October 13, 2000

HSA-1/CC35D

Barry D. Stevens, P.E.
Senior Vice President of Engineering
Energy Absorption Systems, Inc.
3617 Cincinnati Avenue
Rocklin, California 95765

Dear Mr. Stevens:

Your September 27 letter was hand-carried to Mr. Richard Powers of my staff. In that letter you requested a formal Federal Highway Administration (FHWA) review of the accompanying report on two high-speed impacts into a 610-mm (2-foot) wide, nine-bay QuadGuard crash cushion unit to confirm that this longer unit remains fully acceptable as a National Cooperative Highway Research Program (NCHRP) Report 350 crash cushion at Test Level 3 (TL-3). You also asked us to acknowledge that the longer unit can safely stop a 2000-kg pickup truck impacting head-on at approximately 117 km/h (73 mph) and redirect that size test vehicle in a 115 km/h (71 mph) side impact at a 20 degree angle. Testing guidelines contained in NCHRP Report 350 do not address impact speeds over 100 km/h (62.1 mph).

The tested nine-bay QuadGuard is similar to the six-bay unit that was formally accepted by the FHWA as a TL-3 crash cushion in 1996 but with three additional bays added at the rear of the unit, making its total length 9474 mm. The head-on test, described above, resulted in an occupant impact velocity (OIV) of 9.6 m/s and a ridedown acceleration of 13.6 g's. The redirection test resulted in a maximum OIV of 6.8 m/s and a ridedown acceleration of 21.2 g's. The latter value slightly exceeds the maximum recommended value of 20 g's for a 100 km/h (62.1 mph) crash at TL-3.

Based on our review of the information you provided to us, we conclude that the nine-bay QuadGuard, as tested, remains an acceptable TL-3 crash cushion, but one which has additional capacity for some impacts at higher speeds with vehicles in the 2000-kg weight range and higher. We also agree with your conclusion that the longer unit will not likely satisfy all vehicle trajectory or occupant injury criteria when struck at the higher speed with the smaller 820-kg (1800-pound) car, but that it will perform at least as well as the six-bay unit when impacted at speeds over 100 km/h (62.1 mph).

Since the selection of cost-effective safety devices for installation along a public road remains the prerogative of the appropriate highway authority, this letter should not be interpreted as tacit encouragement to use--or discouragement against using--roadside hardware that exceeds currently accepted minimum performance requirements.

Sincerely yours,

(Original signed by Frederick G. Wright, Jr.)

Frederick G. Wright, Jr.
Program Manager, Safety