

**ROVs NPR: Oral Presentation**  
**Before the U.S. Consumer Product Safety Commission**  
**CPSC Docket 2009-0087**  
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Thank you for the opportunity to present the views of Polaris Industries regarding the U.S. Consumer Product Safety Commission's recent proposal to regulate the design and performance of Recreational Off-Highway Vehicles (ROVs).

My name is Paul Vitrano and I am the Vice President for Global Government Relations at Polaris Industries. Polaris has a strong interest in the Commission's proposal, because Polaris is the largest manufacturer of ROVs in the world. Polaris shares the Commission's goal of improving the safety of ROVs.

Polaris has been a leader in ROV safety and recently announced that it has included driver-side seat belt interlocks on most MY 2015 ROVs. Polaris believes that seat belt use is the single most important step an ROV rider can take to reduce the risks of injury, and Polaris is looking forward to seeing the benefits this technology will provide to its customers. In fact, Polaris believes that its voluntary action alone will deliver most of the benefits that CPSC staff estimate will be achieved as a result of the proposed mandatory standard.

Polaris disagrees with the Commission's specific proposals, has vigorously opposed those proposals and will continue to do so. Polaris believes, however, that there is an opportunity for industry and the Commission to reach agreement on tests and standards that are relevant, repeatable and reproducible, and has suggestions for the framework of such an agreement. First, however, I want to summarize briefly why Polaris opposes the Commission's specific proposals.

## **Steering/Handling**

The Commission's proposal would require ROVs to exhibit sublimit understeer and would prohibit sublimit neutral steer and oversteer. In reality, however, if adopted, the Commission's proposal will result in ROVs designed to exhibit substantial understeer. The reason is that every vehicle must be certified as compliant with a mandatory consumer product safety standard, so manufacturers must design with a substantial compliance margin.

In support of its proposal, the Commission states generally that vehicles exhibiting sublimit oversteer are prone to rapid increases in lateral acceleration during a turning event, which makes the vehicle "dynamically unstable." That, however, simply is not true. Indeed, during the industry/agency technical meeting on October 23, 2014, CPSC staff engineers acknowledged that sublimit oversteer is not, by itself, a dangerous design characteristic.

Polaris and the Recreational Off-Highway Vehicle Association (ROHVA) have previously identified several reasons why it is a mistake to mandate understeer:

- Predictability and path-following ability are primary ROV design objectives and those characteristics are exemplified in vehicles that are neutral steer or oversteer.
- Substantial understeer, on the other hand, seriously compromises the path-following ability of the ROV, which can be dangerous in the off-road environment where these vehicles are supposed to be operated.
- Dr. Gillespie's "Fundamentals of Vehicle Dynamics," which is relied upon extensively in the Commission's proposal, instructs that the transition from understeer to oversteer does not mark the onset of divergent instability.

## **Lateral Stability**

To address concerns about ROVs' risk of rollover, the Commission also proposes to require a minimum lateral acceleration of 0.70g at two wheel lift (TWL) during a J-turn test. The proposal is premised on the belief that lateral acceleration at TWL on pavement evaluates off-road rollover resistance. Polaris, however, fundamentally disagrees.

In the proposed J-Turn, the vehicle is undergoing a maneuver that generates force against a pivot point and what is measured essentially is the vehicle's ability to resist that force. The pivot point is the connection between the tires and the test surface, which must have a minimum coefficient of friction of 0.80. The grip of the rubber tires and the high friction surface prevent the vehicle from sliding and allows it to pivot over the contact point, or tip, when the lateral forces are high enough.

The problem with the test is that its foundation is wrong with respect to the intended off-road riding environment, making its key parameter – lateral acceleration of 0.70g or greater at TWL – irrelevant. In fact, Polaris is not aware of any evidence indicating that the test or its pass/fail metric has any relevance to rollovers on off-road surfaces.

In the late 1980s and early 1990s, Dynamic Research, Inc., on behalf of the ATV industry, conducted studies of off-road terrain. It measured tire/soil lateral force coefficients at 20 off-road vehicle riding areas across the United States. It found that the mean lateral force coefficient was 0.55 and that the coefficient at 18 of 20 locations was between 0.45 and 0.65. This data was shared with CPSC staff by ROHVA during a meeting on October 7, 2010.

Because of off-road terrain's relatively low lateral force coefficient, once a vehicle reaches 0.65g on virtually all off-road riding surfaces, it will lose traction and begin to slide. Sliding vehicles do not produce untripped rollovers. Since ROVs begin sliding off-road at

lateral accelerations well below CPSC's proposed pass/fail of 0.70g, the proposed lateral stability standard does not evaluate off-road, untripped rollover resistance.

Moreover, even if the proposed standard did evaluate off-road, untripped rollover resistance, increased resistance to untripped rollovers is unlikely to prevent most ROV rollovers. Preliminary analysis of CPSC incident data indicates that the vast majority of ROV rollovers are tripped rollovers. During the October 23 engineering meeting, CPSC staff candidly acknowledged that the proposed test is not intended to evaluate resistance to tripped rollover.

### **Hang Tag**

The Commission also proposes a point-of-sale hang tag that would state the actual measured lateral acceleration for that vehicle at TWL during the proposed J-turn. As stated, Polaris opposes the proposed hang tag because it will not provide useful information to consumers, and is not based on any data showing that vehicles with higher lateral acceleration at TWL are less likely to experience rollovers off-road.

### **Occupant Protection**

Finally, Polaris would like to address the two Commission proposals related to occupant protection.

As noted above, Polaris already has begun to manufacture ROVs with seat belt interlocks. Polaris, however, does not support extending the interlock to the passenger side, for several reasons. First, it grants the passenger the ability to control the vehicle by buckling or unbuckling the safety belt. This is unwise from a safety perspective; the driver should be the only one able to control the vehicle. Second, there are significant technological challenges to the installation of seat belt interlocks on the passenger side, including the requirement for a water/element-proof weight sensor. The sensor would also have to be able to distinguish

between a passenger bouncing on the seat (as can happen frequently in the off-road environment) vs. a passenger exiting the vehicle. Moreover, ROV passenger seats are often designed to be removable, necessitating the development of an easy to use, all-weather durable connector system.

With respect to the proposal for a passive retention barrier, Polaris submits that this is unnecessary in light of the updated voluntary standard. At CPSC staff's suggestion, ANSI/ROHVA 1-2014 requires either a passive barrier or a single-hand, single-operation barrier. There is no data suggesting that the doors and nets required by the voluntary standard are inadequate to restrain ROV occupants.

### **Framework for Agreement on Voluntary Standards**

During the Commission's vote on the NPR, Polaris noted with interest Chairman Kaye's comment that he would like to see the industry and the agency reach agreement on voluntary standards, instead of a mandatory rule. Polaris shares that interest and offers a framework for a possible agreement, based on the discussion at the October 23 engineering meeting.

With respect to vehicle handling, CPSC should work with Polaris and other industry leaders to develop a standardized test to address divergent instability. During the October 23 meeting, there appeared to be consensus that the real hazard is divergent instability, not oversteer. Polaris believes that divergent instability can be defined and that an appropriate test can be developed to identify and eliminate vehicles that exhibit this undesirable quality, while preserving handling design flexibility.

With respect to lateral stability, Polaris believes that given the wide variety of vehicles included in the ROV category and the varying nature of off-road surfaces, multiple tests or indicators of lateral stability are appropriate for an ROV standard. Polaris agrees with CPSC that

static stability is not a particularly meaningful metric. Polaris believes that tilt-table tests should be paired with the ROHVA J-turn to provide a comprehensive evaluation of lateral stability. Both tests are simple and repeatable, provide manufacturers with maximum design flexibility to determine how to avoid TWL, and eliminate all the data processing, repeatability, and reproducibility issues associated with the CPSC's proposed J-turn. Polaris believes that the lateral stability requirements in ANSI/ROHVA 1-2014 are adequate and appropriate, but Polaris also is willing to consider increased minimum angles for the tilt-table tests and/or increased steering input for the ROHVA J-turn.

With respect to the hang tag, Polaris would be willing to display tilt table test results as a comparative metric. Polaris believes that these metrics are actually related to, and predictive of, rollover risk, and would be easily understood by consumers.

With respect to seat belt reminders, Polaris is prepared to implement a driver's side speed-limiting interlock for all ROVs with electronic throttle control (ETC), but not for ROVs with diesel or carbureted engines because the interlock is not compatible with those engines.

With respect to occupant retention, Polaris believes the use of single-hand, single-operation barriers is appropriate, but is willing to consider stricter deflection tolerances if measured from the edge of the ROPS plane.

## **Conclusion**

Polaris urges the Commission to work with the industry to reach agreement on tests and standards that are relevant, reliable and repeatable. On behalf of Polaris, I appreciate the opportunity to be here today and I would be pleased to try to answer any questions.