

*FAA Response:* TCAS installation and operation is not a requirement for the application of enroute separation standards including 1,000-foot vertical separation below FL 290. Master Minimum Equipment List policy allows for TCAS to be inoperative for up to 3 days. The aircraft equipage requirements for RVSM have provided safe RVSM operations since 1997.

4. ALPA asked us to analyze the incremental safety benefit of requiring TCAS on all aircraft.

*FAA Response:* The safety analysis performed prior to RVSM implementation considers the frequency of aircraft altitude-keeping errors and of human errors. The risk of error events is not considered to be mitigated by TCAS.

We have estimated that there will be a high probability of TCAS equipage in encounters between aircraft. We have estimated that in 81 percent of encounters between pairs of aircraft both aircraft will be TCAS equipped and in 99 percent of such encounters at least one aircraft will be TCAS equipped.

5. CAPA suggested that encounters between aircraft where one is TCAS equipped and the other is not are similar to the European mid-air collision event that occurred in July of 2002.

*FAA Response:* First, we do not believe that the potential event described is specific to a single separation standard, including 1,000-foot separation above FL 290. Second, 1,000-foot vertical separation is applied without requirements for TCAS below FL 290. Third, the mid-air event in Europe occurred despite the fact that both aircraft were TCAS equipped. In NAS airspace, approximately 90 percent of aircraft are estimated to be TCAS equipped.

6. AEA asked for confirmation of TCAS I acceptability for operations in RVSM airspace.

*FAA Response:* The only RVSM requirement related to TCAS installation is that if the aircraft is equipped with TCAS II and used in RVSM operations then TCAS II, Version 7.0 must be incorporated. There is no prohibition in RVSM requirements against TCAS I.

7. AEA asked if Mode S waivers would remain in effect.

*FAA Response:* All TCAS installations require a TCAS-compatible Mode S transponder. This is to allow for coordination during events where more than one aircraft is TCAS equipped. This is true for Version 7 and all previous versions. TCAS Version 7 and all earlier versions are capable of tracking other aircraft that are equipped

with either a Mode A/C or Mode S transponder. TCAS will provide TA and RA protection against aircraft equipped with either type of transponder.

We have not issued any waivers to the requirement for a Mode S transponder on a TCAS-equipped aircraft. This would have resulted in TCAS being inoperative at all times.

The requirement for Version 7 instead of earlier versions of the TCAS logic should have no affect on waivers issued to Mode S requirements for aircraft that are not TCAS equipped.

#### Regulatory Impact Analysis Summary

Executive Order 12866 directs federal agencies to promulgate new regulations or modify existing regulations after consideration of the expected benefits to society and the expected costs. Each federal agency shall assess both the costs and the benefits of proposed regulations while recognizing that some costs and benefits are difficult to quantify. A proposed rule is promulgated only upon a reasoned determination that the benefits of the proposed rule justify its costs.

The order also requires federal agencies to assess whether a proposed rule is considered a "significant regulatory action". The Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. The Office of Management and Budget directs agencies to assess the effect of regulatory changes on international trade. Finally, Public Law 104-4 requires federal agencies to assess the impact of any federal mandates on state, local, tribal governments, and the private sector.

In conducting these analyses, we have determined that this rule: (1) Generates benefits that justify its costs for the significant majority of U.S. operators and is "a significant regulatory action" as defined in the Executive Order; (2) is significant as defined in Department of Transportation's Regulatory Policies and Procedures; (3) has a significant impact on a substantial number of small entities, but provides benefits that justify a final rule; and (4) does not constitute a barrier to international trade. These analyses, available in the docket, are summarized below.

This rule expands Reduced Vertical Separation Minimum (RVSM) operations to aircraft operating between FL 290-410 (inclusive) in the airspace of the 48 contiguous States of the U.S., the District of Columbia, Alaska, that portion of the Gulf of Mexico where we provide air traffic services, the San Juan FIR and the airspace between Florida and the San Juan FIR. Some of the

benefits of this rulemaking are: (1) An increase in the number of available flight levels; (2) enhanced airspace capacity; (3) permits operators to operate more fuel/time efficient routes and altitudes; and (4) enhanced air traffic controller flexibility by increasing the number of available flight levels, while maintaining an equivalent level of safety.

We estimate that this rule will cost U.S. operators \$869.2 million for the fifteen-year period 2002-2016 or \$764.9 million, discounted. For the purposes of this cost analysis, we assumed that operators would choose to upgrade almost all of their aircraft to meet RVSM standards. Operators of non-RVSM approved aircraft would, however, retain the option of flying above or below RVSM airspace. Benefits would begin accruing on January 20, 2005. Estimated quantifiable benefits, based on fuel savings for the U.S. aircraft fleet over the years 2005 to 2016, would be \$5.3 billion or discounted at \$3.0 billion.

In addition to fuel savings, many non-quantifiable or value-added benefits will result from the implementation of RVSM in domestic U.S. airspace. Input from air traffic managers, controllers, and operators has identified numerous additional benefits.

Through implementation of RVSM in the NAT and PAC regions, operators and controllers have realized some additional benefits. The major additional benefits as identified by air traffic managers and controllers are:

- Enhanced capacity
- Reduced airspace complexity
- Decreased operational errors in these regions
- Reduction of user-requested off course climbs for altitude changes
- Improved flexibility for peak traffic demands
- Reduction of the effect of traffic converging at critical points
- Increased number of options in deviating aircraft during periods of adverse weather

The benefits outlined above for RVSM in the NAT and PAC regions are anticipated in domestic U.S. airspace. There should be expected efficiencies through reduced airspace complexity, increased flight levels, and fewer altitude changes with crossing traffic.

Operators can also expect enhanced operating efficiency and the potential for decreased departure delays due to improved airspace efficiency. Specific benefits cited by aircraft operators are:

- Decreased flight delays
- Improved access to desired flight levels