent fuel booster pump replacements) that would be established by a service bulletin or an AD.

The FAA anticipates that the largest compliance costs would be incurred during the first to third fuel tank system inspections as the initial equipment and wiring testing is performed and aging or worn out equipment or wiring is replaced. The FAA assumes that all initial fuel tank system inspections and equipment and wiring testing would be completed during the first 3 years after the proposal's effective date. Thus, the "first-year" cost of compliance with the proposal would be averaged over the first 3 years after the proposal's effective date.

Beginning in the fourth year after the proposal's effective date, the FAA expects that the fuel tank system re-inspections and equipment and wiring re-testing would take less time than did the initial inspections and testing because a significant amount of the equipment and wiring would have been replaced during the initial inspection. The FAA anticipates that subsequent fuel tank system inspections and equipment and wiring testing would take, on average, about two thirds of the time that was needed during the initial fuel tank system inspections and testing.

In addition, it is likely that the recommended changes to the fuel tank inspection procedures made by the design approval holders would not require the equipment and wiring be tested at each fuel tank inspection. The frequency of the recommended re-testing cannot be precisely predicted by the FAA because no design approval holder has performed a fuel tank system assessment. Nevertheless, the FAA assumes that while an operator would take up to 3 years to complete the initial fuel tank system inspection and testing of equipment and wiring, an operator would take an average of up to 5 years to complete the second (and subsequent) fuel tank re-inspections and re-testing of equipment and wiring.

In its 1998 FAA Aviation Forecasts Fiscal Years 1998-2009, the FAA estimated an average annual increase of 4.3 percent in the number of commercial airplanes, which is incorporated into this analysis. The FAA understands that the future mix of airplane models will differ from the mix in the FAA's data base being used for this analysis. However, the FAA cannot precisely predict the future fleet composition. As a result, the FAA directly applies the 4.3 percent growth factor to the estimated cost totals based on the fleet in its data base.

The FAA anticipates that new airplanes would have fuel tanks and equipment and wiring that would not require as much inspection and testing time as would be needed for older airplanes. However, in order not to underestimate these potential compliance costs with the proposal, the FAA assumes that the amount of time for the enhanced fuel tank system inspection and equipment and wiring testing would be the same for both brand new and older, existing airplanes.

The FAA expects that the proposal would increase fuel tank system inspection maintenance times for the following activities: testing the electrical bonding; checking the fuel pump wiring; more frequent fuel pump changes; testing the Fuel Quantity Indicator System (FQIS) wiring; and upgrading certain FQIS probes.

The FAA estimated number of additional hours to perform the various enhanced fuel tank system inspections and testing have been developed primarily from the available service bulletins and from discussions with airline maintenance directors and other airline maintenance engineers. Whereas the service bulletin estimates are directly related to a specific task or set of tasks, the airline estimates tended to be made for the entire enhanced fuel tank system inspection and equipment and wiring testing. Thus, to some extent, the FAA's estimates of the hours required for the individual activities are not as precise as those for the total number of hours for all activities. However, the FAA believes that the total number of fuel tank system inspection hours accurately reflects the labor hours needed to comply with the proposal.

In general, airline estimates of the number of additional inspection and testing labor hours and airplane out-of-service time tended to be greater than those hours reported in the service bulletins. One probable cause of this difference is the maintenance personnel learning curve associated with performing inspections and tests with which they may not be familiar. Thus, as maintenance management and personnel gain more experience with these tests and procedures, the FAA anticipates that the number of labor inspection and testing hours would decline over time. Another probable cause for the difference is that the labor and out-of-service time estimates in the service bulletins do not include estimates for items (e.g., time to organize the work activity) that would be a cost of compliance with the proposal. Thus, when the FAA has differing service bulletin and airline estimates for a particular fuel tank system inspection or testing activity. the FAA tends to select an estimate that, although between the two estimates, tends to be closer to the airline estimate.

Further, the FAA takes the same approach for calculating the compliance cost based on maintenance personnel hours as was taken in calculating the compliance costs based on hours of engineering review for the fuel tank system assessment. That is, rather than trying to estimate the number of additional supervisory, clerical, and administrative hours that would be required to comply with the proposal and multiplying these estimates by estimated compensation rates for each of these labor and management categories, the FAA adjusts the hourly compensation rate (wages plus fringe benefits) of a maintenance mechanic to account for that time. After that adjustment, the FAA uses a compensation rate of $70 an hour for a maintenance mechanic (which is $10 an hour more than the FAA has used in its ADs and $5 an hour more than an industry estimate).

Finally, in order to have a basis of comparison with the estimated benefits, the FAA estimates the compliance costs over a lo-year period.

b. Estimated Compliance Costs Due to the Operational Rules Changes

The incremental cost of complying with the proposal would consist of the following 4 components: (1) the time to incorporate the recommendations developed by the design approval holder from the fuel tank system assessment; (2) the labor hours needed to perform the enhanced fuel tank system inspection and testing of equipment and wiring; (2) the cost of the additional airplane out-of-service time required to complete the enhanced fuel tank system inspection and testing of equipment and wiring; and (3) the increased documentation, recording, and reporting of the inspections, tests, and subsequent findings of the enhanced fuel tank system inspection and equipment and wiring testing.

1. Incorporating Recommendations into Instruction Manual

The first compliance costs that the operators would occur would be those associated with receiving the recommendations from the design approval holders after their fuel tank system assessment. These recommendations would need to be read, understood, discussed with the design approval holder's engineers, transformed into the particular inspection manual language used by the operator, and finally, incorporated into the operator's inspection manual and procedures. After discussions with several airline maintenance chief engineers, the FAA believes that it would take 5 engineer days for each airplane model used by the operator to fully integrate the recommendations into the current operators fuel tank system inspections. The FAA recognizes that some of the operators with multiple models from one manufacturer would likely take less time than the estimate. In order not to underestimate the potential compliance cost, however, the FAA has not used an adjustment factor for this possibility. On that basis, the FAA estimates that the one-time cost of compliance for this activity would be about $4,000 per airplane model for a total of about $1.16 million. The FAA anticipates minimal future costs for operators who purchase airplane models that they have not previously used because the new manuals would not need to be as extensively revised as would existing manuals.

2. Labor Cost for Inspections and Testing

As the proposal would allow operators the flexibility to perform the fuel tank inspections during regularly scheduled major maintenance checks, the labor time to open the tank, drain the fuel, vent the tank, and close the tank is not attributed to the proposal because those activities are necessary to complete other actions required for the maintenance check. Excluding the estimates for the B-747 and the B-707 (which appears to be a statistical outlier), the FAA estimates that the increased annual number of labor hours per airplane resulting from the enhanced fuel tank system inspection and equipment and wiring testing would range from 19 hours to 109 hours in the first three years, and would then become 9 hours to 40 hours beginning in the fourth year.

On that basis, as seen in Table IV-2, the FAA estimates that the annual per airplane compliance costs would be between $1,150 and $6,775 in each of the first 3 years and between $560 and $3,220 in each year thereafter. Assuming each airplane has one annual major maintenance check, the total annual labor cost would be about $21.1 million in the first year, increasing by 4.3 percent per year until the fourth year. In the fourth year, it would become about $10.1 million, again increasing by 4.3 percent each year thereafter. The present value of the total lost net revenue discounted at 7 percent over a 10 year period would be about $100 million. The annualized value of this $100 million discounted at 7 percent over a 10 year period would be about $14.2 million.

3. Lost Net Revenue from Time out of Service

The proposal would increase an airplane's out of service time because there is a limit to the number of maintenance employees who can work inside a fuel tank at one time. Thus, although an operator can increase the number of maintenance employees working on the fuel tanks, an operator cannot completely avoid an increase in out-of-service time due

TABLE IV-2

LABOR COMPLIANCE COSTS FOR INSPECTIONS AND TESTING

Airplane Model	No. of Airplanes	Annual Labor Cost (Yrs. 1-3)(Per Airplane)	Annual Labor Cost (Yrs. 1-3) (All Airplanes)	Annual Labor Cost (Yrs. 4-10) (Per Airplane)	Annual Labor Cost (Yrs. 4-10)(All Airplanes)	Present Value Total Labor Cost (10 Yrs.) (All Airplanes)	Annualized Total Cost (All Airplanes)
A300	51	$3,640	$185,640	$1,596	$81,396	$845,261	$120,346
A310	37	$3,640	$134,680	$1,596	$59,052	$613,228	$87,310
A320	145	$3,640	$527,800	$1,596	$231,420	$2,403,192	$342,160
A330	0	$3,640	$0	$1,596	$0	$0	$0
A340	0	$3,640	$0	$1,596	$0	$0	$0
B707	8	$7,700	$61,600	$3,780	$30,240	$294,692	$41,957
B727	878	$4,620	$4,056,360	$2,268	$1,991,304	$19,405,446	$2,762,899
B737 series	1097	$4,060	$4,453,820	$1,932	$2,119,404	$21,012,052	$2,991,644
B747-200,-300	206	$10,780	$2,220,680	$5,292	$1,090,152	$10,623,634	$1,512,567
B747-400	30	$12,320	$369,600	$6,048	$181,440	$1,768,150	$251,745
B757	467	$4,620	$2,157,540	$2,268	$1,059,156	$10,321,575	$1,469,560
B767	214	$4,620	$988,680	$2,268	$485,352	$4,729,801	$673,417
B777	12	$4,620	$55,440	$2,268	$27,216	$265,222	$37,762
DC8	181	$3,500	$633,500	$1,680	$304,080	$3,000,233	$427,166
DC9	472	$3,500	$1,652,000	$1,680	$792,960	$7,823,812	$1,113,935
DC10	204	$6,767	$1,380,400	$3,220	$656,880	$6,512,395	$927,219
MD11	66	$5,413	$357,280	$2,576	$170,016	$1,685,561	$239,986
MD80 series	617	$3,500	$2,159,500	$1,680	$1,036,560	$10,227,313	$1,456,139
MD90	19	$3,500	$66,500	$1,680	$31,920	$314,942	$44,841
L 1011	112	$4,060	$454,720	$1,932	$216,384	$2,145,260	$305,437
BAE ATP	10	$1,587	$15,867	$756	$7,560	$74,898	$10,664
BAE 41	53	$1,587	$84,093	$756	$40,068	$396,957	$56,518
BAE 146	26	$3,010	$78,260	$1,386	$36,036	$363,911	$51,813
DHC 7	26	$1,587	$41,253	$756	$19,656	$194,734	$27,726
DHC 8	152	$1,587	$241,173	$756	$114,912	$1,138,443	$162,089
F 27	41	$1,587	$65,053	$756	$30,996	$307,080	$43,721
F 28	67	$2,800	$187,600	$952	$63,784	$772,924	$110,047
F100	89	$2,240	$199,360	$1,064	$94,696	$939,776	$133,803
SAAB 340	234	$1,213	$283,920	$588	$137,592	$1,350,400	$192,267
ATR72	51	$1,680	$85,680	$924	$47,124	$432,162	$61,530
ATR42	112	$1,167	$130,667	$560	$62,720	$618,833	$88,108
EMB 145	5	$1,167	$5,833	$560	$2,800	$27,626	$3,933
Shorts 360	59	$1,167	$68,833	$560	$33,040	$325,992	$46,414
Dornier 328	37	$1,167	$43,167	$560	$20,720	$204,436	$29,107
Brad CRJ	2	$1,167	$2,333	$560	$1,120	$11,051	$1,573
EMB 120	226	$1,167	$263,667	$560	$126,560	$1,248,716	$177,789
TOTAL	6006		$23,712,500		$11,404,316	$112,399,708	$16,003,190
TOTAL MINUS B-747			$21,122,220		$10,132,724	$100,007,924	$14,238,878

to the enhanced fuel tank system inspection and equipment and wiring testing.

The FAA estimates that this annual increase in out of service time would be between 11.5 hours and 32 hours per airplane for each of the first 3 years and then become 10 hours to 25 hours per airplane each year thereafter. The economic cost of out of service time is computed using the Office of Management and Budget (OMB) mandated 7 percent average annual risk-free productive rate of return on the value of capital, which, in this case, would be the average value of that airplane model.

The average value of the airplane model is based on the reported values in the AVITAS 2nd half 1997 Jet Aircraft Values and the AVITAS 2nd half 1997 Commercial Turboprop Aircraft Values. For aircraft models with a number of different versions within the model series, the average reported value for each version was weighted by its number of airplanes in the data base.

Thus, as seen in Table IV-3, the annual average out-of-service lost net revenue per fuel tank inspection would range from $40 to $9,750 per airplane. Assuming each airplane has one annual major maintenance check, the total annual out of service lost net revenue would be about $6.4 million in the first year, increasing by 4.3 percent per year until the fourth year. In the fourth year, it would become about $2.95 million, again increasing by 4.3 percent each year thereafter. The present value of the total lost net revenue discounted at 7 percent over a 10 year period would be about $35.6 million. The annualized value of this $35.6 million discounted at 7 percent over a 10 year period would be about $5.1 million.

TABLE IV-3

LOST NET REVENUE FROM INCREASED OUT OF SERVICE TIME

Airplane Model	No of Airplanes	Annual Time out of Service (Yrs. 1-3) (Hours Per Airplane)	Annual Time out of Service (Yrs 4-10) (Hours Per Airplane)	Annual Lost Net Revenue (Yrs. 1-3) (Per Airplane)	Annual Lost Net Revenue (Yrs. 4-10) (Per Airplane)	Annual Lost Net Revenue (Yrs. 1-3) (All Airplanes)	Annual Lost Net Revenue (Yrs 4-10) (All Airplanes)	P V Total Lost Net Revenue (10 Yrs) (All Airplanes)	Annualized Total Lost Net Revenue (All Airplanes)
A300	51	24	16	$1,591	$636	$81,152	$32,461	$421,626	$60,030
A310	37	24	16	$2,059	$824	$76,188	$30,475	$395,837	$56,358
A320	145	24	16	$2,038	$815	$295,549	$118,220	$1,535,528	$218,625
A330	0	24	16	$4,884	$1,954	$0	$0	$0	$0
A340	0	24	21	$5,282	$2,773	$0	$0	$0	$0
B707	8	32	25	$64	$30	$511	$240	$2,863	$408
B727	878	32	25	$260	$122	$228,582	$107,148	$1,279,707	$182,201
B737 series	1097	27	20	$1,393	$619	$1,528,039	$679,129	$8,336,984	$1,186,999
B7-30000	206	32	25	$2, ..450	$1 ., 148	$504,684	$236,571	$2,825,450	$402,281
B747-400	30	32	25	$10.192	$4,777	$305,749	$143,320	$1,711,725	$243,711
B757	467	32	25	$3,134	$1,469	$1,463,510	$686,020	$8,193,397	$1,166,555
B767	214	32	25	$4,280	$2,006	$915,932	$429,343	$5,127,805	$730,084
B777	12	32	25	$9,704	$4,549	$116,449	$54,586	$651,936	$92,821
DC8	181	20	16	$968	$465	$175.188	$84,090	$992,331	$141,286
DC9	472	20	16	$181	$87	$85,385	$40,985	$483,655	$68,862
DC10	204	24	19	$874	$415	$178,285	$84,685	$1,004,651	$143,040
MD11	66	24	19	$4,861	$2,309	$320,838	$1,807,952		$257,412
MD80 series	617	20	16	$986	$473	$608,390	$292,027	$3,446,158	490,655655
MD90	19	20	16	$1,811	$869	$34,414	$16.519	$194.934	$27,754754
L 1011	112	24	19	$296	$141	$33,130	$15,737	$186,693	$26$26,581
BAE ATP	10	15 25	12 25	$186	$90	$1,864	$899	$10,583	$1.5$1,507
BAE 41	53	15.25	12.25	$168	$81	$8,891	$4,285	$50,467	$7,185
BAE 146	26	18 5	14 5	$496	$233	$12,893	$6,063	$72,298	$10,294
DHC 7	26	15.25	12.25	$71	$34	$1,838	$886	$10,430	$1,485
DHC 8	152	15 25	12.25	$269	$129	$40,824	$19,676	$231,716	$32,991
F 27	41	15.25	12.25	$37	$18	$1,532	$738	$8,697	$1,238
F 28	67	25 25	14 25	$130	$44	$8,743	$2,961	$42,279	$6.020
F100	89	19 75	14 75	$752	$337	$66,952	$30,001	$366,727	$52,214
SAAB 340	234	11 75	10	$151	$78	$35,299	$18,218	$207,420	$29,532
ATR72	51	15 75	13	$394	$195	$20,069	$9,966	$115,631	$16,463
ATR42	112	11 5	10	$230	$118	$25,777	$13,257	$151,188	$21 526
EMB 145	5	11 5	10	$368	$189	$1,838	$945	$10,780	$1 535
Shorts 360	59	11 5	10	$39	$20	$2,309	$1,187	$13,541	$1 928
Dornier 328	37	11 5	10	$220	$113	$8,126	$4,179	$47.663	$6,786
Brad CRJ	2	11 5	10	$441	$227	$882	$454	$5,174	$737
EMB 120	226	11 5	10	$139	$72	$31,499	$16,199	$184,750	$26,304
TOTAL	6006					$7,221,315	$3,333,868	$40,128,576	$5 713,407
TOTAL MINUS B-747						$6,410,881	$2 953,978	$35,591,402	$5 067 415

4. Recordkeeping Costs

The FAA estimates that, during the first three years, the increase in the per airplane annual time to document and record the results of the enhanced fuel tank system inspection and equipment and wiring testing would be one hour of documentation for every 8 additional labor hours. Beginning in the fourth year, this proportion would decrease to one hour of recordkeeping for every 10 additional labor hours because the FAA expects that the re-inspections of the fuel tanks would require fewer corrective actions, and, hence, fewer records. Thus, the per airplane recordkeeping hours would be between 3 and 8 hours during the first 3 years and then become 2 to 5 hours in each year thereafter.

On that basis, as seen in Table IV-4, the annual increased recordkeeping cost per airplane (excluding the B-707 and B-747 models) would be between $150 and $850 during the first 3 years and then become $100 to $540 in each year thereafter. The total annual recordkeeping cost would be about $2.6 million in the first year, increasing by 4.3 percent until the fourth year. In the fourth year, it would become about $1.7 million, increasing by 4.3 percent each year thereafter. The present value of the recordkeeping cost over a 10 year period discounted at 7 percent would be about $17.4 million. The annualized value of this $17.4 million over a 10 year period discounted at 7 percent would be about $2.5 million.

Thus, as seen in Table IV-5, the FAA estimates that the total annual compliance cost plus the lost net revenue with the proposed operational rules changes would be about $35 million during the first year, increasing by 4.3 percent per year until the fourth year when it would decline to about $8 million but increasing by 4.3 percent each year

TABLE IV-4

RECORDKEEPING AND DOCUMENTATION COSTS

Airplane Model	No. of Airplanes	Annual RC (Yrs. 1-3) (Per Airplane)	Annual RC (Yrs. 1-3) (All Airplanes)	Annual RC (Yrs. 4-10)(Per Airplane)	Annual RC (Yrs. 4-10)(All Airplanes)	P.V. RC (10 Yrs.) (All Airplanes)	Annualized RC (All Airplanes)
A300	51	$455	$23,205	$266	$13,566	$145,670	$20,740
A310	37	$455	-$16,835	$266	$9,842	$105,682	$15,04
A320	145	$455	$65,975	$266	$38,570	$414,161	$58,96
A330	0	$455	$0	$266	$0	$0	$0
A340	0	$455	$0	$266	$0	$0	$0
B707	8	$963	$7,700	$630	$5,040	$7,33493	
B727	878	$578	$507,045	$378	$331,884	$3,390,810	$482,775
B737 series	1097	$508	$556,728	$322	$353,234	$3,657,593	$520,759
B747-200,-300	206	$1,348	$277,585	$882	$181,692	$1,856,321	$264,298
B747-400	30	$1,540	$$46,200		$30,240	$308,958	$43,989
B757	467	$578	$269,693	$378	$176,526	$1,803,540	$256,784
B767	214	$578	$123,585	$378	$80,892	$826,462	$117,670
B777	12	$578	$6,930	$378	$4,536	$46,344	$6,598
DC8	181	$438	$79,188	$280	$50,680	$522,807	$74,436
DC9	472	$438	$206,500	$280	$132,160	$1,363,343	$194,109
DC10	204	$846	$172,550	$537	$109,480	$1,133,620	$161,402
MD11	66	$677	$44,660	$429	$28,336	$293,408	$41,775
MD80 series	617	$438	$269,938	$280	$172,760	$1,782,167	$253,740
MD90	19	$438	$8,313	$280	$5,320	$54,880	$7,814
L 1011	112	$508	$56,840	$322	$36,064	$373,428	$53,168
BAE ATP	10	$198	$1,983	$126	$1,260	$13,040	$1,85
BAE 41	53	$198	$10,512	$126	$6,678	$69,110	$9,840
BAE 146	26	$376	$9,783	$231	$6,006	$63,092	$8,98
DHC 7	26	$198	$5,157	$126	$3,276	$33,903	$4,82
DHC 8	152	$198	$30,147	$126	$19,152	$198,201	$28,219
F 27	41	$198	$8,132	$126	$5,166	$53,462	$7,61
F 28	67	$350	$23,450	$159	$10,631	$129,165	$18,390
F100	89	$280	$24,920	$177	$15,783	$163,552	$23,286
SAAB 340	234	$152	$35,490	$98	$22,932	$235,590	$33,54
ATR72	51	$210	$10,710	$154	$7,854	$76,568	$10,902
ATR42	112	$146	$16,333	$93	$10,453	$107,835	$15,35
EMB 145	5	$146	$729	$93	$467	$4,814	$685
Shorts 360	59	$146	$8,604	$93	$5,507	$56,806	$8,088
Dornier 328	37	$146	$5,396	$93	$3,453	$35,624	$5,07
Brad CRJ	2	$146	$292	$93	$187	$1,926	$27
EMB 120	226	$146	$32,958	$93	$21,093	$217,596	$30,98
TOTAL	6006		$2,964,063		$1,900,719	$19,590,969	$2,789,31
TOTAL MINUS B-747			$2,640,278		$1,688,787	$17,425,691	$2,481,02

TABLE IV-5

COMPLIANCE COST PLUS LOST NET REVENUE

Airplane Model	No. of Airplanes	First Year Total Cost (All Airplanes) (Yrs. 1-3)	Annual Total Cost (All Airplanes) (Yrs.4-10)	P.V. Total Cost (All Airplanes) (10 Yrs.)	Annualized Total Cost (All Airplanes)
A300	51	$289,997	$127,423	$1,412,557	$201,116
A310	37	$227,703	$99,369	$1,114,747	$158,715
A320	145	$889,324	$388,210	$4,352,880	$619,752
A330	0	$0	$0	$0	$0
A340	0	$0	$0	$0	$0
B707	8	$69,811	$35,520	$349,048	$49,697
B727	878	$4,791,987	$2,430,336	$24,075,963	$3,427,875
B737 series	1097	$6,538,587	$3,151,767	$33,006,6	$4,699,402
B747-200,-300	206	$3,002,94	$1,508,415	$15,305,405	$2,179,145
B747-400	30	$721,549	$355,000	$3,788,832	$539,445
B757	467	$3,890,743	$1,921,702	$20,318,513	$2,892,899
B767	214	$2,028,197	$995,587	$10,684,06[illegible]	$1,521,171
B777	12	$178,819	$86,338	$963,502	$137,181
DC8	181	$887,875	$438,850	$4,515,371	$642,887
DC9	472	$1, 943,885	$966,105	$9,670,810	$1,376,906
DC10	204	$1,731,235	$851,045	$8,650,667	$1,231,660
MD11	66	$722,778	$350,750	$3,786,921	$539,172
MD80 series	617	$3,037,827	$1,501,347	$15,455,638	$2,200,535
MD90	19	$109,227	$53,759	$564,756	$80,409
L 1011	112	$544,690	$268,185	$2,705,380	$385,185
BAE ATP	10	$19.714	$9,719	$98,520	$14,027
BAE 41	53	$103,496	$51,031	$516,534	$73,543
BAE 146	26	$100,936	$48,105	$499,301	$71,089
DHC 7	26	$48,248	$23,818	$239,067	$34,038
DHC 8	152	$312,144	$153,740	$1,568,360	$223,299
F 27	41	$74,717	$36,900	$369,239	$52,571
F 28	67	$219,793	$77,375	$944,369	$134,457
F100	89	$291,232	$140,480	$1,470,055	$209,303
SAAB 340	234	$354,709	$178,742	$1,793,410	$255,341
ATR72	51	$116,459	$64,944	$624,361	$88,895
ATR42	112	$172,777	$86,430	$877,856	$124,987
EMB 145	5	$8,400	$4,212	$43,220	$6,154
Shorts 360	59	$79,746	$39,734	$396,339	$56,430
Dormer 328	37	$56,689	$28,353	$287,723	$40,965
Brad CRJ	2	$3,507	$1,760	$18,151	$2,584
EMB 120	226	$328,124	$163,853	$1,651,061	$235,074
TOTAL	6006	$33,897,877	$16,638,904	$172,119,254	$24,505,910
MANUAL CHANGES		$1,156,000	$0	$1,156,000	$164,588
TOTAL PLUS MANUAL CHANGES		$35,053,877	$16,638,904	$173,275,254	$24,670,498
TOTAL MINUS B-747		$31,329,379	$14,775,489	$154,181,017	$21,951,908

thereafter. The present value of the compliance cost and net lost revenue over a 10 year period discounted at 7 percent would be about $154 million. The annualized value of this $154 million over a 10 year period discounted at 7 percent would be about $22 million.

E. ESTIMATED TOTAL COMPLIANCE COST WITH AND LOST NET REVENUE FROM THE PROPOSAL

Thus, as seen in Table IV-6, the FAA estimates that the total annual compliance cost for both the fuel tank system assessment and the enhanced fuel tank system inspection and equipment and wiring testing plus the lost net revenue with the proposal would be about $46 million during the first year, increasing by 4.3 percent per year until the fourth year when it would decline to about $8.2 million, increasing by 4.3 percent each year thereafter. The present value of these compliance costs and net lost revenue over a 10 year period discounted at 7 percent would be about $170 million. The annualized value of this $170 million over a 10 year period discounted at 7 percent would be about $24 million.

As a final note, the entire spreadsheet is supplied in Appendix B.

TABLE IV-6

TOTAL COST OF PROPOSAL

Airplane Model	No. of Airplanes	First Year Total Cost (All Airplanes) (Yrs. 1-3)	Annual Total Cost (All Airplanes) (Yrs.4-10)	P.V. Total Cost (All Airplanes) (10 Yrs.)	Annualized Total Cost (All Airplanes)
A300	51	$289,997	$127,423	$1,412,557	$201.116
A310	37	$227,703	$99,369	$1,114,747	$158,715
A320	145	$889,324	$388,210	$4,352,880	$619,752
A330	0	$0	$0	$0	$0
A340	0	$0	$0	$0	$0
B707	8	$69,811	$35,520	$349,048	$49,697
B727	878	$4,791,987	$2,430,336	$24,075,963	$3,427,875
B737 series	1097	$6,538,587	$3,151,767	$33,006,630	$4,699,402
B747-200,-300	206	$3,002,949	$1,508,415	$15,305,405	$2,179,145
B747-400	30	$721,549	$355,000	$3 788,832	$539,445
B757	467	$3,890,743	$1,921,702	$20,318,513	$2,892,899
B767	214	$2,028,197	$995,587	$10,684,068	$1,521,171
B777	12	$178,819	$86,338	$963,502	$137,181
DC8	181	$887,875	$438,850	$4,515,371	$642,887
DC9	472	$1,943,885	$966,105	$9,670,810	$1,376,906
DC10	204	$1,731,235	$851,045	$8,650,667	$1,231,660
MD11	66	$722,778	$350,750	$3.786.921	$539,172
MD80 series-	617	$3,037,827	$1,501,347	$15,455,638	$2,200,535
MD90	19	$10$53,759		$564,756	$80,409
L 1011	112	$544,690	$268,185	$2,705,380	$385,185
BAE ATP	10	$19,714	$9,719	$98,520	$14,027
BAE 41	53	$103,496	$51,031	$516,534	$73,543
BAE 146	26	$100,936	$48,105	$499,301	$71,089
DHC 7	26	$48,248	$23,818	$239,067	$34,038
DHC 8	152	$312,144	$153,740	$1,568,360	$223,299
F 27	41	$74,717	$36,900	$369,239	$52,571
F 28	67	$219,793	$77,375	$944,369	$134,457
F100	89	$291,232	$140,480	$1,470,055	$209,303
SAAB 340	234	$354,709	$178,742	$1,793,410	$255,341
ATR72	51	$116,459	$64,944	$624,361	$88,895
ATR42	112	$172,777	$86,430	$877,856	$124,987
EMB 145	5	$8,400	$4,212	$43,220	$6,154
Shorts 360	59	$79,746	$39,734	$396,339	$56,430
Dornier 328	37	$56,689	$28,353	$287,723	$40,965
Brad CRJ	2	$3,507	$1,760	$18,151	$2,584
EMB 120	226	$328,124	$163,853	$1,651,061	$235,074
TOTAL	6006	$33,897,877	$16,638,904	$172,119,254	$24,505,910
MANUAL CHANGES		$1,156,000	$0	$1,156,000	$164,588
TOTAL PLUS MANUAL CHANGES		$35,053,877	$16,638,904	$173,275,254	$24,670,498
TOTAL PLUS TC AND STC COSTS		$49,479,477	$16,853,704	$189,209,519	$26,939,179
TOTAL MINUS B-747		$45,754,979	$14,990,289	$170,115,282	$24,220,589

V. BENEFIT-COST COMPARISON

The estimates presented in Chapters III and IV of this analysis use a. 'typical' accident. In addition, the benefits analysis also evaluated the benefits based on an actual event - the TWA Flight 800 accident. There is, of course, the probability that, if there is one explosion, it may involve a smaller airplane carrying fewer passengers. Even in the explosion scenario involving one explosion involving the fewest "average" number of passengers during the next ten years, the expected present value discounted benefits of $260 million to $310 million would be about 50 percent to 80 percent greater than the expected compliance costs of $170 million.

Further, the FAA did not factor in the recent evidence of fuel tank wiring arcing in B-737s in the risk analysis which likely would have increased the probability of an explosion if corrective action had not been taken.

Therefore, based on these factors and analysis, the FAA believes that the proposal would be cost-beneficial.

VI. INITIAL REGULATORY FLEXIBILITY ANALYSIS

A. INTRODUCTION

The Regulatory Flexibility Act of 1980 establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation." To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination finds that it will, the agency must prepare a Regulatory Flexibility Analysis (RFA) as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 act provides that the head of the agency may so certify, and an RFA is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

Recently, the Small Business Administration's (SBA) Office of Advocacy published new guidance for Federal agencies in responding to the requirements of the Regulatory Flexibility Act, as amended. Application of that guidance to this proposal indicates that it would have a significant impact on a substantial number of small entities. Accordingly, a complete initial regulatory flexibility analysis was conducted and is summarized as follows.

The FAA requests comments on all facets (methodology, assumptions, data, analysis, etc.) of the Initial Regulatory Flexibility Analysis and also requests that commenters supply supporting data or analyses.

B. INITIAL REGULATORY FLEXIBILITY ANALYSIS

1. Introduction

Under section 603(b) of the RFA (as amended), each initial regulatory flexibility analysis is required to address these points: (1) reasons why the FAA is considering the proposed rule; (2) the objectives and legal basis for the proposed rule; (3) the kind and number of small entities to which the proposed rule would apply; (4) the projected reporting, recordkeeping, and other compliance requirements of the proposed rule; and (5) all Federal rules that may duplicate, overlap, or conflict with the proposed rule.

2. Reasons Why the FAA Is Considering the Proposed Rule

This proposed action is being considered in order to reduce significantly the risk of airplane fuel tank explosions with the resultant loss of life (as evidenced by TWA Flight 800). Existing fuel tank system inspection programs may not provide comprehensive, systematic prevention and control of ignition sources in airplane fuel tanks, thereby allowing a small, but unacceptable risk of fuel tank explosions to exist.

3. The Objectives and Legal Basis for the Proposal

The objective of the proposal is to ensure the continuing airworthiness of airplanes certificated with 30 or more passengers or with a payload of more than 7,500 pounds. The design approval holder (including TC holders and STC holders) would be required to perform a fuel tank system design assessment and to provide recommendations and instructions concerning fuel tank system inspections and equipment and wiring testing to operators of those airplanes. This assessment may result in the creation of service bulletins and may also provide supporting data to the FAA for any needed ADs. An operator working under part 91, under part 121, under part 125, and all U.S.-registered airplanes used in scheduled operations under part 129 would be required to incorporate these recommendations into the inspection manual and to perform these inspections and tests as required.

The legal basis for the proposal is found in 49 U.S.C. 44901 et seq. Among other matters the FAA must consider as a matter of policy are maintaining and enhancing safety and security in air commerce as its highest priorities (49 U.S.C. 40101(d)).

4. The Kind and Number of Small Entities to which the Proposal Would Apply

The proposal would apply to the operators of all airplanes certificated for 30 or more passengers or a 7,500 pound payload operated under 14 CFR part 91, 14 CFR part 121, 14 CFR part 125, and all U.S.-registered airplanes operated under 14 CFR part 129. Standard Industrial Classification (SIC) coding does not exactly coincide with the subsets of operators who could be affected by the proposal. Nevertheless, the following distributions based on SBA data, as seen in Table VI-1 of employment size and estimated receipts for all scheduled air transportation firms (SIC Code 4512) are representative of the operators who would be affected by the proposal.

TABLE VI-1

NUMBER OF OPERATORS AND ESTIMATED ANNUAL RECEIPTS IN SIC 4512

OPERATOR CATEGORY (No. of Employees)	NUMBER OF FIRMS	ESTIMATED RECEIPTS (in $1,000s)	ESTIMATED AVERAGE RECEIPTS (IN $1,000s)
0 - 4	153	193,166	1,262
5 - 9	57	145,131	2,546
10 - 19	56	198,105	3,537
20 - 99	107	1,347,711	12,549
100 - 499	74	3,137,624	42,400
TOTAL 0 - 499	447	5,021,737	62,294
500+	73	112,163,942	1,536,492
TOTAL	520	117,185,679	

Most of the smaller operators would not be affected by the proposed rule because they do not operate transport category airplanes with 30 or more passengers under parts 91, 121, 125, or 129.

The SBA has defined a small air carrier to be one that has fewer than 1,500 employees. To give some perspective, that definition of small air carriers encompasses those air carriers ranging in size from Atlas Airlines with 1997 operating revenues of $401 million to Capitol Cargo with 2 airplanes and 1997 operating revenues of $5.4 million. As the employment data are not complete for all of the affected operators, the FAA has determined that all of the air carriers with fewer than 50 affected airplanes would be considered to be small air carriers.

Although this approach is not exactly that used in other FAA studies, the FAA believes that it provides a good proxy in the absence of the employment data.

Based on existing operator/airplane distributions, the FAA estimates that 131 U.S. operators would be subject to the proposal. Note that this excludes the 19 non-U.S. owners of U.S.-registered airplanes that would be affected by the proposal. On that basis, the number of operators affected by the proposal is categorized in Table VI-2 by number of airplanes affected by the proposal. Table VI-2 also reports the estimated total number of airplanes in that operator category. It should also be noted that Table VI-2 excludes the B-747 models because, as noted in Chapter IV, the ADs that have been issued on the B-747 have, effectively, already required the enforcement of the proposed operational rules changes on that particular airplane model.

TABLE VI-2

NUMBER OF OPERATORS AND AIRPLANES AFFECTED BY THE PROPOSAL

OPERATOR CATEGORY NUMBER OF AIRPLANES	NUMBER OF OPERATORS	TOTAL NUMBER OF AIRPLANES
0 - 4	48	93
5 - 9	17	108
10 - 19	22	271
20 - 29	13	277
30 - 39		145
40 - 49	5	220
TOTAL 0 - 49	109	1,114
50+	22	4,594
U.S. TOTAL	131	5,708
Non-U.S.	23	62
TOTAL	154	5,770

5. <u>The Projected Reporting, Recordkeeping, and Other Compliance Requirements of the Proposal</u>

The proposal would not impose any incremental recordkeeping authority. Existing 14 CFR 43, in part, already prescribes the content, form, and disposition of maintenance, preventive maintenance, rebuilding, and alteration records for any aircraft having a U.S. airworthiness certificate or any foreign registered aircraft used in common carriage under parts 121. The FAA recognizes, however, that the proposal would necessitate additional inspection and testing work, and, consequently, would also require the completion of the recordkeeping associated with that additional work.

The FAA estimates that each 8 additional hours of actual inspection and testing resulting from the proposal would require one additional hour of reporting and recordkeeping (i.e., 7.5 recordkeeping minutes per hour of inspection). This recordkeeping would be performed by the holder of an FAA approved repairman or maintenance certificate. The projected recordkeeping and reporting costs of the proposal are included as part of the overall costs computed in the evaluation and included in the Initial Regulatory Flexibility Cost Analysis that is provided later in this chapter.

6. <u>All Federal Rules that May Duplicate, Overlap, or Conflict with the Proposal</u>

The FAA is unaware of any federal rules that would either duplicate, overlap, or conflict with the proposal.

C. INITIAL REGULATORY FLEXIBILITY COST ANALYSIS

1. Calculation of Estimated Compliance Costs

The proposal would consist of three actions. The first action, the proposed part 25 change that would minimize the amount of time a fuel tank would have a flammable atmosphere, would apply to future TC holders and to future fuel tank system STC holders. The second action, the proposed SFAR, would require all design approval TC holders and fuel tank system STC holders: (1) to complete a fuel tank design system assessment and to generate future service bulletins and provide data to the FAA, as needed; and (2) to provide operators with recommendations for fuel tank system inspections, testing, and maintenance. The third action, the proposed operational rules changes, would require that operators incorporate these recommendations for an enhanced fuel tank system inspection and equipment and wiring testing into their inspection and maintenance manuals. This Initial Regulatory Flexibility Cost Analysis focuses on the costs to existing and future production airplanes under existing TCs and STCs because almost 99 percent of the estimated costs of the proposal would be incurred by those airplanes.

Application of the SBA guidelines to the part 25 proposed changes indicates that they would not have a significant impact on a substantial number of small entities because no small entity produces a part 25 type certificated airplane. In addition, although the proposed changes to part 25 would also affect future fuel tank system STCs issued under part 25, industry sources have reported that current industry fuel tank system STC designs would be in compliance with the proposed requirement for those STCs.

However, the proposed SFAR and the proposed operational rules changes would impose compliance costs on small entities. Table VI-3 summarizes the results for the total annualized compliance costs based on Tables Cl - C7 found in Appendix C and also provides the estimated cost per operator and per airplane by each operator size category. In those Appendix Tables Cl - C7, Column A lists each airplane model, Column B contains the number of the affected airplanes, Column C contains the estimated first year compliance cost for all airplanes, Column D contains the estimated annual compliance cost beginning in the fourth year for all airplanes, Column E contains the present value of the estimated total airplane compliance cost discounted by 7 percent over 10 years, and Column F contains the total annualized estimated compliance cost discounted by 7 percent over 10 years.

TABLE VI-3

ESTIMATED ANNUALIZED COMPLIANCE COST BY OPERATOR CATEGORY

OPERATOR CATEGORY NUMBER OF AIRPLANES	TOTAL ANNUALIZED COMPLIANCE COSTS	PER OPERATOR ANNUALIZED COST	PER AIRPLANE ANNUALIZED COST
0 - 4	$293,000	$6,100	$3,150
5 - 9	$275,000	$16,175	$2,550
10 - 19	$1,123,000	$51,050	$4,150
20 - 29	$784,000	$60,300	$2,825
30 - 39	$234,000	$58,500	$1,600
40 - 49	$262,000	$52,400	$1,200
TOTAL 0 - 49	$2,971,000	$27,250	$2,675
50+	$17,820,000	$810,000	$3,775
TOTAL	$20,791,000	$158,700	$3,650

One of the interesting observations revealed in Table VI-3 is that nearly all of the operators with fewer than 50 affected airplanes have average lower per airplane compliance costs than do operators with 50 or more affected airplanes. The likeliest explanation for this average cost difference is that smaller turboprops (which have the lowest per airplane inspection cost) make up a disproportionate share of the fleets of those operators with fewer than 50 affected airplanes.

2. Affordability Analysis

For the purpose of this Initial Regulatory Flexibility analysis, the degree to which small entities can "afford" the cost of compliance is predicated on the availability of financial resources. Initial compliance costs can be paid from either existing company assets such as cash, by borrowing, or through the provision of additional equity capital. Continuing annual costs of compliance may be covered either by accepting reduced profits, by raising ticket prices, or by finding other ways of offsetting costs.

Two general analytical methods often employed to determine affordability are: (1) the liquidity/profitability method; and (2) the relative cost method.

The liquidity/profitability method requires a knowledge of each affected firm's net working capital - the excess of current assets over current liabilities, which can represent the margin of short-term debt paying ability over existing short-term debt. However, that method is not used in this Initial Regulatory Flexibility Analysis because, at this time, the FAA lacks the necessary detailed financial data for most of the smaller operators (1 to 9 airplanes).

The relative cost method compares the annualized cost of compliance with the total operating revenues. Again, the FAA lacks financial data for most of the smaller operators. However, if the average operating revenues from Table VI-1 are compared to the average annualized compliance costs from Table VI-3 (an admittedly crude method), it appears that an average operator would pay no more than 0.4 percent of operating revenues to comply with the proposal. On that basis, most small entities would be able to offset the incremental compliance costs. Nevertheless, it is likely that some very small operators (those with 1 to 4 airplanes) may have difficulty in offsetting these compliance costs. However, due to the unavailability of current financial data on these smallest operators, the FAA cannot more definitively determine the potential economic impact on these smallest affected operators.

3. Disproportionality Analysis

The principle factor determining the compliance cost for an operator would be the type of airplane model in the operator's fleet. As seen in Table V-5, it would cost 3 to 4 times more to inspect a larger transport category model fuel tank system than it would cost to inspect a small transport category turboprop fuel tank system. Consequently, as seen in Table VI-3, the FAA estimates that the proposal would cost operators with fewer than 50 airplanes about $1,100 less per airplane than it would cost operators with more than 50 airplanes. In addition, operators with 30 to 49 airplanes would have the lowest per airplane compliance cost due to the predominance of turboprops in those fleets. In general, the average compliance cost per airplane is relatively consistent across the various small operator categories. However, the compliance cost relative to these airplane's operating revenues would be relatively small. As a result, the FAA does not believe that small entities as a group would be disadvantaged relative to large air carriers due solely to any disproportionate cost effects from compliance with the proposal.

4. Competitiveness Analysis

The proposal would not impose significant compliance costs on a substantial number of small operators that have 10 or more airplanes that would be affected by the proposal. These operators include large regionals, medium regionals, commuter airlines, and air cargo carriers. To some extent, these operators avoid direct competition with major carriers. However, in those markets where there is competition between the small entities and the larger air carriers, the proposal would have minimal competitive impact because the per airplane compliance cost for a given airplane model would be roughly the same for a large and a small operator.

The proposal, however, would likely impose significant costs on some of the smallest air carriers (those with 1 to 9 airplanes), and, as a consequence, may affect the relative position of these carriers in their markets. However, most of these smallest air carriers operate in "niche" markets in which the competition that occurs arises from other small operators using largely similar equipment and often competing on the basis of service rather than on the basis of price. In such markets, the number of competitors is very limited. For example, Atlas Air specializes in supplying international air cargo by using B-747s to carry bulky cargo, like oil rig equipment. Similarly, Northern Air Cargo specializes in mail and air cargo to rural Alaska.

However, the FAA concludes that most of the markets served by these smallest air carriers are low-volume niche markets that larger air carriers have, in many cases abandoned because the larger air carrier's fleets have been designed for high-volume markets. Further, larger air carriers would not be interested in servicing most of these markets because the larger air carriers cannot compete on a cost basis. Thus, these smallest operators would be able to avoid direct competition with larger air carriers. As a result, to the extent that there would be adverse competitiveness effects, they would likely be minimal and they would occur with other similar-sized (1 to 4 airplanes or 5 to 9 airplanes) air carriers. On that basis, the FAA concludes that small air carriers would not lose market share to larger air carriers.

5. Business Closure Analysis

The FAA is unable to determine with certainty the extent to which small entities that would be significantly affected by the proposal would have to close their operations. Many of the very small operations (1 to 4 airplanes) operate very close to the margin, as evidenced by the constant exit from and entry of these types of air carriers into air service. In fact, given that the available data are from 1996, it is probable that some of the operators listed in Table II-2 are no longer in business and that new, start-up air carriers have entered to take their places. Consequently, in the absence of financial data, it is difficult to determine the extent to which the proposal would make the difference in an entity's remaining in business.

D. DESCRIPTION OF ALTERNATIVES

In the general course of promulgating the proposed rule, the FAA has considered and evaluated three alternatives. These alternatives are described below. In formulating the alternatives, FAA focused on its primary responsibility for aviation safety and its particular obligation under 49 U.S.C. 44717 to ensure the continuing airworthiness of airplanes. Towards that end, two of the three alternatives to the proposal included additional airplane models to be covered by the proposal while one alternative reduced the number of airplane models that would be covered by the proposal. The proposed rule limits the potential impact on the airplanes most likely to be used by small entities while meeting the Agency's safety responsibility.

Alternative 1: Require all airplanes in commercial service with 10 or more seats to be covered by the proposal.

Alternative 1 would require all airplanes operating under part 91, part 121, part 125, part 129, and part 135 on-demand to comply with the proposal. As seen in Tables D-l and D-2 in Appendix D, the FAA estimates that about 45 additional airplane models, about 2,360 additional airplanes and about 550 additional operators would be covered by this proposed alternative. For many of these additional operators, the airplane operation is not their principle business. In estimating these potential compliance costs, the FAA assumes that, due to their small fuel tanks and relative straightforward fuel systems, these airplanes would need one-half of the time reported for the smallest part 25 turboprop to complete the fuel tank system assessment. In addition, the FAA assumes that it would also take one-quarter of the time reported for the smallest part 25 turboprop to complete the enhanced fuel tank system inspection and maintenance and wiring testing. Further, the FAA assumes that the out-of-service time would be one-half of the labor time to complete the inspection and testing. However, the FAA assumes that there would be no out-of-service time for part 135 on-demand airplanes because those operators would normally schedule maintenance when they had no contracted work. For the other operators, the FAA estimates the value of the average airplane would be about $750,000.

On that basis, as seen in Table VI-4, the FAA estimates that the additional compliance costs of including these operators (including the fuel tank system assessment cost) would be about $7.4 million in the first-year and would be about $1.1 million in the fourth year. The total compliance cost discounted over 10 years at 7 percent would be about $17.1 million. The annualized cost discounted over 10 years at 7 percent would be about $2.4 million.

Further, it is likely that nearly all of these additional costs under Alternative 1 would be incurred by small air carriers because large air carriers do not operate the types of airplanes that would be included in Alternative l's coverage.

TABLE VI-4

ADDITIONAL COSTS ASSOCIATED WITH ALTERNATIVES 1 AND 2

AIRPLANE MODEL	NUMBER OF AIRPLANES	FIRST YEAR TOTAL COST	P.V.TOTAL COST (OVER 10 YRS.)	ANNUALIZED TOTAL COST
Scheduled ≥10 PAX (Alternative 2)	724	$2,660,000	$5,660,000	$806,000
Non-Scheduled ≥10 PAX	1,638	$4,735,000	$11,425,000	$1,627,000
All Commercial ≥10 PAX (Alternative 1)	2,362	$7,395,000	$17,085,000	$2,433,000

Initially, the FAA planned to adopt this alternative as the proposed rule. The analysis indicated, however, that this alternative would impose significant costs on a large number of operators, particularly small operators. Based on further analysis, the FAA believes that the safety objectives of the proposed rule would be essentially achieved by excluding airplanes with fewer than 30 seats while, at the same time, large cost savings would particularly accrue to small operators. The FAA invites comments on this conclusion. Commenters are asked to provide cost analyses and other appropriate data to justify their comments. Based on new data that may be received, the FAA may include smaller airplanes in the final rule.

Alternative 2: Require all airplanes in commercial service with 30 or more seats (the proposed rule) and all airplanes with 10 or more seats in commercial service to be covered by the proposed operational rules changes.

Alternative 2 would add the requirement that all airplanes with 10 or more seats in commercial service operating under part 91, part 121, part 125, and part 129 to comply with the proposal. As seen in Tables D-3 and D-4 in Appendix D, the FAA estimates that 30 additional airplane models, 724 additional airplanes and about 84 additional operators would be covered by this proposed alternative. However, 35 of the 84 additional operators would already have airplanes that would be covered by the proposal. In estimating these potential compliance costs, the FAA makes the same assumptions that were described under Alternative 1.

On that basis, as seen in Table VI-4, the FAA estimates that the additional compliance costs of including these operators (including the fuel tank system assessment cost) would be about $2.7 million in the first-year. This would decline to about $340,000 in the fourth year. The total compliance cost discounted over 10 years at 7 percent would be about $5.7 million. The annualized cost discounted over 10 years at 7 percent would be about $806,000.

As was also true for Alternative 1, it is likely that nearly all of these additional costs under Alternative 2 would be incurred by small air carriers because large air carriers do not operate the types of airplanes that would be included in Alternative 2's coverage.

As part of the analysis described in the discussion of Alternative 1, the FAA also investigated this alternative 2. As previously discussed, after careful study, the FAA concludes that the safety objectives of the proposed rule would be essentially achieved by excluding airplanes with fewer than 30 seats. Comments are invited on this conclusion.

<u>Alternative 3</u>: Require that only turbojet airplanes in commercial service be covered by the proposal.

Alternative 3 would exempt 1,034 turboprop airplanes certificated under part 25 from the proposal's requirements. By doing so, as seen in Table VI-5, it would reduce the first year total cost of compliance to these operators by about $1.8 million which would become about $545,000 in the fourth year. The total compliance cost savings discounted over 10 years at 7 percent would be about $8.3 million. The annualized cost savings discounted over 10 years at 7 percent would be about $1.2 million.

Although there have been no in-flight fuel tank explosions associated with these part 25 turboprop airplane models, the FAA believes that the underlying fuel tank system risk is similar to those of the larger turbojets. As the FAA's estimated overall benefits are larger than its estimated overall costs, by extrapolation, for example, removing 20 percent of the population at risk from the proposed rule would remove 20 percent of both the benefits and costs. As the benefits are estimated to be greater than the costs, the result would be a reduction in the net dollar benefits and higher safety risk.

TABLE VI-5					
COMPLIANCE COST SAVINGS TO TURBOPROP OPERATORS					
Airplane Model	No. of Airplanes	First Year Total Cost (All Airplanes)	Annual Total Cost (All Airplanes)	P.V. Total Cost (All Airplanes)	Annualized Total Cost (All Airplanes)
A300	0	$0	$0	$0	$0
A310	0	$0	$0	$0	$0
A320	0	$0	$0	$0	$0
A330	0	$0	$0	$0	$0
A340	0	$0	$0	$0	$0
B707	0	$0	$0	$0	$0
B727	0	$0	$0	$0	$0
B737 series	0	$0	$0	$0	$0
B747-200,-300	0	$0	$0	$0	$0
B747-400	0	$0	$0	$0	$0
B757	0	$0	$0	$0	$0
B767	0	$0	$0	$0	$0
B777	0	$0	$0	$0	$0
DC8	0	$0	$0	$0	$0
DC9	0	$0	$0	$0	$0
DC10	0	$0	$0	$0	$0
MD11	0	$0	$0	$0	$0
MD80 series	0	$0	$0	$0	$0
MD90	0	$0	$0	$0	$0
L 1011	0	$0	$0	$0	$0
BAE ATP	10	$19,714	$5,939	$91,014	$12,958
BAE 41	53	$103,496	$$30,997		$67,879
BAE 146	26	$100,936	$24,081	$428,921	$61,069
DHC 7	26	$48,248	$13,990	$219,553	$31,259
DHC 8	152	$312,144	$96,284	$1,454,281	$207,057
F 27	41	$74,717	$21,402	$338,467	$48,190
F 28	0	0	0	0	(
F100	0	0	0	0	(
SAAB 340	234	$354,709	$109,946	$1,655,713	$235,736
ATR72	51	$116,459	$41,382	$574,580	$81,807
ATR42	112	$172,777	$55,070	$815,371	$116,090
EMB 145	5	$8,400	$2,812	$40,431	$5,756
Shorts 360	59	$79,746	$23,214	$363,423	$51,743
Dornier 328	37	$56,689	$17,993	$267,081	$38,026
Brad CRJ	2	$3,507	$1,200	$17,035	$2,425
EMB 120	226	$328,124	$100,573	$1,524,975	$217,122
TOTAL	1034	$1,779,667	$544,883	$8,267,601	$1,177,120

E. CONCLUSION

Thus, the evaluation of these alternatives was performed to directly respond to SBA concerns that small entities could be adversely affected by the proposal. The FAA believes that the scope of the proposal's coverage would be the cost-effective scope of providing the necessary level of safety.

Nevertheless, for a small operator with an airplane worth about $5 million, the estimated annualized cost of $2,675 would be equal to about 3 days of lost net revenue, based on a 7 percent rate of return. For larger operators classified as small entities, the FAA believes that the proposal would not have a significant impact on a substantial number of the larger operators within the small entity classification. Despite the significant impact on small operators, the FAA also believes that, even for the smallest operators of these affected airplanes, the safety benefits would be greater than the compliance costs. The FAA considered the impact on small entities and limited the scope of the proposal, resulting in a significant reduction of the potential impact on small entities. After due consideration to minimizing the impact on small entities, the FAA has responsibly limited the potential scope of this proposal on small entities and selected the approach which would provide the highest net benefits to society.

VII. INTERNATIONAL TRADE IMPACT ASSESSMENT

Consistent with the Administration's belief in the general superiority, desirability, and efficacy of free trade, it is the policy of the Administrator to remove or diminish, to the extent feasible, barriers to international trade, including both barriers affecting the export of American goods and services to foreign countries and those affecting the import of foreign goods and services into the United States.

In accordance with that policy, the FAA is committed to develop as much as possible its aviation standards and practices in harmony with its trading partners. Significant cost savings can result from this, both to American companies doing business in foreign markets, and foreign companies doing business in the United States.

The proposed part 25 type certificate changes would equally affect all future part 25 type certificated airplanes, wherever manufactured, that would be used in the United States. Thus, it would have little or no impact on international trade. The proposed SFAR and operational changes would affect only U.S. -registered airplanes and there could be some small increase in the costs to U.S. air carriers for international flights, which other countries' airlines would not incur. However, the FAA does not anticipate that these cost increases would have a minimal or no effect on U.S. air carriers. In addition, the European Joint Aviation Authorities may consider similar regulations that would affect their air carriers.

VIII. UNFUNDED MANDATES ASSESSMENT

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed "significant intergovernmental mandate." A "significant intergovernmental mandate" under the Act is any provision in a Federal agency regulation that will impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of $100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

The FAA determines that this proposal would not contain a significant intergovernmental or private sector mandate as defined by the Act.

APPENDIX A

LIST Of SUPPLEMENTAL TYPE CERTIFICATES (STC) BY AIRCRAFT AND BY STC HOLDER

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
DC-8-33; T.C. 4A25	SA3611WE	Modification to permit increase in maximum allowable zero fuel weight. Issued 3/27/78.	WE	G.S. Rasmussen P.O. Box 2052 Glendale, CA 91209
DC-8-33; T.C. 4A25	SA3804WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued 12/13/78.	WE	G.S. Rasmussen P.O. Box 10519 Glendale, CA 91209
DC-8-33; T.C. 4A25	SA3907WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued4/20/78.	WE	G.S. Rasmussen P.O. Box 10519 Glendale, CA 91209
DC-8-33; T.C. 4A25 .	SA3910WE	Modifications to permit an increase in maximum allowable zero fuel weight.	WE	G.S. Rasmussen P.O. Box 10519 Glendale, CA 91209
DC-8-43; T.C. 4A25	SA3612WE	Modifications to permit increase in maximum allowable zero fuel weight. Issued3/27/78.	WE	G.S. Rasmussen P.O. Box 2052 Glendale, CA 91209
DC-8-43; T.C. 4A25	SA3749WE	Conversion of passenger airplane to cargo only configuration by installation of cargo door. cargo floor, and increasing maximum landing and zero fuel weight. Issued 9/28/78.	WE	McDonnell Douglas Corp. 3855 Lakewood Blvd Long Beach. CA 90846
DC-8-43; T.C. 4A25	SA3805WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued 12/26/78.	WE	G.S. Rasmussen P.O. Box 10519 Glendale, CA 91209
DC-8-43; T.C. 4A25	SA3880WE	Modifications to permit an increase in maximum allowable zeo fuel weight. Issued3/28/79.	WE	G.S. Rasmussen P.O. Box 10519 Glendale. CA 91209
DC-8-43; T.C. 4A25	SA3911WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued4/23/79.	WE	G.S. Rasmussen P.O. Box 10519 Glendale, CA 91209
DC-8-51; T.C. 4A25	SA4078WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued 2/6/80.	WE	G. S. Rasmussen P.O. Box 10519 Glendale. CA 91209
DC-8-51; T.C. 4A25	SA4080WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued 8/21/80.	WE	G.S. Rasmussen P.O. Box 10519 Glendale. CA 91209

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
DC-8-51. S/N45855 Only; T.C. 4A25	ST00543AT	Increase in aircraft operating weights(Maximum takeoff weight • 315,000 lbs., maximum landing weight • 217.000 lbs., maximum zero fuel weight • 203,000 lbs.) Issued 7/20/94.	CE-A	Aircraft Modification Design 8960 Ridgemond Drive Atlanta GA 30350
DC-8-51. S/N45410 only; T.C. 4A25	ST00558AT	Increase in aircraft operating weights(Maximum takeoff weight • 315,000 tbs., maximum landing weight • 217,000 tbs., maximum zero fuel weight • 203,000 lbs.) Issued 8/26/94.	CE-A	Aircraft Modification Design Svcs 8960 Ridgemont Drive Atlanta GA
DC-8-51, S/N45935 only; T.C. 4A25	ST00617AT	Increase in aircraft operating weights(maximum takeoff weight • 315,000 lbs., maximum landing weight • 217,000 lbs., maximum zero fuel weight • 203,000 lbs. Issued 12/14/94.	CE-A	Aircraft Mod Design Svcs 8960 Ridgemond Drive Atlanta, GA 30350
DC-8-51. -52, -8F-54, -8-61; T.C. 4A25	SA3357WE-D	Retrofit of fuel quantity indicators and totalizers, Gull Airborne Instruments, Inc. P/Ns 206-009 and 206-016 series. Issued 1/30/78.	WE	United Air Lines San Francisco Int'l Arpt San Francisco, CA 91406
DC-8-53; T.C. 4A25	SA3613WE	Modifications to permit increase in maximum allowable zero fuel weight. Issued 3/27/78/	WE	G.S. Rasmussen P.O. Box 2052 Glendale, CA 91209
DC-8-53; T.C. 4A25	SA3806WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued 12/26/78.	WE	G.S. Rasmussen P.O. Box 10519 Glendale. CA 91209
DC-8-53; T.C. 4A25	SA3908WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued 4/20/79.	WE	G.S. Rasmussen P.O. Box 10519 Glendale, CA 91209
DC-8-53; T.C. 4A25	SA3909WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued 4/20/79.	WE	G.S. Rasmussen P.O. Box 10519 Glendale, CA 91209
DC-8-53; T.C. 4A25	SA3912WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued 4/23/79.	WE	G.S. Rasmussen P.O. Box 10519 Glendale, CA 91209
DC-8F-54, S/N 45637 only; T.C. 4A25	ST00924AT	Increase in aircraft operating weights(maximum landing weight . 240,000 lbs., maximum zero fuel weight • 224,000 lbs.) Issued 12/4/95.	CE-A	Aircraft Modification Design Services, Inc. 8960 Ridgemont Drive Atlanta, GA 30350
DC-8-61; T.C. 4A25	SA2379SO	Installation of a Simmonds Precision (Liquidometer) Fuel Quantity Indicating System. Reissued 11/13/92.	CE-A	Airborne Express Air Inc. 145 Hunter Drive Wilmington, OH 45177

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
DC-8-61; T.C. 4A25	SA5510NM	Modification to permit an increased maximum zero fuel weight (MZFW), and maximum landing weight (ML W). Amended I I/15/96.	NM-L	Structural Integrity Engineering 9560 Topanga Canyon Blvd. Chatsworth, CA, 91311
DC-8-61, -61F, -62, -62F, -63, -63F; T.C. 4A25	SA1616GL	Installation of Ametek digital fuel flow/fuel used indicator P/N10250N010F01. Issued 6/17/91.	CE-C	ABX Air, Inc. 145 Hunter Drive Wilmington, OH 45177
DC-8-61, 61F, 63, 63F, 71, 71F, 73, 73F; T.C. 4A25	SA7729SW	Installation of digital fuel quantity indicators, fuel totalizer, and capacitive fuel compensator units. Issued 2/22/90.	SW	Smiths Industries Aerospace & Defense Systems, Inc. 4001 Airport Freeway Ste 380 Bedford, TX 76021
DC-8-62; T.C. 4A25	SA936NE	Installation of long range auxiliary fuel (body fuel) tanks and transfer system (4080 gallons total) in the forward and aft fuselage cargo bays. Issued 1/28/92.	NE	Pats, Inc. 9570 Berger Road Columbia, MD 21046
DC-8-71(S/N 46099 only); T.C. 4A25	ST00794AT	Increase in aircraft operating weights(max takeoff weight - 328,000 lbs., max landing weight - 258,000 lbs., max zero fuel weiht - 245,000 lbs.) Amended 4/24/97.	CE-A	Aircraft Modification Design Servicer Inc. 8960 Ridgemont Drive Atlanta GA 30350
DC-8-71, -71F, -72, -72F, -73, -73F; T.C. 4A25	SE00584AT	Installation of ELDEC fuel flow meter and Kollsman digital fuel flow/fuel used indicator. Issued 10/14/94.	CE-A	JRG Design. Inc. 6015 Crystal Spring Ct. Greensboro, NC 27410
DC-8-73, 73F; T.C. 4A25	SA6058NM	Modification to permit increase in maximum allowable zero fuel weight. Amended 9/2/94.	NM-L	Altair Holdings Limited 111 N. First Street Suite 301 Burbank, CA 91502
DC-9-11, -12, -13, -14, -15, -15F, -21, -31, -32, -32F, -33F, -34, -34F, -51; T.C. A6WE	SA1545SO	Modify the wing fuel quantity system to install a new compensator and modify an existing probe. Issued 1/4/84.	CE-A	Republic Airlines. Inc. Hartsfield/Atlanta Int'l Arpt Atlanta GA 30320
DC-9-11, -12, -13, -14, -15, -15F, -31, -32, -32F, -33F, -34, -34F, -41; T.C. A6WE	SA1621GL	Installation of Ametek digital fuel flow/fuel used indicator PM 10250N010F01. Issued 7/1/91.	CE-C	ABX Air, Inc. 145 Hunter Drive Wilmington. OH 45177
DC-9-11, -12, -13, -14, -15, -31, -32, -32F, -33F, -51; T.C. A6WE	SA7440SW	Installation of fuel quantity indicators, fuel quantity repeaters and digital calibration units. Issued 8/16/88.	SW	Smith Industries Aerospace & Defense Systems, Inc. 4001 Airport Freeway Bedford, TX 76021

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
DC-9-14; T.C. A6WE	SA1334NM	Installation of two auxiliary fuel tanks in the forward cargo compartment and one auxiliary fuel tank in the aft cargo compartment. Reissued 10/15/89.	NM	World Auxiliary Power Co. 10930 Bigge Street San Leandro, CA 94577
DC-9-15; T.C. A6WE	SA1050NW	The installation of three auxiliary fuel tank systems consisting of eight cylindrical fuel tanks. The forward auxiliary tank system of 600 gallons and a mid-auxiliary tank system of 600 gallons are located in the forward cargo compartment and a similar aft auxiliary tank sytsem of 400 gallons located in the aft cargo compartment. Reissued 4/19/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
DC-9-15; T.C. A6WE	SA2587WE	Installation of auxiliary fuselage fuel tanks in forward and aft cargo compartments. Reissued 4/12/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine. CA 92714
DC-9-15F; T.C. A6WE	SA3558WE	Installation of 535-gallon auxiliary fuel tank system in forward cargo compartment. Issued 3/8/78.	WE	Aircraft Tank Service 10201 Cohasset St. Burbank CA 91504
DC-9-30 Series: T.C. A6WE	SA3495NM	Installation of a 2,250 gallon auxiliary fuel system installed in the forward and aft cargo compartments. Reissued 4/12/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine. CA 92714
DC-9-30 Series; T.C. A6WE	ST00402AT	Modify auxiliary fuel system installed by STC SA3495NM. Issued 1/4/94.	CE-A	Lockheed Aeromod Center 1044 Terminal Road Greenville, SC 29605
DC-9-31. -32; T.C. A6WE	SA3888WE	Installation of an auxiliary fuel tank system in the forward baggage compartment. Reissued 11/14/86.	CE-C	Northwest Airlines 2700 Lone Oak Parkway Eagan, MN 55124
DC-9-31. -32, -32(VC-9C), -32F. -32F(C-9A, C-9B), -33F, -34. -34F. 41, -81. -82. -83. -87; T.C. A6WE	SA1411GL	Installation of ferry fuel tanks. Amended 11/27/91.	CE-C	ABX Air, Inc. 145 Hunter Drive Wilmington, OH 45177
DC-9-32; T.C. A6WE	SA1358NM	Installation of a 582 Gallon auxiliary fuel tank in the aft cargo compartment. Reissued 10/15/89.	NM	World Auxiliary Power Co. 10930 Bigge Street San Leandro, CA 94577
DC-9-32; T.C. A6WE	SA3436NM	Installation of an auxiliary fuel system. in the forward and aft cargo compartments. Reissued 4/19/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
DC-9-32, -23F, -33F; T.C. A6WE	SA1710SO	Installation of two different supplemental fuel tank configurations in the aircraft cargo compartment. Reissued 10/15/89.	CE-A	World Auxiliary Power Company 10930 Bigge Street San Leandro, CA 94577
DC-9-33F; T.C. A6WE	ST00605NY	Installation of a six-tank auxiliary fuel system consisting of 3 tanks in forward baggage compartment and 3 tanks in aft baggage compartment. Issued 4/14/97.	NE-NY	PATS, Inc. 9570 Berger Road Columbia MD 21046
DC-9-80 Series; T.C. A6WE	ST00176AT	Installation of standard (pound units) fuel quantity and fuel flow instrumentation. Issued 4/6/93.	CE-A	Lopez and Associates, Inc. 124 Glen Echo Drive Smyrna, TN 37167
DC-9-81, -82, -83; T.C. A6WE	ST00409NY	Installation of a two tank auxiliary fuel system in Mid Cargo Compartment. Amended 6/28/96.	NE-NY	PATS, Inc. 9570 Berger Road Columbia MD 21046
DC-9-82, -83; T.C. A6WE	SA3968SW-D	Modify the refueling system. Issued 10/12/90.	SW	American Airlines, Inc. Maintenance & Engineering Ctr Tulsa OK 74151
DC-9-83; T.C. A6WE	ST00218AT	Installation of a nine tank auxiliary fuel system. Reissued 8/18/93.	CE-A	PATS, Inc. 9570 Berger Road Columbia MD 21046
DC-9-87; T.C. A6WE	ST00523NY	Installation of a Ten Tank Auxiliary Fuel System in forward and aft cargo compartments. Amended 10/16/97.	NE-NY	PATS. Inc. 9570 Berger Road Columbia MD 21046
DC-9-87 (MD-87); T.C. A6WE	ST00630AT	Removal of aft auxiliary fuel tank. Reissued 1/10/95.	CE-A	Shannon Aerospace Ltd. 3855 Lakewood Blvd Long Beach. CA 90846
DC-10 Series; T.C. A22WE	SA1342SO	Installation of Aero Systems CD-3000 fuel management computer. Issued 6/7/82.	CE	Aero Systems. Inc. P.O. Box 522221 Miami, FL 33152
DC-IO-IO. -10F, -15, -30, -30F. -40. -40F; T.C. A22WE	ST00456AT	Installation of a Gull fuel quantity indicating system. Amended 3/24/95.	CE-A	Parker Hannifin Corp Gull Electronic Systems Division 300 Marcus Blvd Smithtown. NY 11787
DC-IO-IO, -30, -30ER, -40; T.C. A22WE	SA2955SO	Replacement of existing electromechanical fuel quantity indicators with Smiths Industries digital fuel quantity. Amended 5/31/96.	CE-A	Smiths Industries. Clearwater Division P.O. Box 5389 Clearwater. FL 34618
DC-IO-IS; T.C. A22WE	ST00629AT	Modification of fuel quantity indicating system from metric to English units. Issued 1/4/95.	CE-A	Harry A. Hokanson 6006 Paradise Point Dr. Miami, FL 33157

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
DC-3A-SCG, -SC3G, -S1CG, S1C3G, -S4C4G, DC-3C-SC3G, 31C3G, -S4C4G, -R-1830-90C, DC-3D-R-1830-90C; T.C. 669	SA1045GL	Installation of Shadin fuel flow indicating system. Issued 7/29/86.	CE-C	Shadin Co., Inc. 6950 Wayzata Blvd. Minneapolis. MN 55426
DC-3-C-SC3G, -S1C3G, -S4C4G, -R-1830-90C(S3C4-G); T.C. A-669	SA3876SW	Installation of long range fuel system. Reissued 9/15/93.	SW	Greenwich Aircraft Corp. 7727 Airport Road Waco, TX 76708
DC3C-SC3G, S1C3G, S4C4G, S3C4G, R-1830-43, R-1830-43A, R-1830-49, R-1830-57, R-1830-65, R-1830-67, R-1830-75, R-1830-82, R-1830-90C, R-1830-90D, R-1830-92, R-1830-94, R-1830-96, R-2000-7M2, R-2000-D5; T.C. A-669	SA4840NM	Installation of Pratt & Whitney of Canada PT6A-67R engines, Hartzell HC-B5MA-3/M 11276 propellers, modified fuel system, revised electrical system, and forward fuselage extension. Amended 3/27/92.	NM	Basler Turbo Conversions Inc. 255 W. 35th Ave. P.O. Box 2305 Oshkosh, WI 54903
DC-3-G102, DC-3-G102A, DC-3-G103A, DC-3-G202A; T.C. A-618	SA1082GL	Installation of Shadin fuel flow indicator. Issued 11/5/86.	CE-C	Shadin Co., Inc. 6950 Wayzata Blvd. Minneapolis, MN 55426
DC-8 Series; T.C. 4A25	SA70SO	Deactivation of center wing and forward auxiliary fix! tanks.	SO	National Airlines, Inc. Int'l Airport Miami, FL 33159
DC-8 Series quipped with ARINC 599 Series Omega; T.C. 4A25	SA1273SO	Installation of Aero Systems CD-3000 fuel management computer system. Issued 9/22/81.	SO	Airlift Int'l Inc. P.O. Box 522495 Miami, FL 33152
DC-8-21; T.C. 4A25	SA3869WE	Modifications to permit an increase in maximum allowable zero fuel weight. Issued 2/20/79.	WE	G. S. Rasmussen P. O. Box 10519 Glendale. CA 91209
DC-8-33; T.C. 4A25	SA3403WE	Conversion of passenger airplane to cargo only configuration by installation of cargo door. cargo handling system. and increasing maximum landing and zero fuel weight. Amended 6/14/78.	WE	McDonnell Douglas Corp. 3855 Lakewood Blvd Long Beach. CA 90846

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
BAC 1-11; T.C. A5EU	SA1350SW	Installation of center wing tank fuel system. Reissued 5/30/79.	WE	Tiger Air Svc Center Inc 3000 North Clybourn Ave Burbank, CA 91505
BAC 1-1 1, 401/AK; T.C. A5EU	SA2971WE	Installation of maximum 1565 gallon auxiliary fuel tanks in forward and aft cargo compartment. Amended 2/12/80.	WE	Aircraft Tank Svc Inc. 1020 1 Cohasset Street Burbank, CA 91505
BAC 1-1 1, 401AK, 41/AQ, 419/EP, 4 1A/EB, 422/EQ; T.C. A5EU	SA1995WE	Installation of auxiliary fuel tanks in forward and aft cargo compartments. Amended 12/6/74.	WE	Aircraft Tank Svc Inc. 1020 1 Cohasset Street Burbank, CA 91504
BAC 1-11, 414EG; T.C. A5EU	SA3819WE	Installation of 1478 gallon auxiliary fuel tank system in the forward and aft cargo compartments. Issued 1/25/79.	WE	Aircraft Tank Svc Inc. 10201 Cohasset street Burbank, CA 91504
737-400; T.C. A16WE	SA3980NM	Installation of provisional structure, wiring, and ducting for an auxiliary fuel system. Reissued 5/25/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
737-400, 500; T.C. A16WE	SA3992NM	Installation of an auxiliary fuel system in the aft cargo compartment. Reissued 3/11/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
747-100; T.C. A20WE	SA5199NM	Increase maximum zero fuel Weight. Reissued 12/19/91.	NM-S	GATX/Airlog 3303 N. Sheridan Gate 32, Hangar 19 Tulsa, OK. 74115
747-100,-100B,-100BSUD, -200B, -200C, -200F, -300; T.C. A20WE	ST20BO	Installation of BFGoodrich No. 300498 Fuel Quantity Indicating System. Amended 1/23/95.	NE	Simmonds Precision Products Inc. BFGoodrich Panton Road Vergennes, VT 05491
747-100, -100B, -100B SUD, -200B, -200C, -200F, -300, -400, -400D, -400F, 747SR, 747SP; T.C. A20WE	ST00040BO	Installation of BFGoodrich No. 20191 remote fuel height measurement sticks. Issued 3/20/95.	NE-B	BFGoodrich Aerospace Simmonds Recision Aircraft Systems Panton Road Vergennes, VT 05491
747-200; T.C. A20WE	SA5759NM	Increase maximum zero fuel Weight. Amended 4/27/95.	NM-S	Gatx/Airlog Company 3303 N. Sheridan Road Tulsa, OK 74115

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
747-200B; T.C. A20WE	ST00380SE	Increase in the maximum zero fuel weight to 590,000 lb. Issued 10/31/96.	NM-S	Becontree Holdings Limited La Motte Chambers, La Motte St. St. Helier, Jersey JE11BJ, Channel Islands
727-231; T.C. A3WE	SA1475CE	Installation of Simmonds Precision performance advisory system (fuel management). Issued 3/6/79.	CE	Trans World Airlines P.O. Box 20126 Kansas City Int'l Airport Kansas City, MO 64195
727, 727C, 727-100, 727-100C, 727-200, 727-200F; T.C. A3WE	ST00053BO	Installation of a Simmonds Precision Products fuel quantity indicating system incorporating a volumetric top-off function. Issued 3/22/96.	NE-BO	Simmonds Precision Products dba BF Goodrich Aerospace Pantom Road Vergennes, VT 05491
727, 727C, 727-200; T.C. A3WE	SA2627WE	Installation of fuel control rod end bearings. Issued 1/4/73.	NM-L	Triumph Corporation 2130 S. Ind. Park Ave. Tempe, AZ 85282
737-2A6; T.C. A16WE	SA2153WE	Installation of fuselage fuel tanks in forward and aft cargo compartments. Reissued 3/11/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
737-2K9A; T.C. A16WE	SA1082NW	Installation of auxiliary fuel tanks in the aft cargo compartment. Reissued 3/11/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
737-2S9A; T.C. A16WE	SA1054NW	Installation of fuselage fuel tanks in the forward and aft cargo compartments.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
737-2H6(S/N 22620), 737-200 Series; T.C. A16WE	SA83NE	Configuration 1: Installation of three-tank auxiliary fuel transfer system (1340 US gallon) in the forward lower cargo compartment; or Configuration 2: Installation of seven-tank auxiliary fuel transfer system (2850 US gallon) in the lower fuselage. Amended 12/20/82.	NE	Patrick Acft Tank Sys Inc P.O. Box 2009 Columbia, MD 21045
737-100, -200; T.C. A16WE	SA531NE	Installation of a Simmonds Precision total fuel/vref dual indicator, PM 393080-203 thru -223. Issued 9/2/87.	NE	Simmonds Precision Panton Road Vergennes, VT 05491
737-100, 737-200 Series; T.C. A16WE	ST310CH	Installation of Ametek fuel flow indicator. Reissued 12/11/95.	CE-C	Ametek Aerospace Products 900 Clymer Avenue Sellersville, PA 18960

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
737-100, -200, -200C; T.C. A16WE	SA1566NM	Replacement of existing JT115 fuel couplings with JT175 fuel couplings. Issued 10/4/83.	NM-D	Stanley Aviation Corp. GAMAH Division 2501 Dallas Street Aurora, CO 80010
737- loo, -200, -300, -400, -500; T.C. A16WE	SA3498NM	Installation of Smiths Industries fuel quantity gauge system. Amended 4/19/94.	NM-L	Smith Industries 255 Great Valley Parkway Malvern, PA 19355
737-100, -200, -200C, -300, -400, -500; T.C. A16WE	ST00043BO	Installation of a Simmonds Precision50203 series fuel quantity harness. Issued 6/9/95.	NE-B	Simmonds Precision Products dba BFGoodrich Aerospace Panton Road Vergennes, VT 05491
737-200; T.C. A16WE	SA1078NE	Installation of 1080-gallon, 3-tank auxiliary fuel system in forward cargo compartment. Issued 4/9/93.	NE	PATS, Inc. 9570 Berger Road Columbia, Maryland 21046
737-200, S/N's 20549, 22002, 22540; T.C. A16WE	ST00604AT	Approval of maximum zero fuel weight increase. Issued 11/18/94.	CE-A	Pemco Aeroplex, Inc. 1943 50th Street North Birmingham, AL 35212
737-200; T.C. A16WE	ST00802AT	Removal of aft cargo bay auxiliary fuel tank and other minor changes. Issued 6/30/95.	CE-A	Avitas Engineering 815 NW 57th Ave, Ste 203 Miami, FL 33126
737-200, -200C, -300, -400, -500 Series; T.C. A16WE	SA725NE	Installation of 1000-gallon, 2-tank auxiliary fuel system in aft cargo compartment. Amended 4/24/96.	NE-NY	PATS, Inc. 9570 Berger Road Columbia, MD 21046
737-300 Series; T.C. A16WE	SA500NE	Installation of 425 U.S. gallon auxiliary fuel system in aft cargo compartment. Amended 6/18/87.	NE	Patrick Aircraft Tank Systems, Inc. 9570 Berger Road Columbia, MD 21046
737-300 Series; T.C. A16WE	SA542NE	Installation of 500 U.S. gallon auxiliary fuel system in aft cargo compartment. Amended 3/11/91.	NE	PATS, Inc. 9570 Berger Road Columbia MD 21046
737-300; T.C. A16WE	SA770NE	Installation of a fuel summation unit. Issued 7/24/90.	NE	PATS, Inc. 9570 Berger Rd. Columbia, MD 21046
737-300, -400 Series; T.C. A16WE	SA553NE	Installation of 425 or 500 U.S. gallon auxiliary fuel system in aft cargo compartment. Amended 1/25/94.	NE-NY	PATS, Inc. 9570 Berger Road Columbia, MD 21046

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STC Holder:
727-17; T.C. A3WE	SA3674WE	Installation of 2700 gallon auxiliary fuel tanks in forward and aft cargo compartments. Reissued 2/26/91	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
727-30; T.C. A3WE	SA1979NM	Installation of an auxiliary fuel system in the forward and aft cargo compartments. Amended 3/31/93.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
727-30; T.C. A3WE	SA3157WE	Installation of 1200 gallon auxiliary fuel tank in forward cargo compartment. Issued 3/26/76.	NM-L	Aircraft Tank Service Inc 10201 Cohasset Street Burbank CA 91504
727-30 T.C. A3WE	SA3319WE	Installation of auxiliary fuselage fuel tanks (1600 gallons) in forward and aft cargo compartment. Reissued 3/4/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
727-30, -30C, -31, -25, -81; T.C. A3WE	SA2734WE	Installation of auxiliary fuselage fuel tanks in forward and aft cargo compartments. Reissued 2/26/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
727-46; T.C. A3WE	SA2970WE	Installation of 300 gallon auxiliary fuel tank in aft cargo compartment. Reissued 2/26/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
727-77, -22; T.C. A3WE	SA3559WE	Installation of a 1932 gallon auxiliary fuel tank system in forward and aft cargo compartments. Reissued 2/28/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
727-100; T.C. A3WE	SA2561SO	Modify the auxiliary fuel tanks of STC SA62NE to use cabin pressure as a backup transfer and provide a pressure relief in the transfer system. Amended 4/20/93.	CE-A	Southeast Aero-Tek Inc. P.O. Box 1277 Sharpes, FL 32959
727-100 Series; T.C. A3WE	SA3920NM	Installation of an auxiliary fuel system in the forward and aft cargo compartments. Reissued 2/21/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
727-100; T.C. A3WE	SA4912NM	Increase in the maximum zero fuel weight. Issued 3/27/90.	NM	Leth and Associates 85 222nd Place SE Redmond, WA 98052

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
727-100; T.C. A3WE	SA5514NM	Modification of a previously approved auxiliary fuel system by removal of one 330 gallon aft cargo compartment tank. Issued 1/2/92.	WE	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
727-100; T.C. A3WE	SA5767NM	Increase in zero fuel weight. Issued I 0/1/92.	NM-S	The Carstan Corporation Aeronautical Engineering Svc. 4600 Kietzke Lane Building F, Suite 155 Reno, NV 89502
727-100 (S/N 19183 only); T.C. A3WE	ST00782AT	Approval of maximum zero fuel weight increase to 132,000 pounds as substantiated by the design dam Issued 6/8/95.	CE-A	Structural Integrity Engineering 65 12 Hollywood Blvd Hollywood, FL 33024
727-100; T.C. A3WE	ST00466NY	Installation of a six tank auxiliary fuel system in the forward and aft cargo compartments. Amended 12/9/96.	NE-NY	PATS, Inc. 9570 Berger Road Columbia, MD 21046
727-100, 727-100C, 727-200, 727-200C; T.C. A3WE	SA7012NM-D	Installation of wing fuel access panels. Issued 2/14/95.	NM-S	Tramco Inc. 11323 30th Avenue W Everett, WA 98204
727-100, -200; T.C. A3WE	SA298NE	Installation of a Simmonds Recision computerized fuel quantity indicator system. Amended 11/19/85.	NE	Simmonds Precision Panton Road Vergennes, VT 05491
727-100, -200 Series; T.C. A3WE	SA387NE	Installation of a two-tank(1132 U.S. gallons) auxiliary fuel transfer system in the lower aft cargo compartment. Amended 3/19/92.	NE	Pats, Inc. 9570 Berger Road Columbia, MD 21046
727-100, -200; T.C. A3WE	SA3468NM	Installation of a 2300-07-1, 2307-02-1, or 2307-03-1 digital fuel quantity gauge system. Amended 9/13/95.	NE-NY	Smith Industries Malvern Division 255 Great Valley Parkway Malvern, PA 19355
727-191; T.C. A3WE	SA1398NM	Installation of an auxiliary fuel system in the forward and aft cargo compartments. Reissued 2/28/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
727-200 Series; T.C. A3WE	SA84NE	Installation of a seven tank (3700 U.S. gallons) auxiliary fuel transfer system in fuselage cargo compartments. Amended 7/21/83.	NE	Patrick Aircraft Tank Systems, Inc. P.O. Box 2009 Columbia, MD 21045
727-200 Series; T.C. A3WE	SA450NE	Installation of a three-section tank and auxiliary fuel transfer system in the lower forward cargo bay. Issued 6/23/86.	NE	Patrick Aircraft Tank Systems, Inc. 9570 Berger Road Columbia, MD 21046
727-200; T.C. A3WE	SA496NE	Installation of auxiliary fuel transfer system in forward and aft lower cargo bays. Amended 10/1/97.	NE-NY	Patrick Aircraft Tank Systems, Inc. 9570 Berger Road Columbia, MD 21046-1569
727-200; T.C. A3WE	SA5960NM	Increase in maximum zero fuel weight. Issued 5/21/93.	NM-L	The Carstan Corporation 111 N. First Street, Suite 301 Burbank, CA 91502
727-200; T.C. A3WE	ST00076SE	Increase in maximum zero fuel weight to 152,000 lbs. and increase in maximum landing weight up to 161,000 lbs. Amended 7/19/95.	NM-L	Altair Holdings Ltd. 111 N. First Street, Suite 301 Burbank. CA 91502
727-200; T.C. A3WE	ST00094SE-T	Increase in the maximum zero fuel weight. Issued 5/31/94.	NM-S	Leth & Associates 85 222nd Place S.E. Redmond, WA 98052
727-200; T.C. A3WE	ST00106SE	Increase in the maximum zero fuel weight to 144,000 lbs. Issued 8/11/94.	NM-SE	Altair Holdings Ltd. 111 N. First Street, Suite 301 Burbank, CA 91502
727-200; T.C. A3WE	ST00117SE	Increase in the maximum zero fuel weight to 155,000 lbs. Amended 10/25/95.	NM-SE	Altair Holdings Ltd. 111 N First Street, Suite 301 Burbank, CA 91502
727-200 Series; T.C. A3WE	ST00106SE	Increase in maximum zero fuel weights to 144,000 lbs., and increase in maximum landing weight to 145,500 lbs. Amended 9/11/97.	NM-S	Altair Holdings, Ltd. 111 N First Street, Suite 301 Burbank, CA 91502
727-200 (SIN 19483, 19484, 19486, 19491, 20180, 20184, 20185, 20187, 20995, 2099619480, 19492, 19481, 19482, 19485, 20191 only); T.C. A3WE	ST00633AT	Approval of maximum zero fuel weight increase from 138,000 pounds to 146,000 pounds. Amended 7/12/95.	CE-A	Structural Integrity Engr 6512 Hollywood, Blvd Hollywood, FL 33024

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
727-200 (SIN 22080 only); T.C. A3WE	ST00720AT	Approval of maximum zero fuel weight and maximum landing weight(Flaps 30) increases to 157,500 pounds and 166,000 pounds, respectively. Issued 3/28/95.	CE-A	Structural Integrity Engineering 6512 Hollywood, Blvd Hollywood, FL 33024
727-200 (S/N 20938 only); T.C. A3WE	ST00795AT	Approval of maximum zero fuel weight increase (155,000 lbs.) and maximum landing weight increase(164 lbs.). Amended 7/12/95.	CE-A	Pemco Aeroplex, Inc. 1943 50th Street North Birmingham, AL 35212
727 Series, 727-100; T.C. A3WE	SA62NE	Installation of six-tank auxiliary fuel transfer system in lower fuselage cargo bays. Amended 1/15/85.	NE	Patrick Aircraft Tank Systems, Inc. 9570 Berger Road Columbia, MD 21046
727 Series, 727-100 Series; T.C. A3WE	SA392NE	Installation of a five tank, 2571.5 U.S. gallons (17,228 lb.) capacity auxiliary fuel transfer system. Amended 7/10/92.	NE	Patrick Aircraft Tank Sys., Inc. 9570 Berger Road Columbia, MD 21046
727, 727-100 Series; T.C. A3WE	SA530NE	Installation of two-section auxiliary fuel tanks (total capacity 14700 lbs.) in the forward and aft cargo bay compartments or installation of a three section auxiliary fuel tank system (total capacity 11350 lb.) in the forward and aft cargo bay compartments. Installation of 2 section auxiliry fuel tank system (total capacity 7718 lb.) in aft cargo bay compartment. Amended 3/11/91.	NE	Pats, Inc. 9570 Berger Rd. Columbia, MD 21046
727, 727C; T.C. A3WE	SA800CE	Installation of three cell forward and three cell aft auxiliary fuel tanks in lower cargo compartment. Issued June 1972.	CE	The Boeing Company 3801 South Oliver Street Wichita, KS 67210
727, 727C, 727-100, -100C, -200, -200F; T.C. A3WE	ST25BO	Installation of BFGoodrich No. 50192-0000-series fuel quantity indicating system wiring harness. Issued 10/20/94.	NE-BO	Simmonds Precision Products BFGoodrich Commercial Fuel and Integrated Systems Div Panton Road Vergennes, VT 05491

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
727 Series 17, 22, 23, 29C, 30, 35, 46, 51, 76, 193; T.C. A3WE	SA3810WE	Installation of a maximum of eight auxiliary fuel tanks in forward and aft cargo compartments. Reissued 3/11/9 I.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 927 14
727-2JO; T.C. A3WE	SA1235CE-D	Forward auxiliary fuel tank removal and reinstallation. Issued 10/9/78.	CE	Boeing Wichita Company 3801 South Oliver Wichita, KS 672 10
727-2K3, -2K5, 727-2S2F, -221; 220 T.C. A3WE	SA1474SO	Installation of forward and aft cargo compartment auxiliary fuel tanks. Amended 5/20/94.	NM-L	World Auxiliary Power Co., 1351 Harbor Bay Pkwy, Ste Alameda, CA 94502
727-2L4; T.C. A3WE	SA3065WE	Installation of 3400 gallon auxiliary fuel tanks in forward and aft cargo compartments. Reissued 2/28/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 92714
727-2M7; T.C. A3WE	SA1350NM	Installation of an 2777 gallon auxiliary fuel system consisting of a 1565 gallon forward tank system. Reissued 10/15/89.	NM	World Auxiliary Power Company 10930 Bigge Street San Leandro, CA 94577
727-2M7; T.C. A3WE	SA2033NM	Installation of a auxiliary fuel system in the forward baggage compartment. Reissued 10/15/89.	NM	World Auxiliary Power Company 10930 Bigge Street San Leandro, CA 94577
727-2M7; T.C. A3WE	SA3564WE	Installation of auxiliary fuel tanks in the forward and aft belly cargo/baggage compartments. Reissued 11/14/86.	CE-C	Northwest Airlines, Inc. 2700 Lone Oak Parkway Eagan, MN 55124
727-2N8; T.C. A3WE	SA1051NW	Installation of an 1870 gallon auxiliary fuel tank system consisting of five cylindrical tanks. Three 330 gallon mid tanks located in the aft end of the forward baggage department and two 440 gallon aft tanks located in the forward end of the aft baggage compartment. Reissued 2/26/91.	NM-L	Rogerson ATS 2201 Alton Avenue Irvine, CA 927 14
L-1011-385-1, L-1011-385-1-14, L-1011-385-1-15, L-1011-385-3; T.C. A23WE	ST00046BO	Installation of BFGoodrich 50209-series fuel quantity indicating system in-tank wiring harness. Issued 10/2/95.	NE-B	Simmonds Precision Panton Road Vergennes, VT 05491

Aircraft Make Model and TC NO.	STC#:	Description:	ACO:	STCHolder:
L-1011; T.C. A23WE	ST01283AT	Installation of Ametek Aerospace Products fuel flow transmitter P/N 8TJ124GGN3 and Ametek Aerospace Products fuel used indicator P/N 10620N()F(). Issued 2/21/97.	CE-A	Delta Airlines Hartsfield Atlanta Int'l Airport Atlanta, GA 30320

APPENDIX B

SPREADSHEET FOR OPERATOR'S COST AND LOST REVENUE AND A' TOTAL COST
INCLUDING THE DESIGN APPROVAL HOLDERS COSTS

FUEL TANK
INSPEC TION
COSTS

Airplane Model	No of Airplanes	No Tanks per Airplane	Average Airplane Value ($millions)	Number of Fuel Pumps	BONDING Initial Major Inspections (Hours Per Tank)	Future Inspections (Hours Per Tank)	Initial Time out of Service (Hours Per Airplane)	Future Time out of Service (Hours Per Airplane)	First Year Labor Cost (Per Tank)	Annual Labor Cost (Per Tank)
A300	51	3	$24 89	6	50	36	24	16	$3 500	$504
A310	37	3	$32 21	6	50	36	24	16	$3 500	$504
A320	145	3	$31 88	6	50	36	24	16	$3 500	$504
A330	0	3	$76 40	6	50	36	24	16	$3 500	$504
A340	0	3	$82 62	6	50	36	24	16	$3 500	$504
B707	8	5	$0 75	10	32	24	18	13	$2 240	$336
B727	878	3	$3 05	8	32	24	18	13	$2 240	$336
B737 series	1097	3	$19 37	6	32	24	18	13	$2 240	$336
B747 200 300	206	7	$28 74	14	32	24	18	13	$2 240	$336
B747-400	30	8	$119 57	16	32	24	18	13	$2,240	$336
B757	467	3	$36 77	6	32	24	18	13	$2 240	$336
B767	214	3	$50 21	6	32	24	18	13	$2,240	$336
B777	12	3	$113 85	6	32	24	18	13	$2 240	$336
DC8	181	3	$18 17	10	16	10	6		$1 120	$140
DC9	472	3	$3 40	6	16	10	6	4	$1 120	$140
DC10	204	5	$13 67	8	24	16	10		$1 680	$224
MD11	66	4	$76 04	8	24	16	10		$1 680	$224
MD80 sums	617	3	$18 51	6	16	10	6		$1.120	$140
MD90	19	3	$34 00	6	16	10	6	4	$1 120	$14
L 1011	112	3	$4 63	8	24	16	10		$1,680	$224
ME ATP	10	2	$4 59	4	8	5	3	2	$560	$70
ME 41	53	2	$4 13	4	8	5	3	2	$560	$70
BAE 146	26	3	$10 06	6	16	10	6	4	$1 120	$140
DHC 7	26	2	$1 74	4	8	5	3		$560	$70
DHC 8	152	2	$6 61	4	8	5	3	2	$560	$70
F 27	41	2	$0 92	4	8	5	3	2	$560	$70
F 28	67	2	$1 94	4	16	10	6	4	$1 120	$140
F 100	89	2	$14 30	4	16	10	6	4	$1 120	$140
SAAB 340	234	2	$4 82	4	6	4	2 5	2	$420	$56
ATR72	51	2	$9 38	4	8	5	3	2	$560	$70
ATR42	112	2	$7 51	4	6	4	2 5		$420	$56
EMB 145	5	2	$12 00	4	6	4	2 5	2	$420	$56
Shorts 360	59	2	$1 28	4	6	4	2 5	2	$420	$56
Dornier 328	37	2	$7 17	4	6	4	2 5	2	$420	$56
Brad CRJ	2	2	$14 40	4	6	4	2 5	2	$420	$56
EMB 120	226	2	$4 55	4	6	4	2 5	2	$420	$56
TOTAL	6006									

Airplane Model	P U M P WIRING Initial Inspections (Hours Per Tank)	Future Inspections (Hours Per Tank)	Initial Time out of Service (Hours Per Airplane)	Future Time out of Service (Hours Per Airplane)	First Year Labor Cost (Per Tank)	Annual Labor Cost (Per Tank)	PUMP WEAR Initial Inspections (Hours Per Tank)	Future Inspections (Hours Per Tank)	Initial Time out of Service (Hours Per Airplane)	Future Time out of Service (Hours Per Airplane)	First Year Labor Cost (Per Tank)
A300	0	0	0	0	$0	$0	2	2	0	0	$140
A310	0	0	0	0	$0	$0	2	2	0	0	$140
A320	0	0	0	0	$0	$0	2	2	0	0	$140
A330	0	0	0	0	$0	$0	2	2	0	0	$140
A340	0	0	0	0	$0	$0	2	2	0	0	$140
B707	8	8	5	5	$560	$112	2	2	0	0	$140
B727	8	8	5	5	$560	$112	2	2	0	0	$140
B737 series	0	0	0	0	$0	so	2	2	0	0	$140
B747 200 300	8	8	5	5	$560	$112	2	2	0	0	$140
B747-400	8	8	5	5	$560	$112	2	2	0	0	$140
B757	8	8	5	5	$560	$112	2	2	0	0	$140
B767	8	8	5	5	$560	$112	2	2	0	0	$140
B777	8	8	5	5	$560	$112	2	2	0	0	$140
DC8	8	8	5	5	$560	$112	2	2	0	0	$140
DC9	8	8	5	5	$560	$112	2	2	0	0	$140
DC10	8	8	5	5	$560	$112	2	2	0	0	$140
MD11	8	8	5	5	$560	$112	2	2	0	0	$140
MD80 sums	8	8	5	5	$560	$112	2	2	0	0	$140
MD90	8	8	5	5	$560	$112	2	2	0	0	$140
L 1011	8	8	5	5	$560	$112	2	2	0	0	$140
ME ATP	8	8	5	5	$560	$112	2	2	0	0	$140
ME 41	8	8	5	5	$560	$112	2	2	0	0	$140
BAE 146	8	8	5	5	$560	$112	2	2	0	0	$140
DHC 7	8	8	5	5	$560	$112	2	2	0	0	$140
DHC 8	8	8	5	5	$560	$112	2	2	0	0	$140
F 27	8	8	5	5	$560	$112	2	2	0	0	$140
F 28	6	6	4	4	$420	$84	2	2	0	0	$140
F 100	8	8	5	5	$560	$112	2	2	0	0	$140
SAAB 340	6	6	4	4	$420	$84	2	2	0	0	$140
ATR72	8	8	5	5	$560	$112	2	2	0	0	$140
ATR42	6	6	4	4	$420	$84	2	2	0	0	$140
EMB 145	6	6	4	4	$420	$84	2	2	0	0	$140
Shorts 360	6	6	4	4	$420	$84	2	2	0	0	$140
Dornier 328	6	6	4	4	$420	$84	2	2	0	0	$140
Brad CRJ	6	6	4	4	$420	$84	2	2	0	0	$140
EMB 120	6	6	4	4	$420	$84	2	2	0	0	$140

[Annual] Labor Cost (Per Tank)	FQIS WIRING Initial Inspections (Hours Per Tank)	Future Inspections (Hours Per Tank)	Initial Time out of Service (Hours Per airplane)	Future Time out of Service (Hours Per Airplane)	First Year Labor Cost (Per Tank)	Annual Labor Cost (Per Tank)	FQIS PROBES Initial Inspections (Hours Per tank)	Future Inspections (Hours Per Tank)	Initial Time out of Service (Hours Per Airplane)	Future Time out of Service (Hours Per Airplane)	First Year Labor Cost (Per Tank)	Annual Labor Cost (Per Tank)	FLAME ARRESTORS Initial Inspections (Hours Per Tank)	Future Inspections (Hours Per Tank)	Time out of Service (Hours Per Airplane)	Future Time out of Service (Hours Per Airplane)	First Year Labor Cost (Per Tank)	Annual Labor Cost (Per Tank)	Airplane Model	No. of Airplanes	TOTAL LABOR HOURS Total First Year Service Hours (Per Tank)
$28	0	0	0	0	$0	$0	0	0	0	0	$0	$0	0	0	0	0	$0	$0	A300	61	52
$28	0	0	0	0	$0	$0	0	0	0		$0	$0	0	0	0	0	$0	$0	A310	37	52
$28	0	0	0	5	--	$0	0	0	0	0	$0	$0	0	0	0	0	$0	$0	A320	145	5.
$28	0	0	0	5	$0	$0	0	0	0	0	$0	$0	0	0	0	0	$0	$0	A330	0	52
$28	0	0	0	5	$1,120	$1$0	0	0	0	0	$0	$0	0	0	0	0	$0	$0	A340	0	52
$28	16	12	7		$1,120		8	8	2	2	$560	$112	0	0	0	0	$0	so	B707	8	66
$28	16	12	7	5	$1,120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	B727	878	66
$28	16	12	7	5	$11[20]	$168	8	8	2	2	$560	$112		0	0	0	$0	$0	B737 series	1097	58
$28	16	12	7		$1,120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	B747-200 -300	206	66
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	B747 400	30	66
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	B757	467	66
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	B767	214	66
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	so	B777	12	66
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	DC8	181	50
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	DC9	472	50
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	DC 10	204	58
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	MD11	66	58
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	MD80 series	617	50
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	MD90	19	50
$28	16	12	7	5	$1 120	$168	8	8	2	2	$560	$112	0	0	0	0	$0	$0	L 1011	112	58
$28	12	8	6	4	$840	$112	4	4	1 25	1 25	$280	$56	0	0	0	0	$0	so	BAE ATP	10	34
$28	12	8	6	4	$840	$112	4	4	1 25	1 25	$280	$56	0	0	0	0	$0	$0	BAE 41	53	34
$28	12	8	6	4	$840	$112	5	5	1 5	1 5	$350	$70	0	0	0	0	$0	$0	BAE 146	26	43
$28	12	8	6	4	$840	$112	4	4	1 25	1 25	$280	$56	0	0	0	0	$0	$0	DHC 7	26	34
$28	12	8	6	4	$840	$112	4	4	1 25	1 25	$280	$56	0	0	0	0	$0	$0	DHC 8	152	34
$28	12	8	6	4	$840	$112	4	4	1 25	1 25	$280	$56	0	0	0	0	$0	$0	F 27	41	34
$28	32	12	14	5	$2 240	$168	4	4	1 25	1 25	$280	$56	0	0	a	0	$0	$0	F 28	67	60
$28	16	12	7	4	$1 120	$168	6	6	1 75	1 75	$420	$84	0	0	0	0	$0	$0	F 100	89	48
$28	8	5	4	3	$560	$70	4	4	1 25	1 25	$280	$56	0	0	0	0	$0	$0	SAAB 340	234	26
$28	12	12	6	4	$840	$168	6	6	1 75	1 75	$420	$84	0	0	0	0	$0	so	ATR72	51	36
$28	a	5	4	3	$560	$70	3	3	1	1	$210	$42	0	0	0	0	$0	so	ATR42	112	25
$28	8	5	4	3	$560	$70	3	3	1	1	$210	$42	0	0	0	0	$0	$0	EMB 145	5	25
$28	8	5	4	3	$560	$70	3	3	1	1	$210	$42	0	0	0	0	$0	$0	Shorts 360	59	25
$28	a'	5	4	3	$560	$70	3	3	1	1	$210	$42	0	0	0	0	$0	$0	Dornier 328	37	25
$28	8	5	4	3	$560	$70	3	3	1	1	$210	$42	0	0	0	0	$0	so	Brad CRJ		25
$28	8	5	4	3	$560	$70	3	3	1	1	$210	$42	0	0	0	0	$0	so	EMB 120	226	25
																			TOTAL	6006	

Total Annual Service Hours (Per Tank)	RK Total First Year RK (Hours Per Tank)	Total Annual RK (Hours Per Tank)	Total First Year RK Cost (Per Tank)	Total Annual RK Cost (Per Tank)	Total First Year Labor & RK (Hours Per Tank)	Total Annual Labor & RK (Hours Per Tank)	Total First Year Labor & RK (Hours Per Airplane)	Total Annual Labor & RK (Hours Per Airplane)	Airplane Model	No of Airplanes	ALL COST AREAS LABOR COSTS First Year Total Labor Cost (Per Tank)	First Year Total Labor Cost (Per Airplane)	First Year Total Labor Cost (All Airplanes)	First Year Total Labor Cost (All Airplanes)	Total Annual Labor Cost (Per Tank)	Total Annual Labor Cost (Per Airplane)	Total Annual Labor Cost (All Airplanes)	Present Value Total Cost (All Airplanes)	Annualized Total Cost (All Airplanes)	LABOR & RK COST First Year Total Labor & RK Cost (Per Tank)
38	7	4	$455	$266	59	42	59	25	A300	51	$3,640	$3,640	$185,640	$185,640	$532	$1,596	$81,396	$845,261	$120,346	$4,09
38	7	4	$455	$266	59	42	59	25	A310	37	$3,640	$3,640	$134,680	$134,680	$532	$1,596	$59,052	$613,228	$87,310	$4,09
38	7	4	$455	$266	59	42	59	25	A320	145	$3,640	$3,640	$527,800	$527,800	$532	$1,596	$231,420	$2,403,192	$342,160	$4,09
38	7	4	$455	$266	59	42	59	25	A330	0	$3,640	$3,640	$0	$0	$532	$1,596	$0	$0	$0	$4,09
38	7	4	$455	$266	59	42	59	25	A340	0	$3,640	$3,640	$0	$0	$532	$1,596	$0	$0	$0	$4,09
54	8	5	$578	$378	74	59	124	59	B707	8	$4,620	$7,700	$61,600	$61,600	$756	$3,780	$30,240	$294,692	$41,957	$5,19
54	8	5	$578	$378	74	59	74	36	B727	878	$4,620	$4,620	$4,056,360	$4,056,360	$756	$2,268	$1,991,304	$19,405,446	$2,762,899	$5,19
46	7	5	$508	$322	65	51	65	30	B737 series	1097	$4,060	$4,060	$4,453,820	$4,453,820	$644	$1,932	$2,119,404	$21,012,052	$2,991,644	$4,56
54	8	5	$578	$378	74	59	173	83	B747-200, 300	206	$4,620	$10,780	$2,220,680	$2,220,680	$756	$5,292	$1,090,152	$10,623,634	$1,512,567	$5,19
54	8	5	$578	$378	74	59	198	95	B747-400	30	$4,620	$12,320	$369,600	$369,600	$756	$6,048	$181,440	$1,768,150	$251,745	$5,19
54	8	5	$578	$378	74	59	74	36	B757	467	$4,620	$4,620	$2,157,540	$2,157,540	$756	$2,268	$1,059,156	$10,321,575	$1,469,560	$5,19
54	8	5	$578	$378	74	59	74	36	B767	214	$4,620	$4,620	$988,680	$988,680	$756	$2,268	$485,352	$4,729,801	$673,417	$5,19
54	8	5	$578	$378	74	59	74	36	B777	12	$4,620	$4,620	$55,440	$55,440	$756	$2,268	$27,216	$265,222	$37,762	$5,19
40	6	4	$438	$280	56	44	56	26	DC8	181	$3,500	$3,500	$633,500	$633,500	$560	$1,680	$304,080	$3,000,233	$427,166	$3,93
40	6	4	$438	$280	56	44	56	26	DC9	472	$3,500	$3,500	$1,652,000	$1,652,000	$560	$1,680	$792,960	$7,823,812	$1,113,935	$3,93
46	7	5	$508	$322	65	51	109	51	DC10	204	$4,060	$6,767	$1,380,400	$1,380,400	$644	$3,220	$656,880	$6,512,395	$927,219	$4,56
46	7	5	$508	$322	65	51	87	40	MD11	66	$4,060	$5,413	$357,280	$357,280	$644	$2,576	$170,016	$1,685,561	$239,986	$4,56
40	6	4	$438	$280	56	44	56	26	MD80 series	617	$3,500	$3,500	$2,159,500	$2,159,500	$560	$1,680	$1,036,560	$10,227,313	$1,456,139	$3,93
40	6	4	$438	$280	56	44	56	26	MD90	19	$3,500	$3,500	$66,500	$66,500	$560	$1,680	$31,920	$314,942	$44,841	$3,93
46	7	5	$508	$322	65	51	65	30	L 1011	112	$4,060	$4,060	$454,720	$454,720	$644	$1,932	$216,384	$2,145,260	$305,437	$4,56
27	4	3	$298	$189	38	30	26	12	BAE ATP	10	$2,380	$1,587	$15,867	$15,867	$378	$756	$7,560	$74,898	$10,664	$2,67
27	4	3	$298	$189	38	30	26	12	BAE 41	53	$2,380	$1,587	$84,093	$84,093	$378	$756	$40,068	$396,957	$56,518	$2,67
33	5	3	$376	$231	48	36	48	22	BAE 146	26	$3,010	$3,010	$78,260	$78,260	$462	$1,386	$36,036	$363,911	$51,813	$3,38
27	4	3	$298	$189	38	30	26	12	DHC 7	26	$2,380	$1,587	$41,253	$41,253	$378	$756	$19,656	$194,734	$27,726	$2,67
27	4	3	$298	$189	38	30	26	12	DHC 8	152	$2,380	$1,587	$241,173	$241,173	$378	$756	$114,912	$1,138,443	$162,089	$2,67
27	4	3	$298	$189	38	30	26	12	F 27	41	$2,380	$1,587	$65,053	$65,053	$378	$756	$30,996	$307,080	$43,721	$2,67
[illegible]	8	3	$525	$238	68	37	45	15	F 28	67	$4,200	$2,800	$187,600	$187,600	$476	$952	$63,784	$772,924	$110,047	$4,72
38	6	4	$420	$266	54	42	36	17	F100	89	$3,360	$2,240	$199,360	$199,360	$532	$1,064	$94,696	$939,776	$133,803	$3,78
21	3	2	$228	$147	29	23	20	9	SAAB 340	234	$1,820	$1,213	$283,920	$283,920	$294	$588	$137,592	$1,350,400	$192,267	$2,04
33	5	3	$315	$231	41	36	27	15	ATR72	51	$2,520	$1,680	$85,680	$85,680	$462	$924	$47,124	$432,162	$61,530	$2,83
20	3	2	$219	$140	28	22	19	9	ATR42	112	$1,750	$1,167	$130,667	$130,667	$280	$560	$62,720	$618,833	$88,108	$1,96
20	3	2	$219	$140	28	22	19	9	EMB 145	5	$1,750	$1,167	$5,833	$5,833	$280	$560	$2,800	$27,626	$3,933	$1,96
20	3	2	$219	$140	28	22	19	9	Shorts 360	59	$1,750	$1,167	$68,833	$68,833	$280	$560	$33,040	$325,992	$46,414	$1,96
20	3	2	$219	$140	28	22	19	9	Dornier 328	37	$1,750	$1,167	$43,167	$43,167	$280	$560	$20,720	$204,436	$29,107	$1,96
20	3	2	$219	$140	28	22	19	9	Brad CRJ	2	$1,750	$1,167	$2,333	$2,333	$280	$560	$1,120	$11,051	$1,573	$1,96
20	3	2	$219	$140	28	22	19	9	EMB 120	226	$1,750	$1,167	$263,667	$263,667	$280	$560	$126,560	$1,248,716	$177,789	$1,96
									TOTAL	8006			$23,712,500	$23,712,500			$11,404,316	$112,399,708	$16,003,190	
									TOTAL					$23,712,500			$11,404,316	$112,399,708	$16,003,190	
									TOTAL MINUS B 747					$21,122,220			$10,132,724	$100,007,924	[illegible]	

...st Year ...tal ...bor & ...K Cost ...er	Total Annual Labor & RK Cost (Per	Total Annual Labor & RK Cost (Per Airplane)	Airplane Model	No. of Airplanes	OUT OF SERVICE LOST NET REVENUE First-Year Time out of Service (Hours Per Airplane)	Annual Time out of Service (Hours Per Airplane)	Total First Year Lost Net Revenue (Per Airplane)	Total Annual Lost Net Revenue (Per Airplane)	Total First Year Lost Net Revenue (All Airplanes)	Total Annual Lost Net Revenue (All Airplanes)	P V Total Lost Net Revenue (All Airplanes)	Annualized Total Lost Net Revenue (All Airplanes)	First Year Total Cost and Lost Net Revenue (Per Airplane)	First Year Total Cost and Lost Net Revenue (All Airplanes)	Total Annual Cost and Lost Net Revenue (Per	Total Annual Cost and Lost Net Revenue (All Airplanes)	First Year Labor Cost (Per Airplane)	Annual Labor Cost Per Airplane	P V Labo... Cost (Per Airplane)
$4 095	$798	$2 394	A300	51	24	16	$1 591	$636	$81,152	$32,461	$421,626	$60 030	$5,686	$289 997	$3 985	$203 246	$3 640	$532	$13,49
$4 095	$798	$2,394	A310	37	24	16	$2 059	$824	$76 188	$30,475	$395,837	$56 358	$6,154	$227 703	$4,453	$164 766	$3 640	$532	$13 49
$4 095	$798	$2 394	A320	145	24	16	$2 038	$815	$295,549	$118 220	$1,535,528	$218 625	$6 133	$889 324	$4 432	$642 679	$3,640	$532	$13 49
$4 095	$798	$2 394	A330	0	24	16	$4,884	$1,954	so	$0	$0	so	$8 979	so	$7 278	$0	$3,640	$532	$13 49
$4 095	$798	$2,394	A340	0	24	21	$5,282	$2,773	so	$0	so	so	$9 377	$0	$7 676	$0	$3,640	$532	$13 49
$8 663	$1,134	$5 670	B707	8	32	25	$64	$30	$511	$240	$2 863	$408	$8,726	$69 811	$6,734	$45 871	$7,700	$756	$26,38
$5 198	$1,134	$3,402	B727	878	32	25	$260	$122	$228 582	$107,148	$1,279 707	$182 201	$5,458	$4 791 987	$3 662	$3 215 538	$4 620	$756	$17,60
$4,568	$966	$2,898	B737 series	1097	27	20	$1,393	$619	$1 528,039	$679,129	$8,338 984	$1,186 999	$5,960	$6,538 587	$4,291	$4 707 145	$4 060	$644	$15 35
$12 128	$1,134	$7,938	B747 200,-300	206	32	25	$2,450	$1 148	$504,684	$236,571	$2,825 450	$402,281	$14 577	$3,002,949	$10,388	$2 139 912	$10 780	$756	$35 16
$13,860	$1,134	$9 072	B747-400	30	32	25	$10,192	$4 777	$305 749	$143,320	$1,711 725	$243,711	$24,052	$721,549	$19,264	$577 909	$12 320	$756	$39 55
$5 198	$1 134	$3,402	B757	467	32	25	$3 134	$1,469	$1 463 510	$686 020	$8,193 397	$1,166 555	$8 331	$3,890 743	$6,536	$3 052,244	$4 620	$756	$17,60
$5 198	$1 134	$3 402	B767	214	32	25	$4,280	$2 006	$915,932	$429,343	$5 127,805	$730 084	$9 478	$2,028,197	$7 682	$1,643 960	$4 620	$756	$17,60
$5 198	$1 134	$3,402	B777	12	32	25	$9 704	$4 549	$116,449	$54,586	$651,938	$92 821	$14,902	$178,819	$13,108	$157 273	$4,620	$756	$17 60
$3 938	$840	$2 520	DC8	181	20	16	$968	$465	$175 188	$84,090	$992,331	$141,286	$4,905	$887,875	$3,488	$631 308	$3 500	$560	$13 261
$3 938	$840	$2 520	DC9	472	m	16	$181	$87	$85,385	$40 985	$483 655	$68 862	$4 118	$1,943,885	$2 701	$1 274 825	$3 500	$560	$13 261
$7 613	$966	$4 830	DC10	204	24	19	$874	$415	$178 285	$84,685	$1 004 651	$143,040	$8,486	$1 731,235	$5,704	$1 163 605	$6 767	$644	$23,06
$6,090	$966	$3,864	MD11	66	24	19	$4 861	$2 309	$320 838	$152,398	$1 807,952	$257 412	$10,951	$722,778	$8 725	$575 862	$5 413	$644	$19 20
$3 938	$840	$2 520	MD80 series	617	20	16	$986	$473	$608 390	$292,027	$3,446,158	$490 655	$4,924	$3,037,827	$3,506	$2 163 230	$3,500	$560	$13,261
$3 938	$840	$2,520	MD90	19	20	16	$1,811	$869	$34,414	$16 519	$194 934	$27,754	$5 749	$109,227	$4,331	$82,294	$3 500	$560	$13 261
$4,568	$966	$2,898	L 1011	112	24	19	$296	$141	$33,130	$15 737	$186,693	$26,581	$4,863	$544,690	$3,194	$357 706	$4,060	$644	$15,350
$1 785	$567	$1 134	BAE ATP	10	15 25	12 25	$186	$90	$1,864	$899	$10,583	$1,507	$1 971	$19 714	$1,320	$13 204	$1 587	$378	$6 739
$1 785	$567	$1 134	BAE 41	53	15 25	12 25	$168	$81	$8,891	$4,285	$50,467	$7 185	$1,953	$103,498	$1,302	$68,993	$1 587	$378	$6,739
$3 386	$693	$2 079	BAE 146	26	18 5	14 5	$496	$233	$12 893	$6 063	$72 298	$10 294	$3,882	$100 938	$2 575	$66 947	$3 010	$462	$11 29
$1 785	$567	$1,134	DHC 7	26	15 25	12 25	$71	$34	$1 838	$886	$10,430	$1,485	$1 856	$48,248	$1 205	$31 322	$1 587	$378	$6 739
$1 785	$567	$1,134	DHC 8	152	15 25	12 25	$269	$129	$40 824	$19,676	$231,716	$32 991	$2,054	$312 144	$1,403	$213,192	$1 587	$378	$6 739
$1 785	$567	$1 134	F 27	41	15 25	12 25	$37	$18	$1 532	$738	$8 697	$1,238	$1,822	$74,717	$1 171	$48 026	$1 587	$378	$6 739
$3 156	$714	$1 428	F 28	67	25 25	14 25	$130	$44	$8,743	$2,961	$42,279	$6,020	$3,280	$219,793	$1 558	$104 419	$2,800	$476	$10 77
$2,520	$798	$1 596	F 100	89	19 75	14 75	$752	$337	$66,952	$30,001	$368,727	$52,214	$3,272	$291,232	$2,348	$208 996	$2,240	$532	$9 50
$1,365	$441	$882	SAAB 340	234	11 75	I0	$151	$78	$35,299	$18,218	$207,420	$29,532	$1,516	$354 709	$1,033	$241,687	$1 213	$294	$5 18
$1,890	$693	$1 386	ATR72	51	15 75	13	$394	$195	$20,089	$9,966	$115,631	$16,463	$2,284	$116,459	$1,780	$90,755	$1,680	$462	$7 49
$1,313	$420	$840	ATR42	112	11 5	10	$230	$118	$25,777	$13,257	$151 188	$21,526	$1,543	$172,777	$1,070	$119,857	$1 167	$280	$4,967
$1,313	$420	$840	EMB 145	5	11 5	10	$368	$189	$1,838	$945	$10,780	$1,535	$1,680	$8,400	$1 208	$6,038	$1 167	$280	$4,967
$1 313	$420	$840	Shorts 360	59	11 5	10	$39	$20	$2,309	$1 187	$13,541	$1,928	$1,352	$79,746	$879	$51 869	$1 167	$280	$4 967
$1 313	$420	$840	Dornier 328	37	11 5	10	$220	$113	$8 126	$4,179	$47,663	$6,786	$1,532	$56,689	$1,060	$39 208	$1 167	$280	$4 967
$1 313	$420	$840	Brad CRJ	2	11 5	10	$441	$227	$882	$454	$5,174	$737	$1,754	$3,507	$1,281	$2,562	$1 167	$280	$4 967
$1,313	$420	$840	EMB 120	226	11 5	10	$139	$72	$31,499	$16 199	$184,750	$26,304	$1,452	$328,124	$979	$221 339	$1 167	$280	$4 967
			TOTAL	6008					$7,221 315	$3,333 868	$40,128,576	$5,713,407		$33,897,877		$24,327 789			
			TOTAL						$7 221 315	$3,333,868	$40 128,576	$5 713,407		$33,897,877		$24 327 789			
			TOTAL MINUS 0 747						$6 410 881	$2 953,978	$35,591,402	$5,067,415		$30,173 379		$21,609 967			

Annualized Labor Cost (Per Airplane)	First Year Out of Service Cost (Per Airplane)	Annual Out of Service Cost (Per Airplane)	P V Out of Service Cost (Per Airplane)	Annualized Out of Service Cost (Per Airplane)	Airplane Model
$1,922	$1,591	$636	$8,267	$1,177	A300
$1,922	$2,059	$824	$10,698	$1,523	A310
$1,922	$2,038	$815	$10,590	$1,508	A320
$1,922	$4,884	$1,954	$25,375	$3,613	A330
$1,922	$5,282	$2,773	$31,310	$4,458	A340
$3,757	$64	$30	$358	$51	B707
$2,506	$260	$122	$1,458	$208	B727
$2,186	$1,393	$619	$7,600	$1,082	B737 series
$5,007	$2,450	$1,148	$13,718	$1,953	B747-200,-300
$5,632	$10,192	$4,777	$57,057	$8,124	B747-400
$2,506	$3,134	$1,469	$17,545	$2,498	B757
$2,506	$4,280	$2,006	$23,962	$3,412	B767
$2,506	$9,704	$4,549	$54,328	$7,735	B777
$1,886	$968	$465	$5,482	$781	DC8
$1,888	$181	$87	$1,025	$146	DC9
$3,284	$874	$415	$4,925	$701	DC10
$2,735	$4,881	$2,309	$27,393	$3,900	MD11
$1,888	$986	$473	$5,585	$795	MD80 series
$1,888	$1,811	$869	$10,260	$1,461	MD90
$2,186	$298	$141	$1,667	$237	L 1011
$960	$186	$90	$1,058	$151	BAE ATP
$960	$168	$81	$952	$136	BAE 41
$1,607	$498	$233	$2,781	$398	BAE 146
$960	$71	$34	$401	$57	DHC 7
$960	$269	$129	$1,524	$217	DHC 8
$960	$37	$18	$212	$30	F 27
$1,534	$130	$44	$631	$90	F 28
$1,353	$752	$337	$4,121	$587	F100
$738	$151	$78	$886	$126	SAAB 340
$1,087	$394	$195	$2,267	$323	ATR72
$707	$230	$118	$1,350	$192	ATR42
$707	$368	$189	$2,156	$307	EMB 145
$707	$39	$20	$230	$33	Shorts 360
$707	$220	$113	$1,288	$183	Dornier 328
$707	$441	$227	$2,587	$368	Brad CRJ
$707	$139	$72	$817	$116	EMB 120
					TOTAL
					TOTAL
					TOTAL MINUS B-747

Airplane Model	No of Airplanes	First Year RC (Per Airplane)	First Year RC (All Airplanes)	Annual RC (Per Airplane)	Annual RC (All Airplanes)	P V RC (Per Airplane)	P V RC (All Airplanes)	Annualized RC (Per Airplane)	Annualized RC (All Airplanes)
A300	51	$455	$23,205	$266	$13,566	$2,856	$145,670	$407	$20,740
A310	37	$455	$16,835	$266	$9,842	$2,856	$105,682	$407	$15,047
A320	145	$455	$65,975	$266	$38,570	$2,856	$414,161	$407	$58,987
A330	0	$455	$0	$266	$0	$2,856	$0	$407	$0
A340	0	$455	$0	$266	$0	$2,856	$0	$407	$0
B707	8	$963	$7,700	$630	$5,040	$6,437	$51,493	$916	$7,331
B727	878	$578	$507,045	$378	$331,884	$3,862	$3,390,810	$550	$482,775
B737 series	1097	$508	$556,728	$322	$353,234	$3,334	$3,657,593	$475	$520,759
B747-200,-300	206	$1,348	$277,585	$882	$181,692	$9,011	$1,856,321	$1,283	$264,298
B747-400	30	$1,540	$46,200	$1,008	$30,240	$10,299	$308,958	$1,466	$43,989
B757	467	$578	$269,693	$378	$176,526	$3,862	$1,803,540	$550	$256,784
B767	214	$578	$123,585	$378	$80,892	$3,862	$826,462	$550	$117,670
B777	12	$578	$6,930	$378	$4,536	$3,862	$46,344	$550	$6,598
DC8	181	$438	$79,188	$280	$50,680	$2,888	$522,807	$411	$74,436
DC9	472	$438	$206,500	$280	$132,160	$2,888	$1,363,343	$411	$194,109
DC10	204	$846	$172,550	$537	$109,480	$5,557	$1,133,620	$791	$161,402
MD11	66	$677	$44,660	$429	$28,336	$4,446	$293,408	$633	$41,775
MD80 series	617	$438	$269,938	$280	$172,760	$2,888	$1,782,167	$411	$253,740
MD90	19	$438	$8,313	$280	$5,320	$2,888	$54,880	$411	$7,814
L 1011	112	$508	$56,840	$322	$36,064	$3,334	$373,428	$475	$53,166
BAE ATP	10	$198	$1,983	$126	$1,260	$1,304	$13,040	$186	$1,857
BAE 41	53	$198	$10,512	$126	$6,678	$1,304	$69,110	$186	$9,840
BAE 146	26	$376	$9,783	$231	$6,006	$2,427	$63,092	$345	$8,983
DHC 7	26	$198	$5,157	$126	$3,276	$1,304	$33,903	$186	$4,827
DHC 8	152	$198	$30,147	$126	$19,152	$1,304	$198,201	$186	$28,219
F 27	41	$198	$8,132	$126	$5,166	$1,304	$53,462	$186	$7,612
F 28	67	$350	$23,450	$159	$10,631	$1,928	$129,165	$274	$18,390
F100	89	$280	$24,920	$177	$15,783	$1,838	$163,552	$262	$23,286
SAAB 340	234	$152	$35,490	$98	$22,932	$1,007	$235,590	$143	$33,543
ATR72	51	$210	$10,710	$154	$7,854	$1,501	$76,566	$214	$10,902
ATR42	112	$146	$16,333	$93	$10,453	$963	$107,835	$137	$15,353
EMB 145	5	$146	$729	$93	$467	$963	$4,814	$137	$685
Shorts 360	59	$146	$8,604	$93	$5,507	$963	$56,806	$137	$8,088
Dornier 328	37	$146	$5,396	$93	$3,453	$963	$35,624	$137	$5,072
Brad CRJ	2	$146	$292	$93	$187	$963	$1,926	$137	$274
EMB 120	226	$146	$32,958	$93	$21,093	$963	$217,596	$137	$30,981
TOTAL	6006		#########		$1,900,719		#########		$2,789,313
TOTAL			#########		$1,900,719		#########		$2,789,313
TOTAL MINUS B-747			#########		$1,688,787		#########		$2,481,026

TOTAL COST FOR RULES

Airplane Model	No of Airplanes	First Year Total Cost (Per Airplane)	Annual Total Cost (Per Airplane)	P V Total Cost (Per Airplane)	Annualized Total Cost (Per Airplane)	First Year Total Cost (All Airplanes)
A300	51	$5,686	$1,434	$24,620	$3,506	$287,98
A310	37	$6,154	$1,622	$27,051	$3,851	$227,70
A320	145	$6,133	$1,613	$26,942	$3,836	$889,32
A330	0	$8,979	$2,752	$41,727	$5,941	$
A340	0	$9,377	$3,571	$47,663	$6,786	$
B707	8	$8,726	$1,416	$33,179	$4,724	$69,81
B727	878	$5,458	$1,256	$22,923	$3,264	$4,791,96
B737 series	1097	$5,960	$1,585	$26,264	$3,742	$6,538,58
B747-200,-300	206	$14,577	$2,786	$57,893	$8,243	$3,002,94
B747-400	30	$24,052	$6,541	########	$15,222	$721,54
B757	467	$8,331	$2,603	$39,010	$5,554	$3,890,74
B767	214	$9,478	$3,140	$45,427	$6,468	$2,028,19
B777	12	$14,902	$5,683	$75,793	$10,791	$178,61
DC8	181	$4,905	$1,305	$21,632	$3,080	$887,87
DC9	472	$4,118	$927	$17,174	$2,445	$1,943,88
DC10	204	$8,486	$1,598	$33,549	$4,777	$1,731,23
MD11	66	$10,951	$3,382	$51,047	$7,268	$722,77
MD80 series	617	$4,924	$1,313	$21,735	$3,095	$3,037,82
MD90	19	$5,749	$1,709	$26,409	$3,760	$109,22
L 1011	112	$4,863	$1,107	$20,351	$2,898	$544,69
BAE ATP	10	$1,971	$594	$9,101	$1,296	$19,71
BAE 41	53	$1,953	$585	$8,995	$1,281	$103,49
BAE 146	26	$3,882	$926	$16,497	$2,349	$100,93
DHC 7	26	$1,856	$538	$8,444	$1,202	$48,24
DHC 8	152	$2,054	$633	$9,568	$1,362	$312,14
F 27	41	$1,822	$522	$8,255	$1,175	$74,71
F 28	67	$3,280	$679	$13,332	$1,898	$219,79
F100	89	$3,272	$1,046	$15,463	$2,202	$291,23
SAAB 340	234	$1,516	$470	$7,076	$1,007	$354,70
ATR72	51	$2,284	$811	$11,266	$1,604	$116,45
ATR42	112	$1,543	$492	$7,280	$1,037	$172,777
EMB 145	5	$1,680	$582	$8,086	$1,151	$8,400
Shorts 360	59	$1,352	$393	$6,160	$877	$79,746
Dornier 328	37	$1,532	$486	$7,218	$1,028	$56,689
Brad CRJ	2	$1,754	$600	$8,517	$1,213	$3,507
EMB 120	226	$1,452	$445	$6,748	$961	$328,124
TOTAL	6006					#########
MANUAL CHANGES						$1,156,000
TOTAL						#########
TOTAL MINUS B-747						#########

nnual Total ost (All rplanes)	P V TOW Cost (AU Airplanes)	Annualized Total Cost (All Airplanes)	TOTAL COST FOR BOTH SFAR AND RULES Airplane Model	No of Airplanes	First Year Total Cost (AU Airplanes)	Annual Total Cost (All Airplanes)	P V Total Cost (All Airplanes)	Annualized Total Cost (/ Airplanes)
$73 159	$1,255,600	$178.769	A300	51	$289.997	$127.423	$1 412 557	$201 11(
$60 001	$1 000,876	$142 502	A310	35	$227.703	$99 369	$1114 747	$158.71!
$233 930	$3,906.629	$556.216	A320	140	$889.324	$388.210	$4352 880	$619.75:
$0	$0	SO	A330	-	$0	$0	$0	$(
$0	S0	SO	A340	0	$0	$0	$0	$(
$11 328	$265.433	$37.792	B707	8	$69.811	$35 520	$349 048	$49.69
;1 102 800	$20 126,042	$2,865.496	B727	878	$4.791.987	$2.430 336	$24 075.963	$3.427.87!
;1 738 831	$28 833.575	$4 105.252	B737 series	1097	$6.538,587	$3,151 767	$33 006.630	$4.699 40:
$573 999	$11,925 979	$1,697 991	B747 200, 300	206	$3 002.949	$1.508 415	$15.305.405	$2 179 14!
$198,240	$3,207 386	$456.660	B747-400	30	$721 549	$355.000	$3 788 832	$539.44!
;1.215.598	$18,217.587	$2.593.775	B757	467	$3.890,743	$1,921 702	$20.318.513	$2.892 89(
$672.019	$9,721,331	$1.384.099	B767	214	$2.028.197	$995.587	$10 684 068	$1 521 17
$68.194	$909.517	$129.495	B777	12	$178 819	$86 338	$963.502	$137 18
$236 130	$3.915.398	$557.464	DC8	181	$887 875	$438 850	$4.515.371	$642 88,
$437.465	$8 108 233	$1 154 145	DC9	472	$1 943 885	$966 105	$9 670 810	$1.376.90(
$325 541	$6 843.959	$974.426	DC10	204	$1 731 235	$851 045	$8.650.667	$1 231,66(
$223.238	$3 369.125	$479.688	MD11	66	$722 778	$350.750	$3 786.921	$539 17:
$810.307	$13.410.418	$1.909.342	MD80 series	617	$3.037.827	$1.501.347	$15.455.638	$2 200.53!
$32 479	$501.775	$71.442	MD90	19	$109 227	$53 759	$564 756	$80.40!
$123.929	$2 279.326	$324.525	L 1011	112	$544 690	$268 185	$2.705.380	$385 18!
$5.939	$91.014	$12.958	BAE ATP	10	$19 714	$9 719	$98.520	$14 02/
$30.997	$476.756	$67.879	BAE 41	53	$103.496	$51.031	$516.534	$73.54:
. $24.081	$428.921	$61 069	'ME 146	26	$100 936	$48 105	$499 301	$71.08!
$13.990	$219.553	$31.259	DHC 7	26	$48.248	$23.818	$239.067	$34 03(
$96.284	$1.454.281	$207.057	DHC 8	152	$312 144	$153 740	$1.568.360	$223.29!
$21.402	$338.467	$48.190	F 27	41	$74 717	$36.900	$369.239	$52 571
$45.488	$893.234	$127.176	F 28	67	$219 793	$77 375	$944.369	$134 457
$93 132	$1 376,185	$195.938	F100	89	$291 232	$140.480	$1.470.055	$209 303
$109 946	$1.655.713	$235.736	SAAB 340	234	$354 709	$178 742	$1 793.410	$255 341
$41.382	$574.580	$81.807	ATR72	51	$116 459	$64.944	$624.361	$88.895
$55.070	$815.371	$116 090	ATR42	112	$172 777	$86.430	$877.856	$124 987
$2.812	$40.431	$5.756	EMB 145	5	$8.400	$4 212	$43.220	$6 154
$23.214	$363.423	$51.743	Shorts 360	59	$79 746	$39 734	$396.339	$56 430
$17.993	$267.081	$38.026	Dornier 328	37	$56 689	$28 353	$287.723	$40.965
$1.200	$17.035	$2.425	Brad CRJ		$3 507	$1 760	$18.151	$2.584
$100.573	$1.524.975	$217 122	EMB 120	226	$328 124	$163.853	$1.651 061	$235.074
$8.818.686	$148,333.207	$21 119.312	TOTAL	6006	$33 897.877	$16 638.904	$172 119.254	$24 505.910
$0	$1 156.000	$164 588	I MANUAL CHANGES		$1.156.000	$0	$1 156.000	$164.588
$8.818.686	$149.489.207	$21.283.900	TOTAL		$35.053 877	$16 638.904	$173 275.254	$24 670 498
			TOTAL PLUS TC 'AND STC COSTS		$49 479 477	$16.853 704	$189 209 519	$26 939 179
$8 048 447	$134.355 842	$19 129 249	TOTAL MINUS B 747		$45 754 979	$14 990 289	$170 1 15 282	$24 220 589
			TOTAL MINUS B 747		$31 329 379	$14 775 489	$154 181 017	$2 1 951.908

APPENDIX C

TABLES FOR OPERATOR'S COST AND LOST REVENUE BY THE NUMBER OF AFFECTED AIRPLANES OPERATED

TABLE C-1

COMPLIANCE COSTS FOR OPERATORS WITH 1 TO 4 AFFECTED AIRPLANES

Airplane Model	No. of Airplanes	First Year Total Cost (All Airplanes)	Annual Total Cost (All Airplanes)	P.V. Total Cost (All Airplanes)	Annualized Total Cost (All Airplanes)
A300	0	SO	SO	$0	$0
A310	0	SO	SO	$0	$0
A320	0	$0	SO	SO	SO
A330	0	$0	SO	$0	$0
A340	0	SO	SO	$0	$0
B707	5	$43,632	$7,080	$165,895	$23,620
B727	34	$185,567	$42,705	$779,368	$110,965
B737 series	10	$59,604	$15,851	$262,840	$37,423
B747-200, 300	0	SO	SO	SO	SO
B747-400	0	SO	$0	SO	$0
B757	5	$41,657	$13,015	$195,049	$27,771
B767	0	SO	SO	$0	SO
B777	0	$0	SO	SO	SO
DC8	3	$14,716	$3,914	$64,896	$9,240
DC9	7	$28,829	$6,488	$120,220	$17,117
DC10	0	$0	SO	$0	$0
MD11	0	SO	SO	SO	SO
MD80 series	2	$9,847	$2,627	$43,470	$6,189
MD90	0	SO	SO	SO	SO
BAE 1011	0	SO	$0	SO	$0
	0	$0	SO	$0	SO
BAE 41	1	$1,953	$585	$8,995	$1,281
BAE 146	0	$0	$0	$0	SO
DHC 7	2	$3,711	$1,076	$16,889	$2,405
DHC 8	4	$8,214	$2,534	$38,271	$5,449
F 27	7	$12,757	$3,654	$57,787	$8,228
F 28	0	SO	SO	SO	SO
F100	0	SO	SO	SO	SO
SAAB 340	3	$4,548	$1,410	$21,227	$3,022
ATR72	0	SO	SO	SO	SO
ATR42	3	$4,628	$1,475	$21,840	$3,110
EMB 145	0	SO	SO	SO	SO
Shorts 360	7	$9,461	$2,754	$43,118	$6,139
Dormer 328	0	$0	SO	$0	SO
Brad CRJ	0	$0	$0	$0	$0
EMB 120	0	SO	SO	SO	SO
TOTAL	93	$429,124	$105,167	$1,839,866	$261,955
MANUAL CHANGES		$216,000	SO	$216,000	$30,754
TOTAL WITH MANUAL CHANGES		$645,124	$105,167	$2,055,866	$292,709
TOTAL PLUS STC COSTS					
TOTAL MINUS B-747		$645,124	$105,167	$2,055,866	$292,709

TABLE C-2

COMPLIANCE COSTS FOR OPERATORS WITH 5 TO 9 AFFECTED AIRPLANES

Airplane Model	No. of Airplanes	* First Year Total Cost (All Airplanes)	Annual Total Cost (All Airplanes)	P V. Total Cost (All Airplanes)	Annualized Total Cost (All Airplanes)
A300	0	SO	SO	SO	SO
A310	0	SO	SO	S O	SO
A320	0	$0	SO	$0	SO
A330	0	SO	$0	SO	$0
A340	0	SO	SO	SO	SO
B707	0	$0	SO	SO	SO
B727	16	$87,326	$20,097	$366,762	$52,219
B737 series	22	$131,129	$34,872	$578,249	$82,330
B747-200,-300	8	$116,619	$22,291	$463,145	$65,941
B747-400	0	SO	SO	SO	SO
B757	0	SO	SO	$0	SO
B767	0	SO	SO	SO	$0
B777	0	SO	SO	SO	SO
DC8	16	$78,486	$20,873	$346,112	$49,279
DC9	12	$49,421	$11,122	$206,091	$29,343
DC10	0	SO	SO	SO	SO
MD11	0	SO	SO	SO	SO
MD80 series	2	$9,847	$2,627	$43,470	$6,189
MD90	0	SO	SO	SO	SO
L 1011	1	$4,863	$1,107	$20,351	$2,898
BAE ATP	5	$9,857	$2,969	$45,507	$6,479
BAE 41	0	$0	SO	SO	$0
BAE 146	0	SO	SO	SO	$0
DHC 7	9	$16,701	$4,843	$75,999	$10,821
DHC 8	9	$18,482	$5,701	$86,109	$12,260
F 27	0	SO	SO	SO	SO
F 28	0	SO	SO	SO	SO
F100	0	SO	SO	SO	SO
SAAB 340	0	SO	SO	SO	SO
ATR72	0	SO	SO	SO	SO
ATR42	0	SO	SO	SO	SO
EMB 145	0	SO	SO	SO	SO
Shorts 360	13	$17,571	$5,115	$80,076	$11,401
Dornier 328	0	SO	SO	SO	SO
Brad CRJ	0	SO	SO	SO	SO
EMB 120	0	SO	SO	$0	SO
TOTAL	113	$540,303	$131,616	$2,311,870	$329,158
MANUAL CHANGES		$80,000	SO	$80,000	$11,390
TOTAL WITH MANUAL CHANGES		$620,303	$131,616	$2,391,870	$340,549
TOTAL PLUS STC COSTS					
TOTAL MINUS B-747		$503,684	$109,325	$1,928,725	$274,607

TABLE C-3					
COMPLIANCE COSTS FOR OPERATORS WITH 10 TO 19 AFFECTED AIRPLANES					
Airplane Model	No. of Airplanes	First Year Total Cost (All Airplanes)	Annual Total Cost (All Airplanes)	P.V. Total Cost (All Airplanes)	Annualized Total Cost (All Airplanes)
A300	0	$0	$0	$0	$0
A310	0	$0	$0	$0	$0
A320	0	$0	$0	$0	$0
A330	0	$0	$0	$0	$0
A340	0	$0	$0	$0	$0
B707	0	$0	$0	$0	$0
B727	52	$283,808	$202,906	$1,998,397	$284,527
B737 series	36	$214,575	$138,207	$1,421,807	$202,433
B747-200,-300	34	$495,632	$338,926	$3,399,542	$484,018
B747-400	0	$0	$0	$0	$0
B757	0	$0	$0	$0	$0
B767	0	$0	$0	$0	$0
B777	0	$0	$0	$0	$0
DC8	25	$122,635	$81,615	$827,988	$117,887
DC9	26	$107,078	$75,058	$745,204	$106,100
DC10	7	$59,405	$40,473	$406,580	$57,888
MD11	9	$98,561	$59,422	$629,277	$89,595
MD80 series	0	$0	$0	$0	$0
MD90	0	$0	$0	$0	$0
L 1011	17	$82,676	$57,129	$570,549	$81,233
BAE ATP	0	$0	$0	$0	$0
BAE 41	0	$0	$0	$0	$0
BAE 146	0	$0	$0	$0	$0
DHC 7	1	$1,856	$1,294	$12,875	$1,833
DHC 8	0	$0	$0	$0	$0
F 27	2	$3,645	$2,556	$25,372	$3,612
F 28	0	$0	$0	$0	$0
F100	13	$42,540	$27,436	$282,085	$40,162
SAAB 340	20	$30,317	$21,157	$210,439	$29,962
ATR72	0	$0	$0	$0	$0
ATR42	12	$18,512	$12,620	$126,747	$18,046
EMB 145	0	$0	$0	$0	$0
Shorts 360	20	$27,033	$19,069	$188,837	$26,886
Dornier 328	0	$0	$0	$0	$0
Brad CRJ	0	$0	$0	$0	$0
EMB 120	31	$45,008	$31,155	$310,924	$44,269
TOTAL	305	$1,633,280	$1,109,021	$11,156,623	$1,588,452
MANUAL CHANGES		$128,000	$0	$128,000	$18,224
TOTAL WITH MANUAL CHANGES		$1,761,280	$1,109,021	$11,284,623	$1,606,676
TOTAL PLUS STC COSTS					
TOTAL MINUS B-747		$1,265,648	$770,095	$7,885,081	$1,122,658

TABLE C-4

COMPLIANCE COSTS FOR OPERATORS WITH 20 TO 29 AFFECTED AIRPLANES

Airplane Model	No. of Airplanes	First Year Total Cost (AH Airplanes)	Annual Total Cost (All Airplanes)	P.V. Total Cost (All Airplanes)	Annualized Total Cost (All Airplanes)
A300	8	$45,490	$11,476	$196,957	$28,042
A310	0	$0	$0	$0	$0
A320	0	$0	$0	$0	$0
A330	0	$0	$0	$0	$0
A340	0	$0	$0	$0	$0
B707	0	$0	$0	$0	$0
B727	60	$327,471	$75,362	$1,375,356	$195,820
B737 series	33	$196,694	$52,308	$867,373	$123,494
B747-200, 300	33	$481,055	$91,951	$1,910,472	$272,008
B747-	0	SO	$0	SO	SO
B757		SO	SO	SO	SO
B768747-8787 67	00	SO	SO	SO	SO
B777	0	SO	SO	SO	$0
DC8	32	$156,972	$41,747	$692,225	$98,557
DC9	32	$131,789	$29,659	$549,575	$78,247
DC10	10	$84,864	$15,958	$335,488	$47,766
MD11	0	28,012	$34,146	$0	SO
MD80 series	26	$1:		$565,107	$80,458
MD90	0	SO	SO	SO	SO
L 1011	0	SO	SO	SO	$0
BAE ATP	5	$9,857	$2,969	$45,507	$6,479
BAE 41	28	$54,677	$16,376	$251,871	$35,861
BAE 146	18	$69,879	$16,672	$296,946	$42,278
DHC 7	0	SO	SO	$0	$0
DHC 8	25	$51,340	$15,836	$239,191	$34,055
F 27	0	$0	$0	$0	$0
F 28	0	SO	$0	$0	$0
F100	0	SO	SO	SO	SO
SAAB 340	0	SO	SO	$0	SO
ATR72	0	SO	SO	SO	SO
ATR42	0	SO	SO	SO	SO
EMB 145	0	SO	SO	SO	SO
Shorts 360	0	SO	SO	SO	SO
Dornier 328	0	SO	SO	SO	SO
Brad CRJ	0	SO	SO	SO	SO
EMB 120	0	SO	SO	SO	SO
TOTAL	310	$1,738,100	$404,459	$7,326,067	$1,043,067
MANUAL CHANGES		$88,000	SO	$88,000	$12,529
TOTAL WITH MANUAL CHANGES		$1,826,100	$404,459	$7,414,067	$1,055,596
TOTAL PLUS STC COSTS					
TOTAL MINUS B-747		$1,345,045	$312,508	$5,503,595	$783,588

TABLE C-5

COMPLIANCE COSTS FOR OPERATORS WITH 30 TO 39 AFFECTED AIRPLANES

Airplane Model	No. of Airplanes	First Year Total Cost (All Airplanes)	Annual Total Cost (All Airplanes)	P.V. Total Cost (All Airplanes)	Annualized Total Cost (All Airplanes)
A300	0	$0	$0	$0	$0
A310	0	$0	$0	$0	$0
A320	0	$0	$0	$0	$0
A330	0	$0	$0	$0	$0
A340	0	$0	$0	$0	$0
B707	0	$0	$0	$0	$0
B727	32	$174,651	$40,193	$733,523	$104,437
B737 series	2	$11,921	$3,170	$52,568	$7 as
B747-200, 300	0	SO	SO	SO	SO
B747-400	0	SO	$0	SO	SO
B757	0	SO	$0	SO	SO
B767	0	SO	S O	SO	SO
B777	0	SO	SO	SO	SO
DC8	0	SO	SO	$0	$0
DC9	1	$4,118	$927	$17,174	$2,445
DC10	0	SO	SO	SO	SO
MD11	0	SO	SO	SO	SO
MD80 series	0	SO	SO	SO	SO
MD90	0	SO	SO	$0	SO
L 1011	0	SO	SO	SO	SO
BAE ATP	0	SO	SO	SO	$0
BAE 41	0	SO	SO	SO	$0
BAE 146	0	SO	SO	SO	SO
DHC 7	0	SO	SO	SO	SO
DHC 8	0	$0	$0	$0	$0
F 27	0	SO	SO	SO	SO
F 28	0	SO	SO	SO	SO
F100	0	SO	SO	SO	SO
SAAB 340	77	$116,721	$36,179	$544,829	$77,571
ATR72	0	SO	SO	SO	SO
ATR42	0	SO	SO	SO	SO
EMB 145	0	SO	SO	SO	SO
Shorts 360	7	$9,461	$2,754	$43,118	$6,139
Dornier 328	25	$38,303	$12,157	$180,460	$25,693
Brad CRJ	0	$0	SO	SO	SO
EMB 120	7	$10,163	$3,115	$47,234	$6,725
TOTAL	151	$365,339	$98,495	$1,618,906	$230,496
MANUAL CHANGES		$28,000	SO	$28,000	$3,987
TOTAL WITH MANUAL CHANGES		$393,339	$98,495	$1,646,906	$234,482
TOTAL PLUS STC COSTS					
TOTAL MINUS B-747		$393,339	$98,495	$1,646,906	$234,482

TABLE C-6

COMPLIANCE COSTS FOR OPERATORS WITH 40 TO 49 AFFECTED AIRPLANES

Airplane Model	No. of Airplanes	First Year Total Cost (All Airplanes)	Annual Total Cost (All Airplanes)	PV. Total Cost (All Airplanes)	Annualized Total Cost (All Airplanes)
A300	0	SO	SO	SO	$0
A310	0	SO	$0	$0	$0
A320	0	SO	$0	$0	$0
A330	0	$0	$0	$0	$0
A340		SO	SO	SO	$0
B707	0	SO	SO	SO	$0
B727	0	$0	$0	$0	$0
B737 series	0	$0	$0	$0	$0
B747-200, 300	0	$0	$0	$0	$0
B747-400	0	$0	$0	$0	$0
B757	0	$0	SO	SO	$0
B767	0	SO	SO	SO	SO
B777	0	SO	SO	SO	SO
DC8	0	SO	SO	SO	SO
DC9	0	SO	SO	SO	SO
DC10	0	SO	SO	SO	SO
MD11	0	SO	SO	SO	SO
MD80 series	0	$0	$0	$0	$0
MD90	0	$0	$0	$0	$0
L 1011	0	$0	$0	$0	$0
BAE ATP	0	$0	$0	$0	$0
BAE 41	0	SO	$0	$0	$0
BAE 146	0	SO	$0	$0	$0
DHC 7	0	SO	$0	$0	$0
DHC 8	59	$121,161	$37,373	$564,491	$80,371
F 27	0	SO	SO	SO	SO
F 28	12	$39,366	$8,146	$159,982	$22,778
F100	0	$0	$0	$0	$0
SAAB 340	77	$116,721	$36,179	$544,829	$77,571
ATR72	2	$4,567	$1,623	$22,533	$3,208
ATR42	41	$63,249	$20,159	$298,484	$42,497
EMB 145	4	$6,720	$2,249	$32,345	$4,605
Shorts 360	4	$5,407	$1,574	$24,639	$3,508
Dornier 328	11	$16,853	$5,349	$79,402	$11,305
brad CRJ	0	$0	SO	SO	SO
EMB 120	10	$14,519	$4,450	$67,477	$9,607
TOTAL	220	$388,562	$117,103	$1,794,181	$255,451
MANUAL CHANGES		$48,000	SO	$48,000	$6,834
TOTAL WITH MANUAL CHANGES		$436,562	$117,103	$1,842,181	$262,285
TOTAL PLUS STC COSTS					
TOTAL MINUS B-747		$436,562	$117,103	$1,842,181	$262,285

APPENDIX D

TABLES FOR THE REGULATORY FLEXIBILITY ALTERNATIVES

TABLE D-I OPERATORS IN PART 135 NON-SCHEDULED WITH AIRPLANES WITH 10 TO 30 SEATS	NUMBER OF AIRPLANES
Count of MAKEMODEL	
OPERATOR	Total
A G SPANOS CONSTRUCTION CO	1
M A Cooper Transportation	2
ABC AVIATION (DELAWARE) INC	1
ABCO LEASING	2
ACM AVIATION INCORPORATED	2
AERO BOISE CO	1
AERO CHARTER INC	1
AERO CONDOR SA	1
AERO FLIGHT SERVICE INC	1
AERO FREIGHT INC	1
AERO SYSTEMS INC	1
AERO TAXI ROCKFORD INC	3
AIR AMBULANCE BY AIR TREK INC	1
Air Care, Inc.	1
AIR CARGO CARRIERS, INC	13
AIR CARGO EXPRESS INC	2
AIR CARGO MASTERS INC	1
AIR CARRIERS INC	2
AIR CHARTER EXPRESS	4
AIR CHARTER SERVICE INC	1
AIR CRANE INC	1
AIR EAST INC	2
AIR FLORIDA Express Inc.	1
AIR LAUREL INC	2
AIR MIDWEST	15
AIR MOLOKAI Inc.	3
AIR NEWARK	1
AIR PATH INC	1
AIR RESPONSE INC	2
AIR SERVICES BROKERAGE LLC	1
AIR SUNSHINE	8
AIR TRAFFIC SERVICE CORP	1
AIR TRANSPORT INC	2
AIR TRANSPORT Inc.	2
AIR WILMINGTON INC	1
AIRCRAFT CHARTER INCORPORATED	1
AIRCRAFT MANAGEMENT INC	1
AIRCRAFT SERVICES	1
AIRCRAFT SPECIALISTS INC	1
AIRFLITE INC	3
AIRJET INC	2
AIRLA	2
AIRLIFT TRANSPORT INC.	1
AIRPAC AIRLINES	1

AIRVANTAGE INC	4
AIRWAYS INTERNATIONAL INC	23
ALASKA CENTRAL EXPRESS	2
ALG AEROLEASING USA	1
ALG TRANSPORTATION INC	1
ALLIANCE AIR INC	1
ALLIANT HEALTH SYSTEM INC	1
ALOHA ISLAND AIR	6
ALPHA AVIATION INCORPORATED	1
ALPINE AIR INC	1
AMERICAN AIRCRAFT SALES INTL	1
AMERICAN HEALTH CENTERS INC	1
AMERICAN HORIZONS LTD INC	1
American International Airways, Inc.	1
AMERICAN INTERNATIONAL AVIATN	2
AMERICAN JET INTERNATIONAL	2
AMERICAN TRANS AIR EXECUJET	1
American Trans Air, Inc.	1
AMERIFLIGHT INCORPORATED	6
Ameriflight, Inc.	77
AMWAY CORPORATION	5
APEX AVIATION GROUP	2
APUS AVIATION INC	1
ARAMCO ASSOCIATED CO	1
ARAWAK AIR CORPORATION	1
ARCTIC CIRCLE AIR SERVICE INC	5
AREA RESCUE CONSORTIUM OF HOSPITALS	1
ARIZONA EXECUTIVE AIR INC	1
ARKANSAS AIRCRAFT INC	1
ARKANSAS AIRCRAFT, INC.	1
ARLINGTON LEASING INCORPORATED	1
ASPEN BASE OPERATIONS INC & PARTNERS	4
ATLANTIC AERO INC	2
ATLANTIC AIRCRAFT INC	1
ATLANTIC COAST AIRLINES	36
ATLANTIC SOUTHEAST AIRLINES INC	5
AVIATION CHARTER SERVICES	7
AVIATION ENTERPRISES	2
AVIATION RESOURCES INC	1
AVIATION SERVICES INC	2
AVIATION TECHNOLOGIES INC	1
AVIEX JET INC	9
AVIEX JET Inc.	1
AVIOR TECHNOLOGIES	2
AVIOR TECHNOLOGIES INC	1
AVJET CORP DEALER	5
AVOCET AVIATION	1
BAKER AVIATION INC	3
BANC ONE SERVICES CORP	6

BANCSERV AIR INC	1
BANKAIR INC	11
BAR HARBOR AIRWAYS	1
BARKEN INTERNATIONAL Inc.	1
BAYOU HELICOPTERS INC	1
BECKAIR COMPANY INC	1
BEMIDJI AVIATION SERVICES INCORPORATED	4
BERING AIR, INC	5
BERRY AVIATION	8
BERRYAVIATIONInc.	1
BEST AVIATION INC	1
BIG ISLAND AIR INC	1
BIG SKY TRANSPORTATION CO	4
BIGHORN AIRWAYS Inc.	2
BLUEBIRD PROPERTIES INC	1
BOHLKE INTERNATIONAL AIRWAYS Inc.	1
BOISE CASCADE CORP	2
BULLFROG INC	4
BULLOCK CHARTER INC	1
BUNN-O-MATIC CORP	2
BUSINESS AIR (USA)	9
BUSINESS EXPRESS	22
BUTLER AIR INC	1
CAL-AIR CHARTER INC	1
CAPE SMYTHE AIR SERVICE	1
CAPE SMYTHE AIR SERVICE Inc.	3
CAPITAL AIRCRAFT INC	3
CAPITAL AIRLINES	1
CARDINAL AIRLINES	2
CAREER AVIATION ACADEMY	3
CARIBAIR	1
CARTERS SHOOTING CENTER INC	1
CARVER AERO INC	1
CASPER AIR SERVICE	3
CAUSEY AVIATION SERVICE INC.	3
CENTRAL AIR CHARTER	1
CENTRAL FLYING SERVICE INC	1
CENTRAL FLYING SERVICE INC.	2
CENTURY AIRLINES INC	2
Century Aviation, Inc.	1
CESSNA AIRCRAFT CO RESALE DIVISION	40
CHAMPLAIN ENTERPRISES INC	1
CHAMPLAIN ENTERPRISES INCORPORATED	30
CHANNEL ISLANDS AVIATION Inc.	2
CHAPARRAL AVIATION INC	1
CHAPMAN EXPLORATION INC	1
CHAPMAN EXPLORATION INC.	1
CHARTER AIRLINES	2
CHARTER SERVICES INC	1

CHARTERSTAR INC	1
CHAUTAUQUA AIRLINES	25
CHERRY AIR INC	4
CHICAGO EXPRESS AIRLINES	5
CHICAGO EXPRESS AIRLINES Inc.	3
CHIPOLA AVIATION INC	2
CHRYSLER AVIATION INC	2
CHRYSLER PENTASTAR AVIATION Inc.	5
CIN AIR INC	1
CIRCLE RAINBOW AIR Inc.	6
CIRRUS AVIATION INC	1
CLASSIC AVIATION-	1
CLAY LACY AVIATION	1
CLAY LACY AVIATION INC	4
'CLINT AERO INC	1
COASTAL AIR TRANSPORT Inc.	1
COASTAL AIRWAYS	3
COCKRELL RESOURCES INC	1
COLE AVIATION LLC	1
COLGAN AIR INC	6
COLGAN AIR Inc.	3
Columbia Helicopters Inc	2
COLVIN AIR CHARTER INC	2
COMAIR ACQUISITIONS INC	40
COMMAND-AIR INC	1
COMMANDER AIRWAYS INC	1
COMMERCIAL AVIATION ENTERPRISE	4
COMTRAN INTERNATIONAL INC	1
CONCORD JET SERVICE INC	1
CONDOR AIR INC	1
CONDOR AVIATION COMPANY INC	1
CONQUEST AIRLINES	1
CONQUEST AIRLINES CORP	10
CONQUEST AIRLINES Corp.	1
CONSOLIDATED CHARTER SRVC	2
CONTINENTAL AVIATION SERVICES	1
CONTINENTAL EXPRESS	2
CONTINENTAL EXPRESS Inc.	25
CORPORATE AIR	42
CORPORATE AVIATION SERVICES INC	16
CORPORATE CHARTER SERVICE Inc.	1
CORPORATE CHARTERS LTD	1
CORPORATE EXPRESS AIRLINES	6
CORPORATE FLEET SERVICES	2
CORPORATE FLIGHT INC	2
CORPORATE FLIGHT INCORPORATED	1
CORPORATE JETS INC	1
CORPORATE JETS INC OF AZ	6
COX AVIATION INC	1

CPA AVIATION INCORPORATED	1
CRITICAL AIR MEDICINE INC	2 1
CROW EXECUTIVE AIR	1
CROWE EXECUTIVE AIR INC	2
CURTIS AVIATION SERVICES PETROLEUM INC	1 1
CUTTER AVIATION COMPANY INC	a
CUTTER AVIATION INC	1
CVG AVIATION INCORPORATED	4
D & D AVIATION LC	3
D AND D AVIATION	2
D W DAVIES & CO INC	1
DALE AVIATION INC	1
DB AVIATION INCORPORATED	1
DE GOL AVIATION INC	1
DECATUR AVIATION INC	1
DESERT AIR	1
DEWITT ENTERPRISES INC	1
DHL AIRWAYS INCORPORATED	1
DIAMOND AIR INCORPORATED	1
DIAMOND AVIATION II INC	2
DIRECT JET CHARTER	1
DIVERSIFIED AIRCRAFT HOLDINGS LTD	1
DOLPHIN EXPRESS AIRLINES	1
DOLPHIN EXPRESS AIRLINES INC	2
DOMINION AIR CHARTER INC	1
DOMINION AIR SERVICES INC	2
DRAKE 8 DRAKE INC	1
DUMONT ASSOCIATES INC	1
DUNCAN AVIATION	2
DUNCAN AVIATION INC (DEALER)	a
DX SERVICE COMPANY INC	1
EAGLE AIR INC	10
EAGLE AVIATION INC	2
EAGLE AVIATION Inc.	4
EAGLE CANYON AIRLINES	14
EAGLE HELICOPTERS Inc.	1
EAGLE JET CHARTER	1
EAST COAST AVIATION SERVICES LTD	3
East Coast Flight Service, Inc.	1
EASTWAY AIRCRAFT SERVICES INC	2
EDS FLYING SERVICE INC	1
EFFINGHAM AIR INC	1
ELITE AVIATION	2
ELLIOTT AVIATION FLIGHT SERVICES INC	5
EMERALD AVIATION INC	2
EMPIRE AIRLINES INCORPORATED	1
EMPIRE AIRLINES, INC	1

EMPIRE AIRWAYS	1
ENTERPRISE AIR INC.	1
ENTERPRISE AVIATION INC	1
EPPS AIR SERVICE INC	1
EPPS AIR SERVICE Inc.	1
'ERA AVIATION INC	12
ERA Aviation Inc. (Alaska Airlines Commu	1
'ERIE AIRWAYS INC --	2
ESPERAIR INC	1
'ESQUIRE AVIATION CORP	2
EVERGREEN HELICOPTERS Inc.	6
EXECUJET CHARTER SERVICE INC	1
EXECUTIVE AIR CHARTER OF BATON ROUGE	3
EXECUTIVE AIR NEW ORLEANS	6
EXECUTIVE AIR TRANSPORT(USA)	1
EXECUTIVE FLIGHT	1
EXECUTIVE FLIGHT INC	5
EXECUTIVE FLIGHT Inc.	1
EXECUTIVE JET	1
EXECUTIVE JET AVIATION Inc.	9
EXPRESS AIRLINES 2	22
EXPRESS AIRLINES INC	22
F S AIR SERVICE INCORPORATED	1
FAWN INDUSTRIES INC	1
FEDERAL EXPRESS CO	4
FELTS FIELD AVIATION INC	2
FISHER AVIATION INC	1
FLAGSTAFF MEDICAL CENTER	2
FLAMENCO AIRWAYS Inc.	a
FLATIRONS AVIATION MANAGEMENT	1
FLIGHT INTERNATIONAL INC	5
FLIGHT INTERNATIONAL OF FLA INC	13
FLIGHT OPERATIONS INC.	1
FLIGHT SERVICES GROUP	1
FLIGHT SPECIALISTS INC	2
FLIGHTCRAFT INC	1
FLINT AVIATION CORP	1
FLORIDA JET SERVICE INC	2
FLORIDA WINGS INC	1
FLORIDA WINGS INCORPORATED	1
FLYING FOX INC	1
FOUR CORNERS AVIATION	1
FOUR STAR AVIATION	2
FRED L HADDAD INC	1
Freedom Air Inc	3
FREIGHT RUNNERS EXPRESS	1
FRONTIER FLYING SERVICE	1
FRONTIER FLYING SERVICE Inc.	4
G L WILSON BUILDING CO	1