The "large flap ice", a more substantial ice shape with a 1.2-inch horn, represented extended exposure to icing, such as during a flaps-down hold, and was considered a conservative configuration. The flap ice shapes were installed on the leading edges of the inboard and outboard trailing edge flaps. Tests were conducted at both forward and aft centers of gravity (cg's).

Flight Test Results

- Buffet

With the baseline 3-inch shapes, buffet levels increased with increasing flap deflection and were consistent with the 767-200 buffet levels with ice at equivalent flap deflection angles. The increased flap deflections at Flaps 30 with the improved -300/-300 ER flap system resulted in higher buffet levels than seen on the 767-200 at its Flaps 30. The buffet increase was primarily driven by the horizontal tail and increased at more forward cg's. Elevator and stabilizer effectiveness were thoroughly tested and found to be satisfactory.

With flap ice there was an additional buffet increase, again growing larger as flap deflection increased. The same flap ice configuration at Flaps 30 exhibited the highest buffet levels generated during the flight test program. It was similar to the buffet level for a non-iced airplane at Flaps 30 with the speedbrakes up. Flow visualization data suggested that the cause of the increased buffet was intermittent flow separation on the outboard flap upper surface. With large flap ice shapes, buffet increased at Flaps 25 and 30 although not quite as much as with the small flap ice. The flow visualization data indicated nearly complete flow separation on both the inboard and outboard flap upper surfaces at Flaps 30. The buffet levels for all ice configurations were found to be acceptable and did not interfere with operation of the aircraft.

The buffet levels are mainly caused by ice accretion on the horizontal stabilizer and the trailing edge flaps. The performance loss at landing flaps is mainly caused by ice accretion on the trailing edge flaps. The effects of ice accretion on both the protected (by thermal anti-ice) and unprotected leading edge slats is far less pronounced. Boeing's information indicates that the Wing anti/de-ice system performs as per design.

- **Lift at Normal Operating Speeds**

There was no effect on lift at normal operating speeds with the 3-inch ice shapes on the wing and empennage, nor with either flap ice shape at detents less than Flaps 25. There was a lift decrement with both small, and large flap ice at Flaps 25 and small flap ice at Flaps 30, equivalent to a change in airspeed of 1 to 4 knots. Flaps 30 with the large flap ice had a somewhat more significant lift loss, equivalent to approximately 12 knots, consistent with separated flow on the flaps.

- **Stall Speeds & Stall Warning Margin**

The baseline 3-inch ice shapes on the wing leading edge caused an increase in stall speeds relative to the clean airplane for all flap detents except Flaps Up. Relative to this level, there was an additional increase in landing flap stall speeds with both small and large flap ice.