Session I
Safety and Security

Positive Passenger Baggage Match
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RESEARCH

Economic Costs of Domestic Positive Bag Match Given a 5%
Passenger Selection Rate

VERY PRELIMINARY ASSESSMENT

No one knows for sure what costs airlines and passengers will
incur if 5% of passengers are selected for bag-match under CAPS.
The relevant information at hand consists largely of the results of
domestic live PPBM tests of May 1997, and estimates about PPBM
costs from the airlines themselves. Much of this information
concerns 100% passenger-to-bag match, and any assessment of a 5%
selection policy requires a sensible procedure for "scaling back" the
original numbers.

COE plans to discuss with individual airlines their sets of
written costs estimates about PPBM, which are predicted on 100%
and 10% selection rates. We also hope to learn the carriers'
assessments about the effects of moving from the present profiling
arrangements—which affect 1.5% of passengers—to a CAPS policy
affecting about 5%. These discussions could substantially affect
COE's final cost estimates about a 5% policy, which COE will present
in mid-January. What follows is primarily an attempt to suggest the
structure of our present thinking.

Kinds of Cost

The primary potential costs of 5%-selection bag-match fall into
two categories, which we call direct and indirect:

Direct Costs

• Introducing CAPS selection software into existing airline
  computers.

- Upgrading computer capabilities to ease (or even automate) the process of determining whether selectees have actually boarded their planes.
- Adding personnel at the gate, the ramp, or the baggage room to implement bag-match policies.

Indirect:

- Operating auxiliary power units and other equipment while "push back" is delayed because of PPBM difficulties.
- Additional salary to airline employees if PPBM delays increase their calculated time on the job.
- Food and lodging for passengers who miss connections because of delays.
- Non-monetary but real costs to passengers when their flights depart late because of PPBM.

Because there will apparently be no "bottom-up" component to the CAPS policy, COE does not consider either bottom-up costs or any benefits resulting form reduced bagging mishandling.

Attached to this document is a first draft of a COE report about the costs of 100% passenger-to-bag matching. Because much of our reasoning below builds on that (preliminary) report, COE considers that document an integral part of this one.

General Thoughts

Briefly put, our initial reasoning about a 5% PPBM policy goes as follows:

Automation

Such technological advances as automated boarding-pass readers and computerized check-in at curbside would continue to make bag match far easier even if it were applied to only a small minority of passengers rather than all of them. Therefore, COE sees the expense of installing new systems—which does not diminish with the selection rate—as a legitimate cost to the carriers of implementing bag match. We therefore assume the

<u>same costs</u> for technological upgrades under 5% selection as under 100% passenger-to-bag match. Conservatively, we assume that the entire costs of this equipment is allocated to bag match, even though it has other benefits and might be adopted even without bag match.

<u>Personnel</u>

Personnel costs, however, could well drop substantially under the limited 5% policy as compared to the 100% one.

<u>Gate Staff</u>

We had posited that, even with automatic boarding-pass readers, a carrier could reasonably act to control reconciliation delays by adding an extra gate agent for a heavily-loaded flight. The issue becomes trickier when only one passenger in 20 is a focus of scrutiny. One major carrier reported that it would not increase gate staff at all under 10% profiling. Moreover, some carriers did not increase gate staff during the live-test of <u>100%</u> bag-match, and they did not suffer conspicuously larger reconciliation delays than did other airlines that increased gate personnel. Thus, it is readily conceivable to COE that additional gate personnel would not be needed under 5% selection.

On the other hand, if profiling becomes in practice a search for "needles in a haystack" (and a search that is supposed to go unnoticed by passengers), the process might be just as demanding as searching the whole haystack. At the upper end, the need for added gate staff might be as large as that under 100% matching. The COE is certain that the actual staff requirement be considerably below this upper bound but has yet to identify a more refined upper bound value.

Thus, as of now, COE would use zero as a lower bound on gate-staff costs under 5% selection, and the COE gate-staff cost estimate under 100% matching as the upper bound. (We will present the latter estimate below.) We anticipate gaining a better understanding of how airlines plan to implement profiling in the near future, and then adjusting this estimate appropriately. (As

noted, the carriers already perform small-scale profiling with present staff.)

Ramp Staff

Assuming that selectees are neither more nor less likely than other passengers to check bags for flights and not board them, difficulties with "missing persons" should be only 5% as common under 5% selection as under 100% matching. Based on its analysis of live-test data, COE provisionally estimates that about 4.5% of domestic jet flights would experience bag-pull attempts if 100% matching were applied domestically. (Some of these attempts would be erroneous, because (for example), both the passenger and the bag had previously been shifted to another flight). If 4.5% is divided by 20, the result is about one pull attempt in every 450 flights. That rate is sufficiently low (and pulls are sufficiently short) that, in COE's view, bag pulls under 5% CAPS selection could be handled by existing ramp staff. If the decision is made to engage in "management by exception" and not load the bags of selectees until they have boarded, then the pulls might be essentially eliminated.

For a first estimate of the added ramp-crew expense under 5% selection, COE would use the cost of paying ramp crews overtime for bag pulls (i.e. greater compensation because of the increase in workload). The amount of money involved would be relatively low.

Baggage Research

As we understand it, bottom-up bag match will not be part of the 5% selection plan. When a selectee's bag arrives at a flight other than the one for which it is tagged, it will presumably not be loaded unless the passenger boards or some research results in authorization to transport it. COE believes that the cost of such research would be at most 5% of the research costs under 100% matching.

Delays:

<u>Bag Pulls</u>

If the carriers apply "management by exception" and practically eliminate bag-pulls, then delays associated with such pulls will be negligible. COE takes the more conservative position, however, that bag-pulls would be so rare that airlines might find it simpler to load bags as usual and accept the (seven-minute) removal delays on those few occasions when they are needed. Under the latter policy, bag-pull delay-minutes would be about 5% their levels under 100% matching.

<u>Reconciliation Delays:</u>

Such delays can be divided into those caused by "data-entry requirements" and those caused by apparently "missing persons" (whose absence results in paging and on-board trips by gate staff to see if the passenger is actually missing). If only 5% of the passengers are under scrutiny, COE assumes that missing person delays will be only 5% as frequent as under 100% matching. Delays caused by data-entry requirements, however, may drop far less, depending on what procedures are used to verify that selectees have actually boarded. In the worst case, the same verification methods would be used as under 100% selection, in which case data-entry delays would not drop at all.

COE assumes that:
"missing person" delays under 5% selection will be at 5% of the levels under 100% matching.

"data entry" delays will have a lower bound of 5% of the levels under full passenger-to-bag match, and an upper bound equal to the delays under full passenger-to-bag match.

The upshot of these preliminary assessments is a range of estimated staffing costs under 5% selection, and a range of estimated delays. (COE would apply FAA conversion formulas to convert the latter into monetary equivalents for airlines and passengers.) We present these ranges below, using as units the <u>cost per passenger enplanement</u>. Such a unit of measure would be useful if one assumes that, because the security program is

meant to benefit all passengers, the costs of the program should be spread across that population.

ROB: I THINK IT WOULD HELP IF, IN THE TABLE, EACH COST UNDER 5% SELECTION WERE COMPARED TO THE CORRESPONDING COST UNDER 100% MATCH. I WOULD BE VERY CAREFUL TO MAKE SURE THE LATTER COULD NOT BE CONFUSED WITH THE FORMER.)

    As noted, COE hopes that it will gain greater understanding of the mechanisms by which 5% selection would be implemented, and can therefore sharply reduce the levels of uncertainty in its cost estimates.