ASTM F-08 Committee Task Force Report

An Analysis of Comments on the Consumer Product Safety Commission's Bicycle Helmet Standard Draft

February 22, 1995

From a discussion focus group of members of the F-08 Headgear committee of the American Society for Testing and Materials during their December, 1994, meeting in Phoenix, Arizona.

Attendees: Dave Halstead, U. of Tennessee
Ed Becker, Snell Memorial Foundation
Michael Chiasson, Canstar Sports
Serge Dextrase, CADEX, Inc
Les Earnest, US Cycling Federation
Hal Fenner (Snell Memorial Foundation)
Ken Hall, Sport Maska
Don L'Heureux, Bell Sports Inc
John Muhlner, Giro Sport Design
Jerry Norquist, Trek Bicycle
Thom Parks, Specialized Bicycle
Dennis Piper, Troxel Cycling & Fitness
Terry Smith, USC Head Protection Research Lab
Jim Sundahl, Bell Sports Inc.
Randy Swart, Bicycle Helmet Safety Institute (notetaker).

The group noted its general satisfaction with the first CPSC draft, which members said was very well done.

Topics of Discussion

1. Lot Definition

    - The group agreed **that the date of manufacture should be clear and uncoded**, primarily to aid in recalls. Sundahl and L'Heureux said that

clear dating had not been a problem for Bell after years of experience with motorcycle and bicycle helmets.

- For quality control programs, "lots" are very difficult to define accurately. Piper noted that under the draft's definition, some Troxel models had "lots" spanning several years of production, and they continue to test helmets regularly even though they have not made changes in components. The group agreed to recommend that the draft should require **a statistically-based production helmet testing program under which the manufacturer must test a statistically relevant sample.**

2. Limits on Time Duration of the Acceleration Pulse

- **The group recommends unanimously that the dwell time requirement in the draft be eliminated.** Although there was general agreement that the time duration of the acceleration pulse is related to injury, there is also agreement that the exact relationship is not actually known, and that the requirement now in the draft is unlikely to result in safer helmets. (Its appearance in the ASTM standard may have been an historical drafting accident.)

3. Extent of Coverage

- After considerable discussion, the group recommends that the test line should be the only defined line regarding extent of coverage. The group acknowledged that difficulties arise in testing due to slipping of helmets when they are impacted on a test line without an extent of protection which is very close to the edge of the helmet, and Ed Becker noted that without an extent of coverage clause manufacturers tend to raise the lower edge of a helmet. Hal Fenner agrees with him. But most of the group believes that any helmet area required below the test line is probably not meaningful in this type of public standard (as opposed to Snell's private, centrally administered standard), since only that which can be tested is required to meet even the most minimal standards of protection. It is probably better to set a test line where the protection is needed rather than setting it higher and requiring that there be some material of unspecified protectiveness below the line, requiring a judgment of the lab technician. The current language is design-constraining. The group recommends **that extent of coverage be defined as the area above the test line.** This would eliminate the

language “the helmet fails to meet the standard if any point of this line falls below the edge of the helmet.

4. Conspicuity

- **There was no consensus on the issue of requiring bright colors or reflective surfaces.** Both raise definitional problems and potential fashion problems. A reflective surface requirement would raise cost considerations. There is no evidence available except some observers’ judgment and observation that conspicuous helmets will reduce injuries. Since dark colors are currently fashionable, there is a possibility of reducing helmet sales by eliminating dark colors. Some members of the group remain strong supporters of enhancing conspicuity, so there was no agreement on a recommendation.

5. Infant-Toddler Headform

- The group could agree that **more research is needed on head weight to relate it to headform weights**, particularly for infant-toddler headforms. There was no general agreement on the extent or significance of any differential in headform weights among adult sizes, although most agreed that the new extra-small infant headform should be lighter than an adult headform.

6. Test Line

- The group agreed that the draft should be modified **to make the initial offset above the basic plane proportional to the size of the headform**. It is now a uniform 60 mm, which is likely to be the correct offset for the size J headform only. ASTM is balloting a change in its own standard to adjust the distance to 53, 57, 60, 63 and 65 mm to match the five headform sizes. Troxel has checked the lines and discovered that for at least some headforms (presumably the smaller ones) the result of this formula might place the line below the Snell B-95 line. Although not all members of the group have worked with the lines enough to make a recommendation here, there was no intention among group members to make any of the ASTM test lines fall below the Snell B-95 line.

7. Test Apparatus

- **The requirement for a rigid steel plate on which to mount the test anvil is not necessary as long as a given mass is specified** (135 kg or 300 pounds may be adequate) for the anvil mount. The current draft has dimensions for the plate which would interfere with the lower wire attachment points of most existing twin-wire drop rigs.

8. Wet Test

- **The group feels that a precisely defined spray box test could replace the current requirement for a total immersion test.** Despite its uniformity, some feel that the immersion test is too severe and not realistic. They also said that due to differences in immersion techniques, uniformity is not necessarily assured. Others noted the difficulty of making the specifications for the spray box and the helmet's position in it precise enough to maintain uniformity between test sites. Members of the ASTM committee are working on this problem.

9. Drop Velocity Tolerance

- The group recommends that the **tolerance for the velocity of each test drop should be +/- 3 percent**. The 5 percent margin specified in the current draft is too generous.

10. Point Loading

- The group considers point loading a potentially important issue for this standard, but believes that **more basic science is needed on the consequences of localized loads and how to measure point loading.**

11. Accessories

- The group recommends that the language on accessories state **that a helmet can be tested with any or all of the accessories on it.** That would require a manufacturer or certifying agency to do whatever tests it felt necessary to determine that the helmet would pass under all conditions with any or all of the supplied accessories attached. It would

avoid a rigid specification for a huge number of tests to verify every possible combination of accessories.

12. Interim Standards

- The group recommends **adding Snell B-90, Snell N-94, Snell B-95 (either now or after it becomes effective), and the CSA CAN/CSA-D113.2-M standard to the list of interim standards.** (The group did not discuss the ANSI Z-90.4 standard, which ANSI says has been "withdrawn" by them but is specified in the legislation.)

13. Warning Label

- The group noted the problems with smaller available surfaces for labels in current helmets combined with additional language required and the need to maintain legible type faces. It urges **the use of generic terms rather than required wording, and the use of restraint on the amount of required language.**

14. Scope and Additional Activities

- A majority of the group felt that **the standard could state that CPSC has determined that evidence indicates that a bicycle helmet offers appropriate protection for non-contact roller skating**, an activity characterized by crashes which normally involve single impacts.

15. Center of Gravity Specification

- The group believes that Bell's suggestion for specifying the center of gravity of the headform on the drop rig is pertinent and would be preferable to the current draft language. It states that "**the center of the anvil must be fixed in alignment with the center vertical axis of the mounting ball within 5 mm.** This prevents lab technicians from intentionally skewing the impact point on the helmet off center on the hemispherical anvil, which results in a much more severe test than is intended.

16. Helmet Positioning Index

- The group recommends that **the HPI be that provided by the manufacturer or, if not available, the technician's best estimate.**

17. Modular Elastomer Programmer (test pad)

- The group will probably be making a recommendation on a change in the specification for the MEP to allow products from other manufacturers.

- Research is needed to determine the optimal thickness and hardness of the MEP.

- It is important that mounting the impactor used with the MEP should not require too much disassembly of the normal twin-wire drop rig to be practical on a daily production basis.

18. Test Records

- The group urges CPSC to **consider permitting alternative means of storing test data other than paper.** Paper records waste space, and electronic or microfilm media can be more easily archived.

19. Retention System Strength Test

- At its December meeting the ASTM F-08 committee discussed the issue of retention system test severity and decided not to change its standard. **We recommend that CPSC retain the requirement in the current draft,** which matches the ASTM requirement.

20. Marking the test line on a child's Helmet or Headform

- **The group recommends that a rectilinear test line be adopted for child helmets** rather than the zigzag pattern specified in the draft. Jim Sundahl has done some sample drawings and will share them with Scott Heh.