UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
4330 EAST WEST HIGHWAY
BETHESDA, MD 20814

VOTE SHEET

Date: OCT - 7 2009

TO : The Commission
Todd A. Stevenson, Secretary

THROUGH: Cheryl A. Falvey, General Counsel CAF
Maruta Budetti, Executive Director mbf

FROM : Philip Chao, Assistant General Counsel PC
Barbara E. Little, Attorney BEL

SUBJECT : Advance Notice of Proposed Rulemaking: Recreational Off-Highway Vehicles

The staff is forwarding to the Commission a briefing package recommending that the Commission issue an advance notice of proposed rulemaking (ANPR) to address the safety of Recreational Off-Highway Vehicles. A draft ANPR was provided as Tab E of the staff briefing package.

Please indicate your vote on the following options.

I. Approve publication of the draft ANPR in the *Federal Register* without change.

_____ _____
Signature Date

II. Approve publication of the draft ANPR in the *Federal Register* with changes. (Please specify.)

_____

_____

_____

CPSA 6(b)(1) CLEARED for PUBLIC 10/7/09 BL
__ NO MFRS/PRVTLBLRS OR PRODUCTS IDENTIFIED

__ EXCEPTED BY: PETITION
RULEMAKING ADMIN. PRCDG

X WITH PORTIONS REMOVED: 10/7/09 memo p.2 + TAB A p.1 + ENTIRE TAB D
CPSA 6(5)(C)

Note: This document has not been reviewed or accepted by the Commission.
Initials RK Date 10/7/09

Signature Date

III. Do not approve publication of the draft ANPR in the *Federal Register*.

_____ _____

Signature Date

IV. Take other action (please specify):

_____

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_____

_____ _____

Signature Date

CONTENTS

Briefing Package

Recreational Off-Highway Vehicles (ROVs)

For Further Information Contact:

Caroleene Paul
Project Manager
Directorate for Engineering Sciences
301-504-7540

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: OCT - 7 2009

TO : The Commission
Todd Stevenson, Secretary

THROUGH: Cheryl A. Falvey, General Counsel CAF
Maruta Z. Budetti, Executive Director MZB

FROM : Robert J. Howell, Assistant Executive Director
Office of Hazard Identification and Reduction
Caroleene Paul, Project Manager C.P.
Directorate for Engineering Sciences

SUBJECT : Advance Notice of Proposed Rulemaking (ANPR) for Recreational Off-Highway Vehicles (ROVs)

I. INTRODUCTION

The U.S. Consumer Product Safety Commission (CPSC) staff prepared this briefing package for the Commission in its consideration of regulatory action on recreational off-highway vehicles (ROVs). This package contains information on ROVs, including related injuries and deaths, market information, risk and hazard analyses, and voluntary standard activities. This package also provides options for Commission consideration along with staff's conclusion and recommendation to publish an advance notice of proposed rulemaking (ANPR) to address hazards presented by ROVs.

II. BACKGROUND

A. The Product (Tab A)

ROVs are motorized vehicles having four or more low pressure tires designed for off-road use and intended by the manufacturer primarily for recreational use by one or more persons (see Figure 1). Other salient characteristics of an ROV include the following: a steering wheel for steering control, foot controls for throttle and braking, bench or bucket seats, rollover protective structure (ROPS), restraint system, and a maximum speed greater than 30 mph.

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CPSA Section 6(b)(1)

Figure 1. Recreational Off-Highway Vehicle (ROV)

Although similar in configuration to some light utility vehicles and golf carts, ROVs are differentiated from these vehicle classes by their speed capability of greater than 30 mph. ROVs are also more likely than utility vehicles to be used recreationally in an off-road environment. Light utility vehicles are used primarily in farm and work applications and have maximum speeds of 25 mph or less. Similarly, golf carts are intended for low speed applications (15 mph or less) on moderate terrain.

ROVs are intended to be used on similar terrain to that on which all-terrain vehicles (ATVs) are used, but are distinguished from ATVs by the presence of a steering wheel instead of a handle bar for steering, bench or bucket seats for the driver and passenger(s) instead of straddle seating, foot controls for throttle and braking instead of levers located on the handle bar, and ROPS and restraint systems that are not present on ATVs.

B. Incident Data and Hazard Patterns (Tab B)

Incident Characteristics

CPSC staff reviewed 181 ROV-related fatality and injury incidents from the Injury and Potential Injury Incident (IPII) and In-Depth Investigation (INDP) databases occurring between January 2003 and August 2009. Based on this review, more than 30% of the 181 incidents were reported to involve more than one victim (either deceased or injured). From the 181 ROV-related incidents, CPSC staff is aware of 116 ROV-related fatalities and 152 ROV-related injuries occurring between January 2003 and August 2009. In considering these counts, it is important to emphasize that data collection is ongoing, and these counts are expected to increase as CPSC staff obtains additional information regarding ROV-related incidents during this period.

Of the 152 injuries that were reported to have occurred as a result of ROV-related incidents, a number were very serious in nature. These injuries include deglovings,[1] fractures, and crushing injuries involving the victims' legs, feet, arms, and hands. In some cases, surgical amputation of the victims' injured limbs was required following the incidents.

[1] A degloving is a type of injury in which a large section of skin and tissue is torn away, sometimes to the bone.

A summary of the 181 reported ROV-related incidents by year is shown in Table 1 below:

Table 1: Number of reported incidents by year of incident (n = 181)

Year	Number of Reported Incidents	Number of Reported Injuries	Number of Reported Deaths
2003	2	2	0
2004	4	1	3
2005	16	10	14
2006	24	20	18
2007	45	36	31
2008	55	54	34
2009 (through August)	34	29	16
Unknown year*	1	unknown	unknown
Total	181	152	116

Source: Injury and Potential Injury Incident (IPII) and In-Depth Investigation (INDP) Jan 2003 – Aug 2009
Note: total injuries and death exceed 181 because many incidents involve more than one victim (either deceased or injured)
*The source document for the unknown year is unclear as to the severity of the incident.

Incident hazard patterns were categorized as follows:

- Overturning: The vehicle was reported to have overturned forward, backward, sideways, or in an unknown direction. These incidents occurred either on level ground or on a grade, and no collision was reported to have preceded the overturning of the vehicle.

- ROV collision: The ROV struck (or was struck by) another vehicle, or the ROV struck a stationary object (e.g., rock, tree, gate, etc.).

- ROV rider struck: While riding in an ROV, the victim collided with an object (e.g., a tree, stick, or utility pole).

- Bystander struck: The ROV struck a bystander, resulting in injury or death of the bystander.

- ROV rider fell or thrown: While riding in the ROV, the victim fell or was thrown from the vehicle without prior overturning or collision of the vehicle.

- Stunt: The ROV operator appeared to have been engaging in some sort of stunt immediately prior to the incident (e.g., jumps or donuts).

- Mechanical: The incident was reported to have involved a mechanical issue with the ROV (including incidents where the vehicle was reported to have caught fire).

- Other.

Of the 181 reported incidents, 125 (69%) of the incidents appeared to have involved overturning of the ROV, with no known collision event preceding the overturning. Additionally, 20 (11%) of the incidents were reported to have involved collision of the vehicle with either a stationary object or another motor vehicle.

A summary of the hazard pattern characteristics is shown in Table 2 below:

Table 2: Summary of hazard patterns (n = 181)	
Hazard pattern	**Number of incidents**
Overturning	125
ROV collision	20
ROV rider struck	3
Bystander struck	2
ROV rider fell or thrown	2
Stunt	6
Mechanical	9
Other	5
Unknown hazard pattern	9

Source: Injury and Potential Injury Incident (IPII) and In-Depth Investigation (INDP) Jan 2003 – Aug 2009

Vehicle Overturning

A summary of the hazard pattern characteristics for incidents involving an overturned ROV is shown in Table 3 below:

Table 3: Helmet use, seat belt use, and ejection (for incidents where ROV overturned, n = 125)			
	Helmet use	**Seat belt use**	**Ejection**
Yes	3	21	105
No	68	51	2
Unknown	54	53	18

Source: Injury and Potential Injury Incident (IPII) and In-Depth Investigation (INDP) Jan 2003 – Aug 2009

Of the 125 incidents that involved overturning of ROVs, CPSC staff was able to determine in 107 incidents whether or not a victim was ejected from the vehicle. Ninety-eight percent (105 of 107) of these incidents appeared to involve at least one victim who exited the vehicle, either partially or wholly. Deceased or injured victims were ejected by being thrown out, falling out, jumping out, climbing out, or otherwise fully or partially exiting the vehicle. Partial ejections included victims' limbs (e.g., arms and legs) coming out of the vehicle and being crushed by some part of the vehicle during rollover.

Of the 125 incidents that involved overturning of ROVs, CPSC staff was able to determine in 72 incidents whether or not the victim was wearing a seat belt. Seventy-one percent (51 of 72) of these incidents appeared to involve at least one victim who was either **not** using the seat belt or was wearing it improperly.[2]

Of the 125 incidents that involved overturning of ROVs, CPSC staff was able to determine in 71 incidents whether or not a victim was wearing a helmet. Ninety-six percent (68 of 71) of these incidents appeared to involve at least one victim who was either **not** wearing a helmet or who was wearing a helmet improperly.[3]

[2] Improper seat belt use includes situations where the victim did not use the shoulder portion of the three-point restraint system.

[3] Improper helmet use includes situations where the victim did not did not fasten the chin strap of the helmet.

Vehicle Collision

A summary of the hazard pattern characteristics for vehicle collision incidents is shown in Table 4 below:

Table 4: Helmet use, seat belt use, and ejection (for incidents where ROV collided with a stationary or moving object, n = 20)

	Helmet use	Seat belt use	Ejection
Yes	2	3	11
No	13	9	3
Unknown	5	8	6

Source: Injury and Potential Injury Incident (IPII) and In-Depth Investigation (INDP) Jan 2003 – Aug 2009

Of the 20 incidents that involved collision of the ROV, CPSC staff was able to determine in 14 incidents whether or not a victim was ejected from the vehicle. Seventy-nine percent (11 of 14) of these incidents appeared to involve at least one victim who exited the vehicle, either partially or wholly. Deceased or injured victims were ejected by being thrown out, falling out, or otherwise fully or partially exiting the vehicle. Partial ejections included victims' limbs (e.g., arms and legs) coming out of the vehicle and being crushed by some part of the vehicle. In some incidents, collision of the ROV was then followed by the rollover of the ROV.

Of the 20 incidents that involved collision of the ROV, CPSC staff was able to determine in 12 incidents whether or not the victim was wearing a seat belt. Seventy-five percent (9 of 12) of these incidents appeared to involve at least one victim who was either not using the seat belt or was wearing it improperly.

Of the 20 incidents that involved collision of the ROV, CPSC staff was able to determine in 15 incidents whether or not a victim was wearing a helmet. Eighty-seven percent (13 of 15) of these incidents appeared to involve at least one victim who was either not wearing a helmet or who was wearing a helmet improperly.

C. ROV Market (Tab C)

The number of manufacturers and importers marketing ROVs in the United States has increased substantially in the last couple of years. The first utility vehicle that exceeded 30 mph, thus putting it in the ROV category, was introduced in the late 1990s. No other manufacturer offered a ROV until 2003. Since 2003, more than a dozen manufacturers and importers have entered the market, most in only the last couple of years. Among the recent entrants are several large firms that are also major manufacturers of ATVs and other recreational vehicles. The other recent entrants are mostly Chinese manufacturers and importers of vehicles made by Chinese manufacturers. Most of these recent entrants also manufacture and import ATVs, scooters, go-karts, and other recreational vehicles. The number of individual models of ROVs being offered by these manufacturers and importers is difficult to determine since some importers obtain their models from more than one manufacturer and some manufacturers provide products to more than one importer, but is probably in excess of 20.

In 2008, five large manufacturers, with manufacturing facilities in North America, had a combined 94% share of the ROV market.[4] The remaining 6% of the market was spread among a dozen or more importers or distributors, most of which, as noted above, were offering product from several Chinese manufacturers. Four recreational vehicle manufacturers established the Recreational Off-Highway Vehicle Association (or "ROHVA"). One of the stated purposes of ROHVA is to develop a voluntary standard for ROVs.

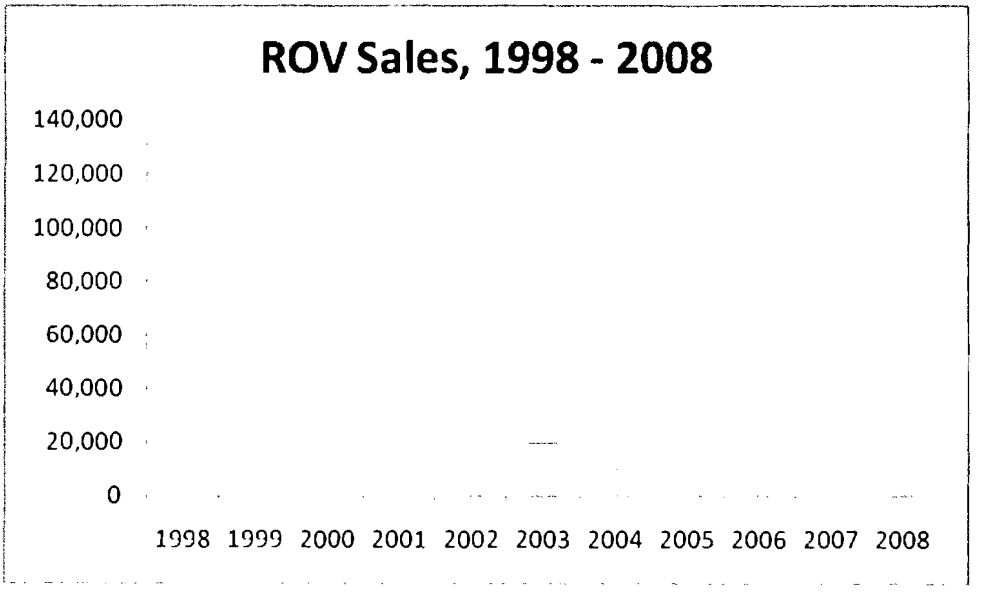
Retail Prices

The suggested retail prices for new ROVs are generally higher than those for other types of recreational and utility vehicles. The prices of the ROVs offered by the five major manufacturers range from about $8,000 to $14,000 depending upon factors such as engine size and other features. The prices of most of the models offered by the smaller importers and distributors range from about $6,000 to $8,000.

There is also an active secondary market for ROVs. For models produced by the major manufacturers, prices for used ROVs range from as low as $2,000 to $3,000 for models produced in the early 2000's, to $5,000 to $8,000 for those produced in 2006 or 2007.[5]

Sales and Number in Use

ROVs are a relatively new product category that has gained popularity in recent years. In 1998, only one manufacturer offered ROV models and fewer than 2,000 units were sold.[6] Sales of these products have increased rapidly (see chart below). By 2003, when a second major manufacturer entered the market, almost 20,000 ROVs were sold. In 2008, it is estimated that more than 126,000 ROVs were sold by more than 20 different manufacturers or distributors.



Source: CPSC analysis of sales data compiled by Power Products Marketing

[4] Market share data based upon an analysis of sales data compiled by Power Products Marketing, Eden Prairie, MN.
[5] National Automobile Dealers Association, Motorcycle/Snowmobile/ATV/Personal Watercraft Appraisal Guide, September-December 2009.
[6] Based upon an analysis of sales data compiled by Power Products Marketing, Eden Prairie, MN.

The estimated approximate number of ROVs in use is a measure of risk exposure. This exposure can be estimated with the CPSC's Product Population Model, a computer model that projects the number of products in use given information on product sales and the expected rate at which products fail or go out of use.[7] Based on sales through 2008, and assuming an average product life of about 10 years, there may have been more than 416,000 ROVs in use at the end of 2008. This contrasts with fewer than 45,000 in use at the end of 2003.

D. Preliminary Societal Cost (Tab C)

As noted earlier, CPSC staff is aware of 116 deaths and 152 injuries involving ROVs. The actual numbers of injuries and deaths are probably higher since not all incidents involving ROVs are believed to have been reported to CPSC staff.[8]

The societal costs of injuries include more than the medical cost of treating the injury. The injury cost also includes the cost of lost work due to the injury, intangible costs, such as pain and suffering, and product insurance and litigation costs. The injury costs will vary by factors such as the severity of the injury (an injury resulting in a hospital stay is more costly than one that does not) and the body part affected (a head injury is usually more costly than an injury to a finger). Usually, the intangible cost (pain and suffering) is the largest component of the societal cost of injuries.

If the non-fatal injuries associated with ROVs are similar to those associated with ATVs (e.g., in terms of the severity and type of injury), then the average societal cost associated with an injury would be about $38,000. Pain and suffering would account for about 67% of the cost, medical costs would account for almost 13% of the total, and work loss would account for about almost 20% of the cost. The legal and liability costs would account for less than one percent of the total.[9]

III. DISCUSSION

A. Past Work (Tab A)

From November 2008 to February 2009, CPSC staff performed tests and evaluations of several ROV models on the market in support of the Office of Compliance and Field Operations. CPSC staff's preliminary evaluations indicated that the vehicles may exhibit inadequate lateral stability, undesirable steering characteristics, and inadequate occupant protection during a rollover crash.

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[7] For a more complete description of the Product Population Model, see M.L. Lahr and B. B. Gordon, Final Report on Product Life Model Feasibility and Development Study to Deputy Associate Executive Director, Directorate for Economic Analysis, U.S. Consumer Product Safety Commission, prepared by Battelle Columbus Laboratories, Columbus, Ohio (14 July 1980).

[8] CPSC Memorandum from Sarah Garland and Robin Streeter, Directorate for Epidemiology, to Caroleene Paul, Project Manager, Directorate for Engineering Sciences, "Review of Reported Injuries and Fatalities Associated with Recreational Off-Highway Vehicles (ROVs)," September 2008.

[9] These estimates are based on the average cost of an injury associated with an ATV calculated using the CPSC's Injury Cost Model (ICM). For a more thorough discussion of the ICM see Ted R. Miller, et al., *The Consumer Product Safety Commission's Revised Injury Cost Model, Final Report to the U.S. Consumer Product Safety Commission*, Public Services Research Institute, Calverton, Maryland, December 2000. It is available from the CPSC website (in 2 files) at http://www.cpsc.gov/LIBRARY/FOIA/FOIA02/os/Costmodept1.pdf and http://www.cpsc.gov/LIBRARY/FOIA/FOIA02/os/Costmodept2.pdf.

CPSC staff identified three factors related to the design of a ROV that have the greatest impact on occupant safety:

1. Static stability factor (SSF)
2. Vehicle handling
3. Occupant retention and protection

Static Stability Factor

The static stability factor (SSF) of a vehicle is the ratio of the vehicle's track width to twice the height of its center of gravity.[10] The National Highway Traffic Safety Administration (NHTSA) has established a strong correlation between a vehicle's SSF and the risk of rollover in a single-vehicle crash. As shown in Figure 2, NHTSA Rollover Resistance Rating System, the risk of rollover for automobiles in a single-vehicle crash ranges from over 40% (1 star) to less than 10% (5 star) with a vehicle SSF range from 1.03 to 1.45. NHTSA's rollover ratings reflect the real-world rollover experience of vehicles involved in over 86,000 single-vehicle crashes.[11] The higher the SSF value, the more stable the vehicle and the less likely the vehicle is to roll over.

The SSF values for the ROV models (with 2 occupants) tested by CPSC staff ranged from 0.84 to 0.92, which is far lower than the range for automobiles. CPSC staff believes that a SSF range of 0.84 to 0.92 is inadequate (too low) for a vehicle that is specifically designed to traverse conditions, such as uneven terrain and slopes, that present an even greater rollover hazard to vehicles than level on-road conditions.

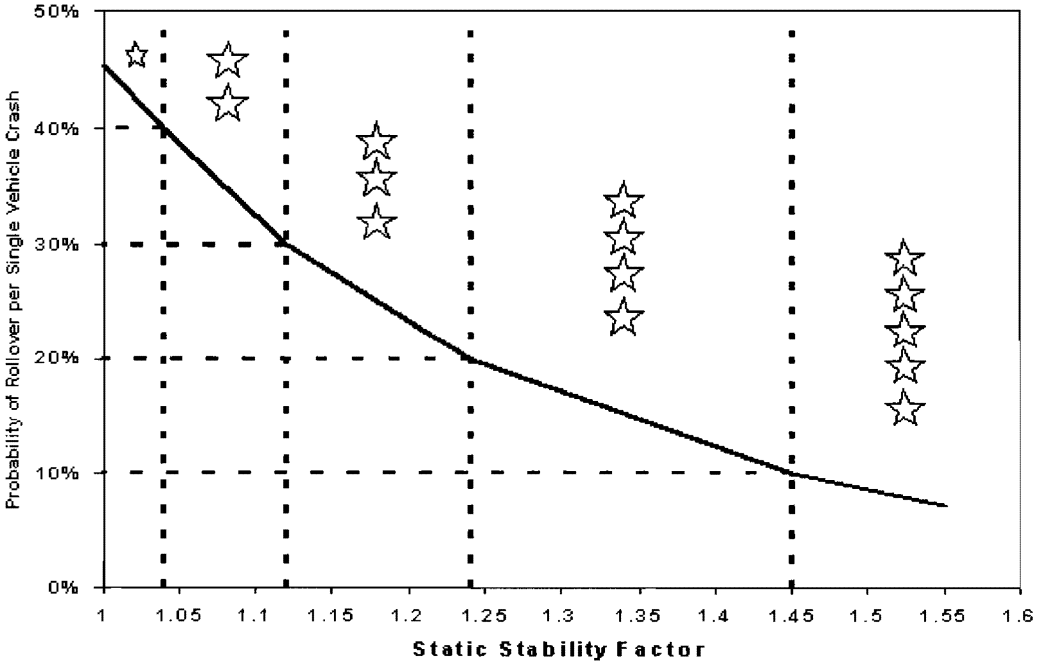

Figure 2. NHTSA Rollover Resistance Rating System (Based On SSF And Risk Of Rollover In Single-Vehicle Crash)

[10] SSF = T/2H, where T = vehicle track width and H = vertical distance from ground to vehicle's center of gravity

[11] http://www.safercar.gov/portal/site/safercar/menuitem.13dd5c887c7e1358fefe0a2f35a67789/?vgnextoid=c688e66aeee35110VgnVCM1000002fd17898RCRD

Vehicle Handling

CPSC staff tested sample ROVs to a standard vehicle handling test, SAE J266 *Steady-State Directional Control Test Procedures for Passenger Cars and Light Trucks*. The tests showed that some models of ROVs exhibited severe oversteer while other models exhibited understeer. If a vehicle understeers in a turn, the front wheels lose traction and the steering wheel needs to be turned more to stay on the path of the turn. This condition is directionally stable, predictable, and for this reason passenger cars are deliberately designed to slightly understeer. If a vehicle oversteers, by contrast, the rear wheels lose traction and the steering wheel needs to be turned less to stay on the turn. This condition is directionally unstable because it can result in spin out or rollover of the vehicle. Controlling oversteer requires driver skill that is beyond the average driver. CPSC staff believes ROVs should exhibit understeer characteristics that are similar to automobiles because it is safer and more familiar to drivers.

Occupant Protection

CPSC staff's testing of the sample ROVs to static and dynamic rollover simulations indicated that some models of ROVs provided better restraint for occupants than other models. Specifically, CPSC staff observed that occupants may be better restrained in ROVs where the occupant seating location is significantly lower within the vehicle and where the vehicle provides a physical shoulder guard on both the passenger and driver side that aids in keeping the upper torso of the occupant within the vehicle. CPSC staff is not aware of any industry standard procedures for evaluating occupant protection.

Repair Program

In March 2009, CPSC staff negotiated a repair program on the Yamaha Rhino 450, 660, and 700 model ROVs to address stability and handling issues with the vehicles.[12] CPSC staff investigated more than 50 incidents, including 46 driver and passenger deaths, related to Yamaha Rhinos. The manufacturer voluntarily agreed to design changes through a retrofit program that would increase the vehicle's SSF and change the vehicle's handling characteristic from oversteer to understeer. The repair consisted of the following: 1) addition of rear spacers on the vehicle's rear wheels and the removal of the rear anti-sway bar to increase vehicle stability and improve handling, and 2) installation of half doors and passenger hand holds to help keep occupants' arms and legs inside the vehicle during a rollover, which is provided with new models.

B. Voluntary Standard (Tab A)

CPSC staff met with representatives of the Recreational Off-Highway Vehicle Association (ROHVA) on December 12, 2008, to discuss the development of an American National Standards Institute (ANSI) standard for ROVs. ROHVA representatives presented an outline for a voluntary standard that included requirements for vehicle configuration, service and parking brake performance, and lateral and pitch stability. At this meeting, CPSC staff expressed concerns about the lateral stability and occupant protection aspects of the ROV class of vehicles. In particular, CPSC staff expressed concern regarding a proposed minimum lateral stability requirement of a 20-degree tilt angle for a fully loaded vehicle. CPSC staff suggested that

[12]CPSC Release #09-172, March 31, 2009, Yamaha Motor Corp. Offers Free Repair for 450, 660, and 700 Model Rhino Vehicles

ROHVA consider NHTSA's use of a vehicle's SSF to describe lateral stability and discussed the possibility of using an SSF greater than 1.0 as a minimum lateral stability requirement for ROVs. The ROHVA representatives rejected using SSF. In addition, CPSC staff encouraged ROHVA to develop requirements dedicated to ensuring adequate occupant protection.

ROHVA representatives indicated that the voluntary standard would be developed using the ANSI Canvass Method where a standards developer conducts a letter ballot to a list of canvassees to determine consensus. The canvassees are a balanced group of those who are directly and materially affected by the standards activity and consist of producers, users, general interest parties, and government representatives. As a canvass member, CPSC staff would not actively participate in standard development but would have the opportunity to comment on a proposed standard. [13]

On June 12, 2009, CPSC staff received a canvass copy of the draft proposed American National Standard for Recreational Off-Highway Vehicles, ANSI/ROHVA 1-200X. The draft voluntary standard addresses design, configuration, and performance aspects of ROVs, including requirements for accelerator, clutch, and gearshift controls; engine and fuel cutoff devices; lighting; tires; service and parking brake performance; lateral and pitch stability; occupant handholds and rollover protective structure (ROPS); seat belts; and requirements for labels and owner's manuals.

CPSC staff reviewed the draft standard and found no improvements to the proposals made by ROHVA at the December 2008 meeting in the areas of lateral stability and occupant protection. ROHVA still proposed a low tilt angle requirement to address lateral stability, defined stability coefficients for an unoccupied vehicle (an unrealistic use configuration), failed to address vehicle handling, and failed to address occupants coming out of a vehicle during a rollover event. CPSC staff submitted the following comments on the proposed draft standard in a letter to ROHVA in August 2009 (included in Tab A).[14]

Vehicle Stability

CPSC staff does not believe the requirements in Section 8. *Lateral Stability* are adequate to address vehicle rollover. CPSC staff believes that the lateral stability requirement for ROVs should be in an occupied configuration, and at a minimum, should be in the 1.03 to 1.45 SSF range.

Vehicle Handling

CPSC staff believes the voluntary standard should include steering characteristic requirements to ensure that ROVs predictably understeer in a turn to reduce the possibility of slide out and rollover. Most passenger cars are designed to understeer because the vehicle tends to be more stable if a sudden change of direction occurs and drivers have more time to recover to this safer and predictable condition. CPSC staff believes ROVs should exhibit similar predictable understeering characteristics that will be familiar to, and safer for, drivers.

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[13] In accordance with 16 C.F.R. § 1031.11 (c) and (d), involvement of CPSC staff in a voluntary standards committee is on a non-voting basis.

[14] Letter from Caroleene Paul, US CPSC to Mr. Thomas S. Yager, Vice President, Recreational Off-Highway Vehicle Association, August 7, 2009

Occupant Retention and Protection

CPSC staff does not believe the requirement in Section 4.7 *Seat Belt* is adequate to address occupant retention, especially in a rollover scenario. The current minimum requirement for a three-point seat belt does not adequately protect the occupant and does not address occupant limbs, torso, and head coming out of the vehicle. Occupant retention is imperative because these vehicles are used in an off-road environment and at a relatively high rate of speed. A number of factors. such as occupant seating location within a vehicle, physical side guards such as doors and shoulder guards, four-point seat belts, and technologies for increasing seat belt use, can improve occupant retention. CPSC staff believes performance requirements for occupant retention and protection should be developed to increase occupant restraint use and to ensure occupant protection within a vehicle in the event of a rollover or collision.

Based on its review of the draft requirements currently proposed by ROHVA, CPSC staff believes that the proposed voluntary standard will not adequately address the deaths and injuries associated with ROV rollovers and collisions.

IV. CONCLUSION

In the six years that ROVs have been on the market, there have been more than 180 reports of ROV-related injuries and deaths. From January 2003 to August 2009, CPSC staff is aware of 116 deaths and 152 injuries involving ROVs. The actual number of injuries and deaths is unknown since not all incidents involving ROVs are believed to have been reported to CPSC staff. CPSC staff expects to receive additional reports for this time period. Furthermore, the number of incidents is probably higher because ROVs are a new product and incidents involving ROVs are frequently mislabeled as involving ATVs or light utility vehicles. The ROV market continues to grow and sales have increased rapidly in the last three years. Consequently, the estimated number of ROVs in use has increased from fewer than 45,000 units in 2003 to more than 416,000 units at the end of 2008.

Will Compliance to the Draft Voluntary Standard Address Hazard?

CPSC staff identified three factors related to the design of ROVs that can have the greatest impact on occupant safety: static stability factor (lateral stability), vehicle handling, and occupant retention and protection. CPSC staff encouraged ROHVA to address these areas in their development of a voluntary standard for ROVs. CPSC staff's review of the draft voluntary standard proposed by ROHVA indicates that these issues are not adequately addressed.

V. STAFF RECOMMENDATION

CPSC staff recommends that the Commission proceed with the rulemaking process for ROVs by publishing an advance notice of proposed rulemaking (ANPR) as drafted by the Office of the General Counsel (see Tab E).

TAB A

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Memorandum

Date: September 25, 2009

TO : Robert J. Howell, Assistant Executive Director
Office of Hazard Identification and Reduction

THROUGH: Hugh M. McLaurin, Associate Executive Director
Directorate for Engineering Sciences
Mark Kumagai, Division Director
Division of Mechanical Engineering

FROM : Caroleene Paul, Division of Mechanical Engineering

SUBJECT : Recreational Off-Highway Vehicles (ROVs)

Background

Product

Recreational off-highway vehicles (ROVs) are a relatively new product in the motorized off-road vehicle category. The staff of the U.S. Consumer Product Safety Commission (CPSC) has received more than 180 reports of ROV-related fatality and injury incidents occurring between January 2003 and August 2009. The non-fatal injuries associated with these incidents are significant in nature, often resulting in amputation, degloving, or other severe injury of extremities that can cause permanent disfigurement.[1]

ROVs are motorized vehicles having four or more low pressure tires designed for off-road use and intended by the manufacturer primarily for recreational use by one or more persons (see Figure 1). Other salient characteristics of an ROV include: a steering wheel for steering control, foot controls for throttle and braking, bench or bucket seats, rollover protective structure (ROPS), restraint system, and a maximum speed greater than 30 mph.

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CPSA Section 6(b)(1)
10/6/09

Figure 1. Recreational Off-Highway Vehicle (ROV)

[1] A degloving is a type of injury in which a large section of skin and tissue is torn away, sometimes to the bone.

Although similar in configuration to some light utility vehicles and golf carts, ROVs are differentiated from these vehicle classes by their speed capability of greater than 30 mph. ROVs are also more likely than utility vehicles to be used recreationally in an off-road environment. Light utility vehicles are used primarily in farm and work applications and have maximum speeds of 25 mph or less. Similarly, golf carts are intended for low speed applications (15 mph or less) on moderate terrain.

ROVs are intended to be used on similar terrain to that on which all-terrain vehicles (ATVs) are used, but are distinguished from ATVs by the presence of a steering wheel instead of a handle bar for steering, bench or bucket seats for the driver and passenger(s) instead of straddle seating, foot controls for throttle and braking instead of levers located on the handle bar, and ROPS and restraint systems that are not present on ATVs.

Past Work

In support of the Office of Compliance, CPSC staff performed tests and evaluations of several ROV models on the market. The tests were conducted from November 2008 to January 2009, and CPSC staff's preliminary evaluations indicated that the vehicles may exhibit inadequate lateral stability, undesirable steering characteristics, and inadequate occupant protection during a rollover crash. CPSC staff identified three factors related to the design of a ROV that have the greatest impact on occupant safety:

1. Static Stability Factor (SSF)
2. Vehicle Handling
3. Occupant Retention and Protection

The static stability factor (SSF) of a vehicle is the ratio of the vehicle's track width to twice the height of its center of gravity.[2] The National Highway Traffic Safety Administration (NHTSA) has established a strong correlation between a vehicle's SSF and the risk of rollover in a single-vehicle crash. As seen in Figure 2, NHTSA Rollover Resistance Rating System, the risk of rollover for automobiles in a single-vehicle crash ranges from over 40% (1 star) to less than 10% (5 star) with a vehicle SSF range from 1.03 to 1.45. NHTSA's rollover ratings reflect the real-world rollover experience of vehicles involved in over 86,000 single-vehicle crashes.[3] The higher the SSF value the more stable the vehicle, and the less likely the vehicle is to roll over.

The SSF values for the ROV models (with 2 occupants) tested by CPSC staff ranged from 0.84 to 0.92, which is far lower than the range for automobiles. CPSC staff believes that a SSF range of 0.84 to 0.92 is inadequate for a vehicle that is specifically designed to traverse conditions, such as uneven terrain and slopes, that present an even greater rollover hazard to vehicles than level on-road conditions.

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[2] SSF = T/2H, where T = vehicle track width and H = vertical distance from ground to vehicle's center of gravity

[3] http://www.safercar.gov/portal/site/safercar/menuitem.13dd5c887c7e1358fefe0a2f35a67789/?vgnextoid=c688e66aeee35110VgnVCM1000002fd17898RCRD

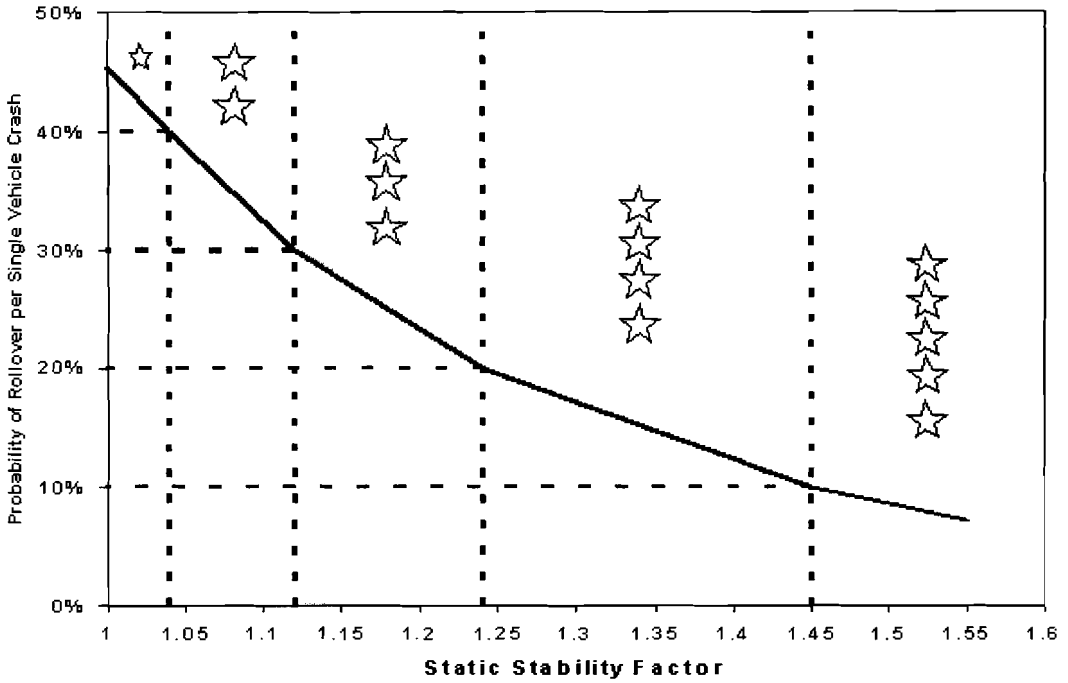


Figure 2. NHTSA Star Rating System Based On SSF And Risk Of Rollover In Single-Vehicle Crash

CPSC staff tested sample ROVs to a standard vehicle handling test, SAE J266 *Steady-State Directional Control Test Procedures for Passenger Cars and Light Trucks*. The tests showed that some model ROVs exhibit severe oversteer while other model ROVs exhibit understeer. If a vehicle understeers in a turn, the front wheels lose traction and the steering wheel needs to be turned more to stay on the path of the turn. This condition is directionally stable, predictable, and for this reason passenger cars are deliberately designed to slightly understeer. If a vehicle oversteers, in contrast, the rear wheels lose traction and the steering wheel needs to be turned less to stay on the turn. This condition is directionally unstable because it can result in spin out or rollover of the vehicle. Controlling oversteer requires driver skill that is beyond the average driver. CPSC staff believes ROVs should exhibit understeer characteristics that are similar to automobiles because it is safer and more familiar to drivers.

CPSC staff's testing of the sample ROVs to static and dynamic rollover simulations indicated that some models of ROVs provided better restraint for occupants than other models. Specifically, CPSC staff observed that occupants may be better restrained in ROVs where the occupant seating location is significantly lower within the vehicle and where the vehicle provides a physical shoulder guard on both the passenger and driver side that aids in keeping the upper torso of the occupant within the vehicle. CPSC staff is not aware of any industry standard procedures for evaluating occupant protection.

In March 2009, CPSC staff negotiated a repair program on the Yamaha Rhino 450, 660, and 700 model ROVs to address stability and handling issues with the vehicles (see Attachment A). CPSC staff investigated more than 50 incidents, including 46 driver and passenger deaths, related to Yamaha Rhinos. The manufacturer voluntarily agreed to design changes through a retrofit program that would increase the vehicle's SSF and change the vehicle's handling

characteristic from oversteer to understeer. The repair consisted of the following: 1) addition of rear spacers on the vehicle's rear wheels and the removal of the rear anti-sway bar to increase vehicle stability and improve handling, and 2) installation of half doors and passenger hand holds to help keep occupants' arms and legs inside the vehicle during a rollover, which is provided with new models.

Voluntary Standard

CPSC staff met with representatives of the Recreational Off-Highway Vehicle Association (ROHVA) on December 12, 2008, to discuss the development of an American National Standards Institute (ANSI) standard for ROVs (see Attachment B). ROHVA representatives presented an outline for a voluntary standard that included requirements for vehicle configuration, service and parking brake performance, and lateral and pitch stability. At this meeting, CPSC staff expressed concerns about the lateral stability and occupant protection aspects of the ROV class of vehicles. In particular, CPSC staff expressed concern regarding a proposed minimum lateral stability requirement of a 20-degree tilt angle for a fully loaded vehicle. CPSC staff suggested that ROHVA consider NHTSA's use of a vehicle's SSF to describe lateral stability and discussed the possibility of using an SSF greater than 1.0 as a minimum lateral stability requirement for ROVs. The ROHVA representatives rejected using SSF. In addition, CPSC staff encouraged ROHVA to develop requirements dedicated to ensuring adequate occupant protection.

ROHVA representatives indicated that the voluntary standard would be developed using the ANSI Canvass Method where a standards developer conducts a letter ballot to a list of canvassees to determine consensus. The canvassees are a balanced group of those who are directly and materially affected by the standards activity and consist of producers, users, general interest parties, and government representatives. As a canvass member, CPSC staff would not actively participate in standard development but would have the opportunity to comment on a proposed standard.[4] ROHVA representatives indicated that the first canvass of the draft voluntary standard for ROVs would be distributed in January 2009.

On June 12, 2009, CPSC staff received a canvass copy of the draft proposed American National Standard for Recreational Off-Highway Vehicles, ANSI/ROHVA 1-200X. The draft voluntary standard addresses design, configuration and performance aspects of ROVs, including requirements for accelerator, clutch and gearshift controls; engine and fuel cutoff devices; lighting; tires; service and parking brake performance; lateral and pitch stability; occupant handholds and rollover protective structure (ROPS); seat belts; and requirements for labels and owner's manuals.

CPSC staff reviewed the draft standard and found no improvements to the proposals made by ROHVA at the December 2008 meeting in the areas of lateral stability and occupant protection. ROHVA still proposed a low tilt angle requirement to address lateral stability, defined stability coefficients for an unoccupied vehicle (an unrealistic use configuration), failed to address vehicle handling, and failed to address occupants coming out of a vehicle during a rollover event. Based

[4] In accordance with 16 C.F.R. § 1031.11 (c) and (d), involvement of CPSC staff in a voluntary standards committee is on a non-voting basis.

on the continuing deaths and injuries involving ROVs and a review of the draft requirements currently proposed by ROHVA, CPSC staff believes that the proposed voluntary standard will not adequately address the deaths and injuries associated with ROV rollovers and collisions.

CPSC staff submitted the following comments on the proposed draft standard in a letter to ROHVA on August 7, 2009 (see Attachment C):

Vehicle Stability

Section 8. *Lateral Stability* of the proposed standard requires the following:

1) That all ROVs, in a fully loaded configuration with occupants and cargo, laterally tilt up to 20 degrees on a tilt table without lifting off,
2) That all ROVs, loaded with two occupants, laterally tilt up to 28 degrees on a tilt table without tipping over, and
3) That all ROVs, in an unloaded configuration, meet a stability coefficient calculated from the vehicle's track width, center of gravity, and wheelbase that is at least 1.0.

CPSC staff does not believe the requirements in Section 8. *Lateral Stability* are adequate to address vehicle rollover. The tilt table requirements for an occupied vehicle equate to a static stability factor (SSF) of 0.53 and the stability coefficient (Kst) requirement of 1.0 is for an unoccupied vehicle. CPSC staff believes the lateral stability requirements for ROVs should be in an occupied configuration and, at a minimum, should be in the 1.03 to 1.45 SSF range of comparable automobiles. CPSC staff believes that ROVs that are specifically designed and marketed for off-road conditions should at least meet the minimum lateral stability requirements for cars on a level on-road environment.

Vehicle Handling

The proposed draft voluntary standard for ROVs does not include requirements that address vehicle handling.

CPSC staff believes the voluntary standard should include steering characteristic requirements to ensure that ROVs predictably understeer in a turn to reduce the possibility of slide out and rollover. Most passenger cars are designed to understeer because the vehicle tends to be more stable if a sudden change of direction occurs and drivers have more time to recover to this safer and predictable condition. CPSC staff believes ROVs should exhibit similar predictable understeering characteristics that will be familiar to, and safer for, drivers.

Occupant Retention and Protection

Section 4.7 *Seat Belt* requires that each seating position in an ROV have a minimum of a three-point seat belt that meets SAE J2292 *Combination Pelvic/Upper Torso (Type 2) Operator Restraint Systems for Off-Road Work Machines.*

CPSC staff does not believe the requirement in Section 4.7 *Seat Belt* is adequate to address occupant retention, especially in a rollover scenario. The current minimum requirement for a three-point seat belt does not adequately protect the occupant and does not address occupant limbs, torso, and head coming out of the vehicle. Occupant retention is imperative because these vehicles are used in an off-road environment and at a relatively high rate of speed. A number of factors, such as occupant seating location within a vehicle, physical side guards such as doors and shoulder guards, four-point seat belts, and technologies for increasing seat belt use, can improve occupant retention. CPSC staff believes performance requirements for occupant protection should be developed to increase occupant restraint use and to ensure occupant protection within a vehicle in the event of a rollover or collision.

Conclusion

Based on the continuing deaths and injuries involving ROVs and a review of the draft requirements currently proposed by the ROHVA, CPSC staff believes that the proposed voluntary standard will not adequately address the deaths and injuries associated with ROV rollovers and collisions. Additionally, there are many safety features or characteristics that can be incorporated on ROVs to make them more stable and safer to use.

Attachment A

NEWS from CPSC

U.S. Consumer Product Safety Commission

Office of Information and Public Affairs — Washington, DC 20207

FOR IMMEDIATE RELEASE
March 31, 2009
Release #09-172

Yamaha Hotline: (800) 962-7926
CPSC Hotline: (800) 638-2772
CPSC Media Contact: (301) 504-7908

Updated To Include Additional Model Information; safety tips also available.

Yamaha Motor Corp. Offers Free Repair For 450, 660, and 700 Model Rhino Vehicles

CPSC advises consumers not to use the off-road vehicles until repaired

WASHINGTON, D.C. - The U.S. Consumer Product Safety Commission (CPSC), in cooperation with Yamaha Motor Corp. U.S.A., of Cypress, Calif., is announcing a free repair program to address safety issues with all Rhino 450, 660, and 700 model off-highway recreational vehicles. Yamaha has also agreed to voluntarily suspend sale of these models immediately until repaired. Consumers should immediately stop using these popular recreational vehicles until the repair is installed by a dealer.

CPSC staff has investigated more than 50 incidents involving these three Rhino models, including 46 driver and passenger deaths involving the Rhino 450 and 660 models. More than two-thirds of the cases involved rollovers and many involved unbelted occupants. Of the rollover-related deaths and hundreds of reported injuries, some of which were serious, many appear to involve turns at relatively low speeds and on level terrain.

About 120,000 of the 450 and 660 model Rhinos have been distributed nationwide since Fall 2003. Some units have been equipped by Yamaha with half doors and additional passenger handholds, either before or after sale.

Yamaha's repair includes the installation of a spacer on the rear wheels as well as the removal of the rear anti-sway bar to help reduce the chance of rollover and improve vehicle handling, and continued installation of half doors and additional passenger handholds where these features have not been previously installed to help keep occupants' arms and legs inside the vehicle during a rollover and reduce injuries. Owners of the affected Rhinos should stop using them and call their dealer to schedule an appointment to have repairs made once they are available and to take advantage of a free helmet offer.

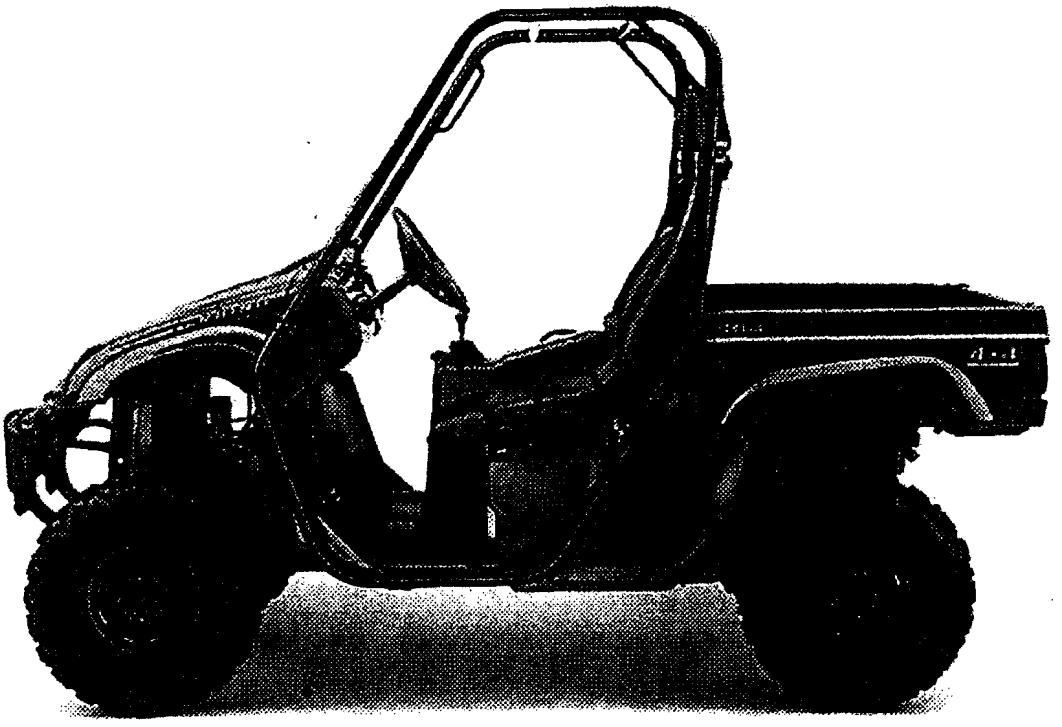
Yamaha is also voluntarily implementing the same repair program and suspension of sale for the Rhino 700 model, in order to ensure customer satisfaction. Consumers should stop riding the 700 model until it is repaired. About 25,000 Rhino 700s are part of this repair program.

Once these repairs have been made to their vehicles, Rhino users should always wear their helmet and seatbelt and follow the safety instructions and warnings in the on-product labels, owner's manuals and other safety materials. The Rhino is only recommended for operators 16 and older with a valid driver's license. All passengers must be tall enough to place both feet on the floorboard with their back against the seat back.

For additional information, contact Yamaha at 800-962-7926 anytime, or visit the firm's Web site at www.yamaha-motor.com

Rhino 450 (with doors)

Rhino 450 (without doors)



Rhino 660 (without doors)

CPSC is still interested in receiving incident or injury reports that are either directly related to this product recall or involve a different hazard with the same product. Please tell us about it by visiting https://www.cpsc.gov/cgibin/incident.aspx

Send the link for this page to a friend! The U.S. Consumer Product Safety Commission is charged with protecting the public from unreasonable risks of serious injury or death from thousands of types of consumer products under the agency's jurisdiction. The CPSC is committed to protecting consumers and families from products that pose a fire, electrical, chemical, or mechanical hazard. The CPSC's work to ensure the safety of consumer products - such as toys, cribs, power tools, cigarette lighters, and household chemicals - contributed significantly to the decline in the rate of deaths and injuries associated with consumer products over the past 30 years.

To report a dangerous product or a product-related injury, call CPSC's Hotline at (800) 638-2772 or CPSC's teletypewriter at (800) 638-8270. To join a CPSC e-mail subscription list, please go to https://www.cpsc.gov/cpsclist.aspx. Consumers

Attachment B

LOG OF MEETING
DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: ANSI Standard Development by the Recreational Off-Highway Vehicle Association

DATE OF MEETING: December 12, 2008

PLACE OF MEETING: U.S. Consumer Product Safety Commission, Bethesda, MD

LOG ENTRY SOURCE: Mark Kumagai, ESME (***MEK 1/16/09***)

COMMISSION ATTENDEES: See attached attendance list

NON-COMMISSION ATTENDEES: See attached attendance list

SUMMARY OF MEETING:

The meeting opened with self introductions of the CPSC staff and the Recreational Off-Highway Vehicle Association (ROHVA). ROHVA members include Arctic Cat, BRP, Polaris, Yamaha, and Kawasaki. The ROHVA website is www.**rohva**.org.

Paul Vitrano of ROHVA made a presentation on the development of the ANSI Standard for Recreational Off-Highway Vehicles.

The presentation discussed the following information:

- ANSI processes and timeline
  - 1/6/09 released for public review
  - 2/20/09 for review of comments
  - 3/20/09 for submission of standard to ANSI for approval
- Definition – a ROV is a vehicle for use by one or more people having a top speed in excess of 35 mph. The ROV has four wheels, uses a steering wheel for steering control and has non-straddle seating.
- Design requirements that will be addressed in standard include:
  - Occupant Protection System
  - Seat Belts
  - Hand Holds
  - Lights
  - Ignition Key
  - Spark Arrestor
  - Low PSI Tires (not for highway use)
- Other requirements include:
  - Operator Manuals
  - Safety Labels
  - Testing

        - Brakes – Parking and Service
        - Lateral Stability – 36.4% grade (20 degrees)
        - Pitch Stability – 46.4% grade (25 degrees)
- Canvass Participants include:
    - ROHVA members
    - CFA
    - User groups
    - Bureau of Land Management
    - Fish and Wildlife Service
    - Transport Canada
    - CPSC staff
- Training – ROHVA will offer on-line training rather than hands-on training, similar to ASI

The CPSC staff questioned the effectiveness of a lateral stability requirement of 20 degrees. Staff expressed concern that this requirement was not adequate and could result in extremely unstable vehicles. The ROHVA technical representative believed the lateral stability requirement was sufficient.

CPSC staff and ROHVA members discussed the use of Static Stability Factor (SSF) as a measure of lateral stability. CPSC staff asked if a SSF greater than 1 could be used as a minimum lateral stability requirement. The ROHVA technical representative responded that SSF was considered but the tilt table method was preferred due to the vehicles' long travel suspension and soft tires issues for these vehicles.

CPSC staff asked the ROHVA members if the National Highway Traffic Safety Administration (NHTSA) was on the Canvass list. NHTSA was not asked to comment because these are off-road vehicles.

CPSC staff asked if the standard will have requirements to prevent arms and legs from coming out of the vehicle during a roll-over. The ROHVA technical representative responded that there are no mechanical requirements for keeping limbs inside the vehicle in the current draft. This may emerge as a requirement in the future.

Other topics of discussion included:

- Expected vehicle life (ROHVA did not have this information),
- Fuel system integrity (EPA has requirements for emissions, no requirements in the current draft)
- Seat belt interlock (not currently incorporated or discussed in the draft standard)
- Market data (sold through established dealerships; cost about $10,000; no sales data available; no import data available; products are relatively new and quickly emerging onto the market)
- Incident data (Industry asked if there was any way to quickly share any injury pattern data that CSPC staff might have; CPSC staff reported that code 5044 was established for Utility Vehicles.)

- Use on paved roads (Although some localities are allowing use of off-highway vehicles on public roads, ROHVA does not support, and warns against, this use of ROVs due to the possibility of being hit by another vehicle.)
- Labeling (Warning labels will include safe riding practices and use of appropriate safety gear such as helmets, goggles, and gloves.)

Meeting Attendance Record
Date: 12/12/08
Location: US Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD 20814
Room 410B/C
Project: ROHVA

COMMISSION ATTENDEES:		
Name (last, first)		Organization
Brown	Sarah	ESHF
Goldsmith	Jason	HS
Haslett	Renee	OGC
Howell	Jay	EXHR
Karen	Mike	ESME
Kumagai	Mark	ESME
Leland	Elizabeth	EC
Malihi	M. Reza	OGC
Mullan	Gib	EXC
Paul	Caroleene	ESME
Popkin	Seth	OGC
Sharpless	Perry	LS
Stadnik	Andrew	LS
Streeter	Robin	EPHA
Topka	Tanya	CDI
Vallese	Julie	EXPA
Yelenik	Ronald	OGC

NON-COMMISSION ATTENDEES:		
Name (last, first)		Organization
Alden	Jack	Honda
Daley	Annamarie	RKM&C
D'Entremont	Ken	Polaris
Johnson	Tom	KMC
Lund	Kevin	Deere & CO
McConnell	Mary	Polaris
Murray	David	WF&G
Nathanson	Paul	PRN
St.Arnaud	Yves	BRP
Vitrano	Paul	ROHVA

Weintraub	Rachel	CFA
Wiegard	Michael	ESCM
Willen	William	Honda
Wilson	Douglas	KMC
Woods	Kathy	OPEI

Attachment C

U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, DC 20207

Caroleene Paul
Mechanical Engineer
Division of Mechanical Engineering
Directorate for Engineering Sciences

Tel: 301-504-7540
Fax: 301-504-0533
Email: cpaul@cpsc.gov

August 7, 2009

Mr. Thomas S. Yager
Vice President
Recreational Off-Highway Vehicle Association
2 Jenner Street, Suite 150
Irvine, California 92618-3806

Dear Mr. Yager:

On June 12, 2009, the U.S. Consumer Product Safety Commission (CPSC) staff received a canvass copy of the draft proposed American National Standard for Recreational Off-Highway Vehicles, ANSI/ROHVA 1-200X.* CPSC staff reviewed the draft and believes that the proposed standard does not adequately address vehicle stability, vehicle handling, and occupant retention and protection.

As of July 2009, CPSC staff has received reports of more than 100 fatalities involving Recreational Off-Highway Vehicles (ROVs). A number of very serious injuries that required medical treatment resulting in permanent disfiguration, including amputation and degloving, have also been reported. Many of these death and injury cases involved rollover of the vehicle. In addition, many involved unbelted as well as belted occupants who were ejected from the vehicle. Accordingly, CPSC staff believes robust stability, vehicle handling, and occupant retention and protection requirements are needed in the voluntary standard to address these deaths and injuries.

CPSC staff does not believe the requirements in Section 8. *Lateral Stability* are adequate to address vehicle rollover. The tilt table requirements for an occupied vehicle equate to a static stability factor (SSF) of .53 and the stability coefficient (Kst) requirement of 1.0 is for an unoccupied vehicle. The National Highway Traffic Safety Administration (NHTSA) has established a strong correlation between a vehicle's SSF (which is a ratio of its track width and center of gravity) and the risk of rollover in a single vehicle crash. CPSC staff believes the lateral stability requirements for ROVs should be in an occupied configuration and, at a minimum, should be in the 1.03 to 1.45 SSF range of comparable automobiles. CPSC staff recognizes that NHTSA studies these factors as they relate to on-road vehicles; however, staff

* The comments in this letter are those of the CPSC staff and have not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

believes that off-road vehicles used in off-road conditions present an even greater vehicle rollover hazard.

CPSC staff believes the voluntary standard should also include steering characteristic requirements to ensure that ROVs predictably understeer in a turn to reduce the possibility of slide out and rollover. CPSC testing of ROVs to SAE J266 *Steady-State Directional Control Test Procedures for Passenger Cars and Light Trucks* indicates that some model ROVs exhibit severe oversteer while other model ROVs exhibit terminal understeer. Most passenger cars are designed to understeer because the vehicle tends to be more stable if a sudden change of direction occurs and drivers have more time to recover to this safer and predictable condition. CPSC staff believes ROVs should exhibit similar predictable understeering characteristics that will be familiar to and safer for drivers.

CPSC staff does not believe the requirement in Section 4.7 *Seat Belt* is adequate to address occupant retention, especially in a rollover scenario. The current minimum requirement for a 3 point seat belt does not adequately protect the occupant and does not address occupant limbs coming out of the vehicle. Occupant retention is imperative because these vehicles are used in an off-road environment and at a relatively high rate of speed. A number of factors, such as occupant seating location within a vehicle, physical side guards such as doors and shoulder guards, four-point seat belts, and technologies for increasing seat belt use, can improve occupant retention. CPSC staff believes a section dedicated to occupant retention should be developed for the voluntary standard.

Thank you for this opportunity to comment. CPSC staff looks forward to continued communication with ROHVA regarding the ANSI/ROVHA voluntary standard. If you have any questions or comments, please feel free to contact me.

Sincerely,

Caroleene Paul

TAB B

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
4330 EAST WEST HIGHWAY
BETHESDA, MD 20814

Memorandum

Date: September 25, 2009

TO : Caroleene Paul, Project Manager
Directorate for Engineering Sciences

THROUGH: Russell Roegner, Associate Executive Director
Directorate for Epidemiology

Kathleen Stralka, Director
Division of Hazard Analysis

FROM : Sarah Garland, Mathematical Statistician
Division of Hazard Analysis

Robin Streeter, Mathematical Statistician
Division of Hazard Analysis

SUBJECT : Review of Reported Injuries and Fatalities
Associated with Recreational Off-Highway Vehicles (ROVs)*

Introduction

Recreational off-highway vehicles (ROVs) are motorized vehicles having four or more low pressure tires. ROVs are intended by manufacturers primarily for recreational off-highway use by one or more persons. ROVs are distinguished from all-terrain vehicles (ATVs) by the presence of steering wheels for steering control, non-straddle seats (i.e., either bench seats or bucket seats) for both the ROV operator and the passenger(s), foot controls for throttle and brake, roll over protective structures (ROPSs), and restraint systems. In addition, ROVs are designed to achieve maximum speeds greater than 30 miles per hour (mph). Although similar to some light utility vehicles and golf carts, ROVs are differentiated from these vehicle classes by their intended recreational off-highway use and their speed capability (i.e., greater than 30 mph).

The U.S. Consumer Product Safety Commission (CPSC) staff has received reports of more than 180 ROV-related fatality and injury incidents occurring between January 2003 and August 2009. Many of these reports were submitted to CPSC staff by consumers, medical examiners, and police departments. In addition, CPSC staff has obtained reports of ROV-

related injury and fatality incidents through review of newspaper articles and other news sources, including online news reports.

Because of the number of incidents reported and the severity of many of these incidents, CPSC's Division of Hazard Analysis undertook a review of available data for ROV-related injury and fatality incidents. This memorandum describes the findings from that review.

Findings

CPSC staff maintains a database containing anecdotal reports of consumer-product-related incidents submitted by consumers, medical personnel, and others. This database of Injury or Potential Injury Incident (or IPII) reports also contains news accounts of consumer-product-related injuries.

As resources allow, reported incidents are assigned for in-depth investigation by CPSC's field staff. These in-depth investigation reports are stored in CPSC staff's INDP database. Currently, nearly all ROV-related incidents are being assigned for investigation.

In August 2009, CPSC's Hazard Analysis staff conducted a search of CPSC's IPII and INDP databases to identify reports of ROV-related incidents. This search yielded reports of 181 ROV-related fatality and injury incidents occurring between January 2003 and August 2009. The following subsections briefly summarize the principal findings of the data review with respect to both general incident characteristics and event characteristics.

General Incident Characteristics

Based on review of reports describing the 181 ROV-related death and injury incidents available in CPSC's databases, CPSC staff is aware of 116 ROV-related fatalities and 152 ROV-related injuries occurring between January 2003 and August 2009. More than 30 percent (59/181) of these 181 incidents were reported to involve more than one victim (either deceased or injured). In considering these counts, it is important to emphasize that data collection is ongoing, and these counts are expected to change as CPSC staff obtains additional information regarding ROV-related incidents.

In addition to the reported 116 ROV-related fatalities, a number of very serious injuries have been reported to have occurred as a result of ROV-related incidents. These injuries include deglovings[1], fractures, and crushing injuries involving the victims' legs, feet, arms, and hands. In some cases, surgical amputation of the victims' injured limbs was required following the incidents.

Tables 1 and 2 summarize the 181 ROV-related incidents by year and state of incident.

[1] A degloving is a type of injury in which a large section of skin and tissue is torn away, sometimes to the bone.

Table 1: Number of Reported Incidents by Year (n = 181)	
Year	**Number of incidents**
2003	2
2004	4
2005	16
2006	24
2007	45
2008	55
2009 (through August)	34
Unknown year	1

Table 2: States with 6 or more reported ROV-related incidents (n = 181)	
State	**Number of reported incidents**
California	22
Texas	19
Florida	9
Michigan	8
Missouri	8
Utah	8
Georgia	7
Kentucky	7
Ohio	7
Arizona	6
Mississippi	6
Tennessee	6
West Virginia	6

Notes:
(1) Total number of states represented: 39.
(2) States with fewer than 6 reported incidents: Alabama (5), Alaska (3), Arkansas (1), Colorado (2), Delaware (1), Indiana (2), Kansas (1), Louisiana (1), Maine (1), Minnesota (5), Montana (3), Nebraska (3), Nevada (4), New Jersey (1), New Mexico (1), New York (2), North Carolina (3), Oklahoma (1), Oregon (3), Pennsylvania (5), South Carolina (1), Vermont (1), Virginia (1), Washington (2), Wisconsin (4), and Wyoming (2).
(3) In addition, there were 3 incidents where the state of incident was unknown.

Event Characteristics

Available reports for the 181 ROV-related death and injury incidents were reviewed to determine the hazard pattern characteristics. Incident hazard patterns were categorized as follows:

- Overturning: The vehicle was reported to have overturned forward, backward, sideways, or in an unknown direction. These incidents occurred either on level ground

or on a grade, and no collision was reported to have preceded the overturning of the vehicle.

- ROV collision: The ROV struck (or was struck by) another vehicle, or the ROV struck a stationary object (e.g., rock, tree, gate, etc.). [Note that, in some incidents, collision of the ROV with an object or with another vehicle was then followed by the overturning of the ROV. These incidents were categorized as "ROV collision" rather than as "Overturning."]

- ROV rider struck: While riding in an ROV, the victim collided with an object (e.g., a tree, stick, or utility pole). [In one such case, this type of hazard pattern occurred when an ROV passenger leaned out of the vehicle and subsequently struck a tree. In a second case, this hazard pattern occurred when a stick punctured the floor board of the ROV, causing injury to one of the ROV occupants. In a third case, the victim struck a utility pole as he was climbing from the front of the ROV to the rear of the ROV while the ROV was in motion.]

- Bystander struck: The ROV struck a bystander, resulting in injury or death of the bystander.

- ROV rider fell or thrown: While riding in the ROV, the victim fell or was thrown from the vehicle without prior overturning or collision of the vehicle.

- Stunt: The ROV operator appeared to have been engaging in some sort of stunt immediately prior to the incident. [Examples of activities categorized as stunts include: (1) going over a hill or jump such that the ROV became airborne, or (2) doing "donuts". In addition, in one of the incidents reviewed, the ROV operator was described as driving on an obstacle course at the time of the incident, and this incident was also categorized as a "Stunt".]

- Mechanical: The incident was reported to have involved a mechanical issue with the ROV. This hazard pattern was also assigned to incidents where the vehicle was reported to have caught fire, including one incident where the ROV was reported to have overturned and then caught fire.

- Other: The five incidents in this hazard pattern category were the following:
    - While in operation, the ROV went over the edge of a retaining wall.
    - While in operation, the ROV went over the edge of a quarry into a water-filled pit.
    - While being operated on a frozen body of water, the ROV exited the ice-covered area and entered an area of open water.
    - The ROV operator's boot strap became caught on the vehicle's gas pedal.
    - The ROV was being operated on a dirt slope or bank that subsequently gave way.

The incident hazard patterns are summarized in Table 3:

Table 3: Summary of hazard patterns (n = 181)	
Hazard pattern	**Number of incidents**
Overturning	125
ROV collision	20
ROV rider struck	3
Bystander struck	2
ROV rider fell or thrown	2
Stunt	6
Mechanical	9
Other	5
Unknown hazard pattern	9

Of the 181 reported incidents, 69 percent (125/181) appeared to have involved overturning of the ROV, with no known collision event preceding the overturning. An additional 11 percent (20/181) of the incidents were reported to have involved collision of the ROV with either a stationary object or another motor vehicle.

Table 4 summarizes additional incident information regarding the 125 incidents where the hazard pattern was characterized as "Overturning". In reviewing Table 4, several points deserve note:

- In the 71 incidents where the victims' helmet use was known, 96 percent (68/71) of these incidents appeared to involve at least one victim who was either not wearing a helmet or who was wearing a helmet improperly.[2]

- In the 72 incidents where the victims' seat belt use was known, 71 percent (51/72) of the incidents appeared to involve at least one victim who was either not using the seat belt or who was wearing it improperly.[3]

- In the 107 incidents where it could be determined that one or more of the victims exited the ROV, 98 percent (105/107) of the incidents appeared to involve at least one victim who either fell from, was thrown from, or climbed out of the ROV during the incident.

[2] Improper helmet use includes situations where the victim did not fasten the chin strap of the helmet.
[3] Improper seat belt use includes situations where the victim did not use the shoulder portion of the three-point restraint system.

Table 4: Helmet use, seat belt use, and ejection (for incidents where ROV overturned, n = 125)

	Helmet use	Seat belt use	Exited ROV
Yes	3	21	105
No	68	51	2
Unknown	54	53	18

Notes:

(1) This tabulation excludes incidents where the overturning of the ROV followed a reported collision event (see Table 5).

(2) "Helmet use = yes" indicates that all victims (deceased and/or injured) in the incident were wearing helmets and that the helmets were properly fastened.

(3) "Seat belt use = yes" indicates that all victims (deceased and/or injured) in the incident were wearing seat belts and that the seat belts were properly fastened.

(4) "Exited ROV = yes" indicates that one or more of the victims in the incident (deceased and/or injured) were thrown, fell out, jumped out, climbed out, or otherwise exited the ROV during the incident. "Exited ROV = yes" includes both partial and complete ejection of one or more victims. "Exited ROV = yes" includes incidents where it was reported that a victim's limb (e.g., leg, arm) was crushed by some part of the ROV.

Table 5 summarizes additional incident information where the hazard pattern was characterized as "ROV collision".

- In the 15 incidents where the victims' helmet use was known, 87 percent (13/15) of the incidents appeared to involve at least one victim who was either not wearing a helmet or who was wearing a helmet improperly.[2]

- In the 12 incidents where the victims' seat belt use was known, 75 percent (9/12) of the incidents appeared to involve at least one victim who was either not using the seat belt or who was wearing it improperly.[3]

- In the 14 incidents where it could be determined whether one or more of the victims exited the ROV, 79 percent (11/14) of the incidents appeared to involve at least one victim who either fell from, was thrown from, or climbed out of the ROV during the incident.

Table 5: Helmet use, seat belt use, and ejection (for incidents where ROV struck a stationary or moving object, n = 20)

	Helmet use	Seat belt use	Exited ROV
Yes	2	3	11
No	13	9	3
Unknown	5	8	6

Notes:

(1) This tabulation includes incidents where the ROV overturned after a reported collision event.

(2) "Helmet use = yes" indicates that all victims (deceased and/or injured) in the incident were wearing helmets and that their helmets were properly fastened.

(3) "Seat belt use = yes" indicates that all victims (deceased and/or injured) in the incident were wearing seat belts and that their seat belts were properly fastened.

(4) "Exited ROV = yes" indicates that one or more of the victims in the incident (deceased and/or injured) were thrown, fell out, jumped out, climbed out, or otherwise exited the ROV during the incident. "Exited ROV = yes" includes both partial and complete ejection of one or more victims. "Exited ROV = yes" includes incidents where it was reported that a victim's limb (e.g., arm or leg) was crushed by the ROV or by some part of the ROV (e.g., the roll cage).

In considering the findings from this data review, several points deserve note:

- CPSC staff is expecting to receive additional reports of ROV-related injuries and fatalities for the time period discussed in this memorandum (January 2003 through August 2009). In addition, CPSC staff is expecting to receive additional information regarding some of the 181 incidents reviewed for this memorandum. That information, together with reports of additional ROV-related incidents, may result in changes to some of the information presented herein.

- There is no requirement for consumers, medical personnel, or police officials to report consumer-product-related incidents (including ROV-related incidents) to CPSC staff. As a result, in conducting reviews such as the ROV analysis described herein, CPSC staff relies largely on anecdotal data submitted to CPSC staff and on available news reports in order to identify incidents involving consumer products (including ROVs). In some cases, these reports are submitted by a victim's family member, friend, physician, attorney, etc. As such, these reports may provide only indirect (i.e., second-hand or third-hand) information. Moreover, in some cases, these reports are submitted months or years after the incident occurred. These factors may affect the accuracy, completeness, and level of detail in the reports that are available to CPSC staff.

- The incidents reviewed for the study described herein do not constitute a statistically-derived sample of ROV-related incidents. Thus, caution must be used in interpreting the results, particularly with regard to comparing the relative frequencies observed in the reported hazard patterns (e.g., in comparing the proportion of incidents involving the ROV overturning versus the proportion of incidents involving collision).

- Where available to CPSC staff, the information compiled in this review was based on police and medical reports. However, these reports were not available for all incidents. In addition, when the reports were available, the quality and completeness of these reports varied greatly across jurisdiction. This factor also makes it difficult to compare incident characteristics.

- Because news reports, police reports, and other information sources may refer to ROVs as ATVs or as four-wheelers, it can be difficult to identify potential ROV-related incidents. Moreover, confirmation that an incident is ROV-related requires that the vehicle's make/model be known. The analysis presented herein included only those ROV-related incidents where the vehicle make/model was specifically reported.

- The hazard patterns associated with ROV-related fatality and injury incidents are often complex, involving a number of events. In addition, medical, police, and news reports for a given incident sometimes contain conflicting information. Thus, determining the precise sequence of events or identifying the most critical event in the hazard pattern sequence can be difficult and, in some cases, may not be possible.

TAB C

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
4330 EAST WEST HIGHWAY
BETHESDA, MD 20814

Memorandum

Date: 6 October 2009

TO : Caroleene Paul, Project Manager
Directorate for Engineering Sciences

THROUGH: Gregory B. Rodgers, Ph.D., Associate Executive Director, GBR
Directorate for Economic Analysis

Deborah Aiken, Ph.D., Senior Staff Coordinator DVA
Directorate for Economic Analysis

FROM : Robert Franklin, Economist RF
Directorate for Economic Analysis

SUBJECT : Recreational Off-Highway Vehicles: Market Information

This report provides market information on a type of consumer vehicle known as a recreational off-highway vehicle (or "ROVs"). This includes information on the sales of these vehicles, the number in use and some information on related products.

The report also discusses the societal cost of injuries associated with ROVs. Although ROVs are a relatively new type of vehicle, the Consumer Product Safety Commission is aware of 116 deaths and 152 injuries associated with these products that occurred between January 2003 and August 2009. The Commission is considering initiating a rulemaking procedure to establish safety requirements for these vehicles.

Description of Product

ROVs are a type of motorized, off-road vehicle. Like automobiles, ROVs are steered by means of a steering wheel (as opposed to handlebars) and the throttle and brakes are operated through foot controls. ROVs may have either bucket or bench seating and usually have seating sufficient for 2 to 4 riders, including the driver. ROVs have at least 4 wheels, usually with low-pressure off-road tires, but some models have 6 wheels. The maximum speed is greater than 30 miles per hour (mph). Although ROVs have work or utility applications (e.g., transporting people, equipment or material to or from a worksite), and are frequently considered to be a type of utility vehicle, they are intended primarily for recreational use.

Similar or Substitute Products

There are several types of off-road vehicles that can be distinguished from ROVs. However, each of the vehicles discussed below have some similarities to ROVs and can be used for many of the same purposes.

Utility vehicles (or "UVs") are very similar to ROVs except that their maximum speed is less than 30 mph. Whereas the first ROVs were introduced in the late 1990s, UVs have been on the market since at least the early 1980s. UVs are intended for both utility or work applications and for recreational uses.

All terrain vehicles (ATVs) can be differentiated from ROVs in that ATVs make use of a handle bar and hand controls for steering and for operating the throttle and brakes. ATVs also have seats that are straddled instead of the bucket or bench seats on ROVs. Some ATVs are intended for work and utility applications as well as for recreational uses. Others are intended primarily for recreational purposes. Most ATVs are designed for one rider (the driver). On ATVs that are designed for more than one rider, the passenger sits behind the driver. ROVs, on the other hand, are sometimes called "side-by-sides" because a passenger can sit beside the driver.

Another distinction between ATVs and ROVs is that ROVs are not rider interactive as are ATVs. When riding an ATV, the driver must shift his or her weight from side to side while turning or forwards or backwards when ascending or descending a hill or crossing an obstacle. ROVs do not require the drivers to shift their weight while operating the vehicle.

Go karts are another type of recreational vehicle that has some similarities to ROVs. In fact, an article in a trade publication stated that a recently introduced ROV "blurs the line between kart and utility vehicle."[1] Go karts are generally intended solely for recreational purposes. Like ATVs, there are go-karts with smaller engines that are intended to be driven by children 12 and younger. Other go-karts have larger engines and have maximum speeds in excess of 50 mph. Most go-karts have seats for two riders, including the driver, but about 20 percent are intended for only one rider.[2]

Manufacturers and Market Shares

The number of manufacturers and importers marketing ROVs in the United States has increased substantially in the last couple of years. The first utility vehicle that exceeded 30 mph, thus putting it in the ROV category, was introduced in the late 1990s. No other manufacturer offered an ROV until 2003. Since 2003, more than a dozen manufacturers and importers have entered the market, most in only the last couple of years. Among the recent entrants are several large firms that are also major manufacturers of ATVs and other recreational vehicles. The other recent entrants are mostly Chinese manufacturers and importers of vehicles made by Chinese

[1] "Karts Feel the Chinese Crunch," Dealer News, (November 2007), p. 44(2).

[2] Ibid.

manufacturers. Most of these recent entrants also manufacture and import ATVs, scooters, go-karts, and other recreational vehicles. The number of individual models of ROVs being offered by these manufacturers and importers is difficult to determine since some importers obtain their models from more than one manufacturer and some manufacturers provide products to more than one importer, but is probably in excess of 20.

In 2008, five large manufacturers with manufacturing facilities in North America had a combined 94 percent share of the ROV market.[3] The remaining 6 percent of the market was spread among a dozen or more importers or distributors, most of which, as noted above, were offering product from several Chinese manufacturers. Four recreational vehicle manufacturers established the Recreational Off-Highway Vehicle Association (or "ROHVA"). One of the stated purposes of ROHVA is to develop a voluntary standard for ROVs.

Retail Prices

The suggested retail prices for new ROVs are generally higher than those for other types of recreational and utility vehicles. The prices of the ROVs offered by the five major manufacturers range from about $8,000 to $14,000 depending upon factors such as engine size and other features. The prices of most of the models offered by the smaller importers and distributers range from about $6,000 to $8,000.

There is also an active secondary market for ROVs. For models produced by the major manufacturers, used prices can range from as low as $2,000 to $3,000 for models produced in the early 2000's, to $5,000 to $8,000 for those produced in 2006 or 2007.[4]

The prices of new UVs are somewhat lower than the prices for new ROVs. A UV from one of major manufacturers will typically retail for between $6,000 and $12,000. ATVs typically retail for between $4,000 and $9,000 depending upon the model although some imports might retail for somewhat less. Go-karts usually retail for between $1,500 and $8,000.[5]

Sales and Number in Use

ROVs are a relatively new product category that has gained popularity only in recent years. In 1998, only one manufacturer offered ROV models and fewer than 2,000 units were sold.[6] Sales of these products have increased rapidly (see table below). By 2003, when a second major manufacturer entered the market, almost 20,000 ROVs were sold. In 2008, it is estimated that more than 126,000 ROVs were sold by more than 20 different manufacturers or distributors.

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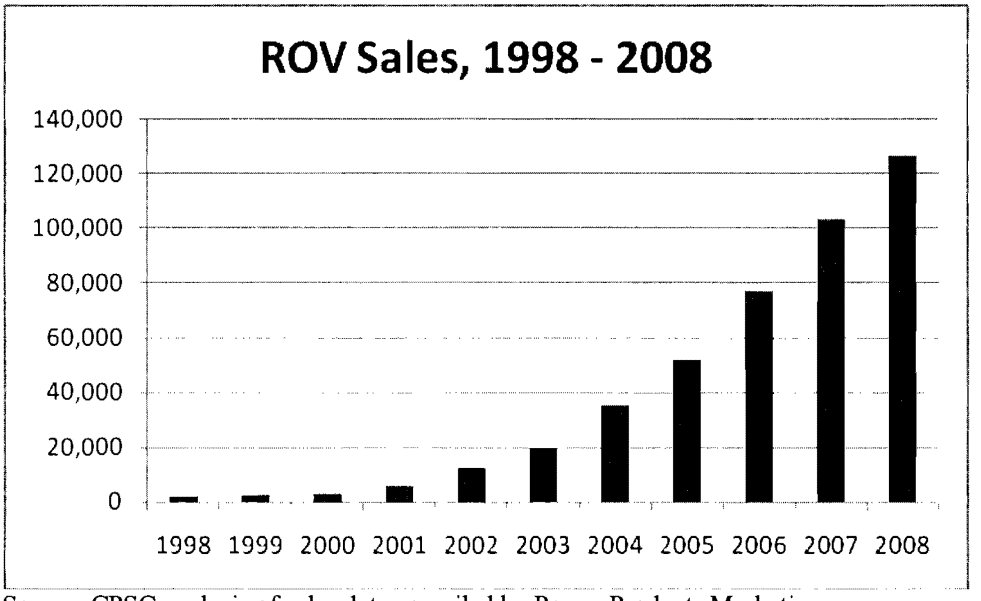
[3] Market share data based upon an analysis of sales data compiled by Power Products Marketing, Eden Prairie, MN.

[4] National Automobile Dealers Association, Motorcycle/Snowmobile/ATV/Personal Watercraft Appraisal Guide, September-December 2009.

[5] Based upon an analysis of sales data compiled by Power Products Marketing, Eden Prairie, MN and an examination of the suggested retail prices on several manufacturers' internet sites.

[6] Based upon an analysis of sales data compiled by Power Products Marketing, Eden Prairie, MN.

An approximate number of ROVs in use, a measure of risk exposure, can be estimated with the CPSC's Product Population Model, a computer model that projects the number of products in use given information on product sales and the expected rate at which products fail or go out of use.[7] Based on sales through 2008, and assuming an average product life of about 10 years, there may have been more than 416,000 ROVs in use at the end of 2008. This contrasts with fewer than 45,000 in use at the end of 2003.



Source: CPSC analysis of sales data compiled by Power Products Marketing

The related utility vehicles (with maximum speeds of less than 30 mph) have been on the market since the early 1980s, but their sales have also increased substantially since 1998. In 1998 an estimated 43,000 of these vehicles were sold. The number of vehicles sold increased each year until 2007, when an estimated 132,000 were sold. In 2008, the number of UVs sold declined to an estimated 113,000.[8] Although we do not have estimates of the number of UVs sold before 1998, assuming a useful life similar to that of ROVs, the number of UVs in use probably exceeded 1 million vehicles at the end of 2008.

One caveat to consider in comparing the sales of ROVs to the sales of utility vehicles is that a larger proportion of UV sales are for commercial or non-consumer applications than are sales of ROVS. Commercial applications include things such as golf course and other landscape maintenance applications. Other commercial applications include uses in forestry management,

[7] For a more complete description of the Product Population Model, see M.L. Lahr and B. B. Gordon, Final Report on Product Life Model Feasibility and Development Study to Deputy Associate Executive Director For Economic Analysis, U.S. Consumer Product Safety Commission, prepared by Battelle Columbus Laboratories, Columbus, Ohio (14 July 1980).

[8] Sales data are based upon an analysis of sales data provided by Power Products Marketing, Eden Prairie, MN. The analysis attempted to exclude those models that were less likely to be purchased by consumers or were not likely to be used for off-road recreation.

large construction projects, pipeline or utility maintenance, and other applications in large industrial facilities. It is estimated that less than 10 percent of the vehicles classified as ROVs are sold for commercial purposes, but between 30 and 40 percent of the UV vehicles might be sold for commercial applications.[9]

U.S. sales of ATVs surpassed 1 million vehicles a year in 2005. This figure includes those intended for adults as well as those intended for youth under the age of 16 years. By 2008, sales of ATVs had declined by 30 percent.[10] The decline is largely attributed to the financial crisis and recession that developed during the year. CPSC estimates that there were about 10.2 million ATVs in use at the end of 2008.

After increasing for several years, go-kart sales peaked at about 109,000 vehicles in 2004. Sales declined over the next couple of years reaching 81,000 vehicles in 2006. One article in a trade publication suggested that the decline in sales was due to the influx of inexpensive ATVs imported from China, which caused some consumers to purchase an ATV over a go-kart.[11]

Factors Affecting the Sales of ROVs

With the exception of ROVs, sales of virtually types of recreational vehicles declined in 2008. The decline was generally attributed to the credit crisis and recession that developed during the year. However, it is notable that 23,000 more ROVs were sold in 2008 than in 2007. This demonstrates the growing popularity of ROVs in recent years. It may also suggest that some of the growth in ROV sales is the result of some consumers substituting ROVs for other recreational vehicles.

In recent years, there has been an apparent trend for older ATV riders to switch to ROVs.[12] ROVs might offer these riders a more comfortable or easier ride since ROVs are not rider-interactive as are ATVs. It is also easier to carry a passenger on a ROV. Most ATVs are not intended to carry passengers and the side-by-side seating offered by ROVs appears to be preferred over the tandem seating on the few ATVs intended to carry passengers.

One disadvantage of a ROV compared to an ATV is that most ROVs are too wide to travel on some trail systems intended for ATVs. However, the recent introduction of ROVs that can negotiate ATV trails could increase the number of consumers that switch from ATVs to ROVs in the future.[13]

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[9] Based upon information provided by Powersports marketing.

[10] CPSC Directorate for Economic Analysis Estimates.

[11] "Karts Feel the Chinese Crunch," Dealer News, (November 2007), p. 44(2).

[12] "UTV Sales Flatten Out in 2008," Dealer News, August 2009, p. 40(4) and "2009 Kawasaki Teryx 750 FI 4x4 Sport RUV Test Ride Review," article posted on http://www.atvriders.com, accessed 20 August 2009 and Tom Kaiser, "Slowing sales: It's now a trend," Powersports Business, 12 February 2007, p. 44(1).

[13] Chris Vogtman, "Ranger shifts into recreation mode," Powersports Business, 12 February 2007, p., 46(2).

Societal Costs of Injuries

CPSC staff are aware of 116 deaths and 152 injuries involving ROVs that occurred between January 2003 and August 2009. The actual number of injuries and deaths are probably higher since not all incidents involving ROVs are believed to have been reported to CPSC staff.[14]

The societal cost of injuries include more than the medical cost of treating the injury. The injury cost also includes the cost of lost work due to the injury, intangible costs, such as pain and suffering, and product insurance and litigation costs. The injury costs will vary by factors such as the severity of the injury (an injury resulting in a hospital stay is more costly than one that does not) and the body part affected (a head injury is usually more costly than an injury to a finger). Usually, the intangible cost (pain and suffering) is the largest component of the societal cost of injuries.

If the non-fatal injuries associated with ROVs are similar to those associated with ATVs (e.g., in terms of the severity and type of injury), then the average societal cost associated with an injury would be about $38,000. Pain and suffering would account for about 67 percent of the cost, medical costs would account for almost 13 percent of the total, and work loss would account for about almost 20 percent of the cost. The legal and liability costs would account for less than one percent of the total.[15]

[14] CPSC Memorandum from Sarah Garland and Robin Streeter, Directorate for Epidemiology, to Caroleene Paul, Project Manager, Directorate for Engineering Sciences, "Review of Reported Injuries and Fatalities Associated with Recreational Off-Highway Vehicles (ROVs)," September 2009.

[15] These estimates are based on the average cost of an injury associated with an ATV calculated using the CPSC's Injury Cost Model (ICM). For a more thorough discussion of the ICM see Ted R. Miller, et al., *The Consumer Product Safety Commission's Revised Injury Cost Model, Final Report to the U.S. Consumer Product Safety Commission*, Public Services Research Institute, Calverton, Maryland, December 2000. It is available from the CPSC website (in 2 files) at http://www.cpsc.gov/LIBRARY/FOIA/FOIA02/os/Costmodept1.pdf and http://www.cpsc.gov/LIBRARY/FOIA/FOIA02/os/Costmodept2.pdf.

TAB D

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CPSA Section 6 (b)(1)

TAB E

[Billing Code 6355-01-U]

CONSUMER PRODUCT SAFETY COMMISSION

16 CFR Part 1422

RIN 3041-AC78

Standard for Recreational Off-Highway Vehicles

AGENCY: Consumer Product Safety Commission.

ACTION: Advance notice of proposed rulemaking.

SUMMARY: The Consumer Product Safety Commission ("Commission") is considering whether there may be unreasonable risks of injury and death associated with Recreational Off-Highway Vehicles (ROVs). This advance notice of proposed rulemaking (ANPR) begins a rulemaking proceeding under the Consumer Product Safety Act (CPSA).

DATES: Written comments in response to this document must be received by the Commission no later than [**insert date that is 60 days after publication**].

ADDRESSES: You may submit comments, identified by Docket No. _____, by any of the following methods:

Electronic Submissions

Submit electronic comments in the following way:

Federal eRulemaking Portal: http://www.regulations.gov. Follow the instructions for submitting comments. To ensure timely processing of comments, the Commission is no longer accepting

comments submitted by electronic mail (e-mail) except through http://www.regulations.gov.

Written Submissions

Submit written submissions in the following way:

Mail/Hand delivery/Courier (for paper (preferably in five copies), disk, or CD-ROM submissions), to: Office of the Secretary, Consumer Product Safety Commission, Room 502, 4330 East West Highway, Bethesda, MD 20814; telephone (301) 504-7923.

Instructions: All submissions received must include the agency name and docket number for this rulemaking. All comments received may be posted without change, including any personal identifiers, contact information, or other personal information provided, to http://www.regulations.gov. Do not submit confidential business information, trade secret information, or other sensitive or protected information electronically. Such information should be submitted in writing.

Docket: For access to the docket to read background comments or comments received, go to http://www.regulations.gov.

FOR FURTHER INFORMATION CONTACT: Caroleene Paul, Project Manager, Recreational Off-Highway Vehicle Team, Directorate for Engineering Sciences, Consumer Product Safety Commission, 4330 East West Highway, Bethesda, Maryland 20814-4408; telephone (301) 504-7540 or e-mail: cpaul@cpsc.gov.

SUPPLEMENTARY INFORMATION:

A. Background

In general, ROVs are motorized vehicles having four or more low pressure tires designed for off-road use and intended by the manufacturer primarily for recreational use by one or more persons. ROVs are a relatively new product in the motorized off-road vehicle category, and, as explained in more detail in part B of this preamble below, their speed and design make them distinct from other vehicles such as all-terrain vehicles (ATVs), light utility vehicles, and golf carts. The number of manufacturers and importers marketing ROVs in the United States has increased substantially in recent years. The first utility vehicle that exceeded 30 mph, thus putting it in the ROV category, was introduced in the late 1990s. No other manufacturer offered a ROV until 2003. Since 2003, more than a dozen manufacturers and importers have entered the market, mostly in only the last couple of years.

The Commission has received more than 180 reports of ROV-related injury and fatality incidents occurring between January 2003 and August 2009. Additionally, non-fatal injuries involving ROVs are significant in nature, often resulting in amputation, degloving,[1] or other severe injury of extremities that can cause permanent disfigurement. Although a voluntary

[1] A degloving is a type of injury in which a large section of skin and tissue is torn away, sometimes to the bone.

standard for ROVs has been proposed (as discussed in part D.3 of this preamble), the Commission does not believe the proposed voluntary standard as currently drafted adequately addresses the risk of injury associated with ROVs. The Commission is considering whether there may be unreasonable deaths and injuries associated with ROVs such that rulemaking is necessary.

B. The Product

ROVs are motorized vehicles having four or more low pressure tires designed for off-road use and intended by the manufacturer primarily for recreational use by one or more persons. Other salient characteristics of an ROV include: a steering wheel for steering control, foot controls for throttle and braking, bench or bucket seats, rollover protective structure (ROPS), restraint system, and a maximum speed greater than 30 miles per hour (mph).

Although similar in configuration to some light utility vehicles and golf carts, ROVs differ from these vehicle classes by their ability to reach speeds greater than 30 mph. In addition, ROVs are more likely than utility vehicles to be used recreationally in an off-road environment. Light utility vehicles are used primarily in farm and work applications and have maximum speeds of 25 mph or less. Similarly, golf carts

are intended for low speed applications (15 mph or less) on moderate terrain.

ROVs are intended to be used on similar terrain to that on which all-terrain vehicles (ATVs) are used, but are distinguished from ATVs by having a steering wheel instead of a handle bar, bench or bucket seats for the driver and passenger(s) instead of straddle seating, foot controls for throttle and braking instead of levers located on the handle bar, and ROPS and restraint systems that are not present on ATVs.

Retail Prices: The suggested retail prices for ROVs are generally higher than those for other types of recreational and utility vehicles. The prices of the ROVs offered by the five major manufacturers range from about $8,000 to $14,000, depending upon factors such as engine size and other features. The retail prices of most of the models offered by the smaller importers and distributors range from about $6,000 to $8,000.

There also is an active secondary market for ROVs. For models produced by the major manufacturers, prices for used ROVs range from as low as $2,000 to $3,000 for models produced in the early 2000's, to $5,000 to $8,000 for those produced in 2006 or 2007.[2]

[2] National Automobile Dealers Association, Motorcycle/Snowmobile/ATV/Personal Watercraft Appraisal Guide, September-December 2009.

Sales and Numbers in Use: ROV sales have seen significant growth in a short time period. In 1998, only one manufacturer offered ROV models and fewer than 2,000 units were sold.[3] By 2003, when a second major manufacturer entered the market, almost 20,000 ROVs were sold. In 2008, it is estimated that more than 126,000 ROVs were sold by more than a dozen different manufacturers or distributors.[4]

The CPSC's Product Population Model is a computer model that projects the number of products in use given information on product sales and the expected rate at which products fail or go out of use.[5] The estimated approximate number of ROVs in use is a measure of risk exposure. Based on sales through 2008, and assuming an average product life of about 10 years, there may have been more than 416,000 ROVs in use at the end of 2008. This contrasts with fewer than 45,000 ROVs in use at the end of 2003.

C. The Risk of Injury

The Commission has received reports of 181 ROV-related fatality and injury incidents occurring between January 2003 and August 2009. Many reports were submitted to the CPSC by

[3] Based upon analysis of sales data compiled by Power Products Marketing, Eden Prairie, MN.
[4] Id.
[5] For a more complete description of the Product Population Model, see M.L. Lahr and B.B. Gordon, Final Report on Product Life Model Feasibility and Development Study to Deputy Associate Executive Director for Economic Analysis, U.S. Consumer Product Safety Commission, prepared by Battelle Columbus Laboratories, Columbus, Ohio (14 July 1980).

consumers, medical examiners, and police departments. In addition, the Commission obtained reports of ROV-related injury and fatality incidents through review of newspaper articles and other news sources, including online news reports. These incidents do not constitute a statistically derived sample of ROV-related incidents.

Because of the number and severity of the incidents, CPSC's Division of Hazard Analysis undertook a more thorough review of these incidents. From the 181 ROV-related incidents, the Commission is aware of 116 ROV-related fatalities and 152 ROV-related injuries. More than 30 percent of the 181 incidents were reported to involve more than one victim (either deceased or injured). In considering these counts, it is important to emphasize that data collection is ongoing, and these counts are expected to increase as CPSC staff obtains additional information regarding ROV-related incidents. In addition, the Commission is expecting to receive additional information regarding some of the 181 incidents reviewed. This information, together with reports of additional ROV-related incidents, may result in changes to some of the information.

Of the 152 injuries that were reported to have occurred as a result of ROV-related incidents, a number were very serious in nature. These injuries include deglovings, fractures, and

crushing injuries involving the victims' legs, feet, arms and hands. In some cases, surgical amputation of the victims' injured limbs was required after the incident.

Of the 181 reported incidents, 125 (69 percent) of the incidents appeared to have involved overturning of the ROV, with no known collision event preceding the overturning. Additionally, 20 (11 percent) of the incidents were reported to have involved collision of the vehicle with either a stationary object or another motor vehicle.

Vehicle Overturning: Of the 125 incidents that involved overturning of the ROV, the CPCS staff was able to determine in 107 incidents whether or not a victim was ejected from the vehicle. Ninety-eight percent (105 of 107) of these incidents appeared to involve at least one victim who exited the vehicle, either partially or completely. Deceased or injured victims were ejected by being thrown out, falling out, jumping out, climbing out, or otherwise fully or partially exiting the vehicle. Partial ejections include victims' limbs (i.e., arms and legs) coming out of the vehicle and being crushed by some part of the vehicle.

Of the 125 incidents that involved overturning of the ROV, the CPSC staff was able to determine in 72 incidents whether or not the victim was wearing a seat belt. Seventy-one percent (51

of 72) of these incidents appeared to involve at least one victim who was either not using the seat belt or was wearing it improperly. (Improper seat belt use includes situations where the victim did not use the shoulder portion of the three-point restraint system on the ROV.)

Of the 125 incidents that involved overturning of the ROV, CPSC staff was able to determine in 71 incidents whether or not a victim was wearing a helmet. Ninety-six percent (68 of 71) of these incidents appeared to involve at least one victim who was either not wearing a helmet or who was wearing a helmet improperly.

Vehicle Collision: Of the 20 incidents that involved collision of the ROV, CPSC staff was able to determine in 14 incidents whether or not a victim was ejected from the vehicle. Seventy-nine percent (11 of 14) of these incidents appeared to involve at least one victim who exited the vehicle, either partially or completely. Deceased or injured victims were ejected by being thrown out, falling out, or otherwise completely or partially exiting the vehicle. Partial ejections include victims' limbs (i.e., arms and legs) coming out of the vehicle and being crushed by the vehicle. In some incidents, collision of the ROV was then followed by the overturning of the

ROV. These incidents were categorized as "ROV collision" rather than as "Overturning."

Of the 20 incidents that involved collision of the ROV, CPSC staff was able to determine in 12 incidents whether or not the victim was wearing a seat belt. Seventy-five percent (9 of 12) of the incidents appeared to involve at least one victim who was either not using the seat belt or who was wearing it improperly.

Of the 20 incidents that involved collision of the ROV, CPSC staff was able to determine in 15 incidents whether or not a victim was wearing a helmet. Eighty-seven percent (13 of 15) of these incidents appeared to involve at least one victim who was either not wearing a helmet or who was wearing a helmet improperly.

Societal Costs of Injuries: The societal costs of injuries include the medical cost of treating the injury, the cost of lost work due to the injury, intangible costs (such as pain and suffering), and the product insurance and litigation costs. The injury costs will vary by factors such as the severity of the injury (an injury resulting in a hospital stay is more costly than one that does not) and the body part affected (a head injury is usually more costly than an injury to a finger).

Usually, the intangible cost (pain and suffering) is the largest component of the societal cost of injuries.

Assuming the non-fatal injuries associated with ROVs are similar to those associated with ATVs in terms of the severity and type of injury, then the average societal cost of an injury would be about $38,000. Pain and suffering would account for about 67 percent of the cost, medical costs would account for almost 13% of the cost, and work loss would account for about almost 20% of the cost. The legal and liability costs would account for less than one percent of the total. (These estimates are based on the average cost of an injury associated with an ATV calculated using the CPSC's Injury Cost Model (ICM).)

D. Current Safety Efforts

1. Testing: From November 2008 to January 2009, the Commission staff tested and evaluated several ROV models on the market. The staff's preliminary evaluations indicate that the vehicles may exhibit inadequate lateral stability, undesirable steering characteristics, and inadequate occupant protection during a rollover crash. CPSC staff believes improved lateral stability and vehicle handling can reduce some of the rollover related incidents. In addition, CPSC staff believes improved occupant retention and protection (including improved occupant

use of seat belts) can reduce some of the occupant ejections associated with ROV rollover and collision. CPSC staff identified three factors related to the design of a ROV that have the greatest impact on occupant safety: (1) static stability factor (SSF); (2) vehicle handling; and (3) occupant retention and protection.

a. SSF: The SSF of a vehicle is the ratio of the vehicle's track width to twice the height of its center of gravity.[6] The National Highway Traffic Safety Administration (NHTSA) has established a strong correlation between a vehicle's SSF and the risk of rollover in a single vehicle crash. The risk of rollover for automobiles in a single-vehicle crash ranges from over 40% to less than 10% with a vehicle SSF range from 1.03 to 1.45.[7] NHTSA's rollover ratings reflect the real-world rollover experience of vehicles involved in over 86,000 single-vehicle crashes.[8] The higher the SSF value the more stable the vehicle, and the less likely the vehicle is to rollover. The SSF values for the ROV models (with 2 occupants) tested by CPSC staff ranged from 0.84 to 0.92, which is far lower than the range for automobiles. CPSC staff believes that a SSF range of 0.84 to 0.92 is inadequate for a vehicle that is specifically designed to traverse conditions, such as uneven

[6] SSF=T/2H, where T= vehicle track width and H = vertical distance from ground to vehicle's center of gravity.
[7] http://www.safercar.gov
[8] Id.

terrain and slopes, that present an even greater rollover hazard to vehicles than level, on-road conditions.

b. Vehicle Handling: Passenger cars are deliberately designed to understeer. If a vehicle understeers in a turn, the front wheels lose traction and the steering wheel needs to be turned more to stay on the path of the turn. This condition is directionally stable and predictable. If a vehicle oversteers in a turn, by contrast, the rear wheels lose traction and the steering wheel needs to be turned less to stay on the turn. This condition is directionally unstable because it can result in spin out or rollover of the vehicle. Controlling oversteer requires driver skill and knowledge in using acceleration and steering that is beyond the average driver.

The CPSC testing of sample ROVs to SAE J266, *Steady-State Directional Control Test Procedures for Passenger Cars and Light Trucks*, a standard vehicle handling test, indicates that some model ROVs exhibit severe oversteer while other model ROVs exhibit understeer. The CPSC staff believes that ROVs should exhibit understeer characteristics that are similar to automobiles because such characteristics are safer and more familiar to drivers.

c. Occupant Retention and Protection: CPSC staff's testing of the sample ROVs to static and dynamic rollover

simulations indicate that occupants may be better restrained in some model ROVs. Specifically, occupants may be better restrained in ROVs where the occupant seating location is significantly lower within the vehicle and the vehicle provides a physical shoulder guard on both the passenger and driver side that helps keep the occupant's upper torso within the vehicle.

2. Repair Program: In March 2009, the Commission negotiated a repair program involving the Yamaha Rhino 450, 660, and 700 model ROVs to address stability and handling issues with the vehicles.[9] CPSC staff investigated more than 50 incidents, including 46 driver and passenger deaths. The manufacturer voluntarily agreed to design changes through a retrofit program that would increase the vehicle's SSF and change the vehicle's handling characteristic from oversteer to understeer. The repair consisted of: (1) the addition of rear spacers on the vehicle's rear wheels and the removal of the rear anti-sway bar to increase vehicle stability and improve handling; and (2) continued installation of half doors and passenger hand holds to help keep occupants' arms and legs inside the vehicle during a rollover.

3. Voluntary Standard: CPSC staff met with representatives of the Recreational Off-Highway Vehicle

[9] CPSC Release #09-172, Yamaha Motor Corp. Offers Free Repair for 450, 660, and 700 Model Rhino Vehicles, (March 31, 2009).

Association (ROHVA) on December 12, 2008, to discuss the development of an American National Standards Institute (ANSI) standard for ROVs. ROHVA was formed by four manufacturers, and one of its stated purposes is to develop a voluntary standard for ROVs. The ROHVA representatives presented an outline for a voluntary standard that included requirements for vehicle configuration, service and parking brake performance, and lateral and pitch stability. At this meeting, CPSC staff expressed concerns about the lateral stability and occupant protection aspects of the ROV class of vehicles. In particular, CPSC staff expressed concern regarding a proposed requirement for a 20 degree tilt angle for a fully loaded vehicle. CPSC staff suggested that ROHVA consider NHTSA's use of a vehicle's SSF to describe lateral stability and discussed the possibility of using an SSF greater than 1.0 as a minimum lateral stability requirement for ROVs. The ROHVA representatives rejected using SSF. In addition, CPSC staff encouraged ROHVA to develop requirements dedicated to ensuring adequate occupant protection.

On June 12, 2009, CPSC staff received a copy of the draft proposed American National Standard for Recreational Off-Highway Vehicles, ANSI/ROHVA 1-200X. The draft voluntary standard addresses design, configuration and performance aspects of ROVs, including requirements for accelerator, clutch, and gearshift

controls; engine and fuel cutoff devices; lighting; tires; service and parking brake performance; lateral and pitch stability; occupant handholds and rollover protection structure (ROPS); seat belts; and requirements for labels and owner's manuals.

CPSC staff reviewed the draft standard and found no improvement from the proposals made by ROHVA at the December 2008 meeting in the areas of lateral stability and occupant protection. ROHVA continues to propose low tilt angles as a lateral stability requirement, continues to define stability coefficients for an unoccupied vehicle (an unrealistic use configuration), fails to address vehicle handling, and fails to address occupants coming out of a vehicle during a rollover event. This notice, in parts D.3.a through D.3.c of this preamble immediately below, discusses the CPSC staff's concerns on specific aspects of the draft standard.

a. Vehicle Stability: Section 8 of the draft voluntary standard, *Lateral Stability,* requires the following: that all ROVs, in a fully loaded configuration with occupants and cargo, laterally tilt up to 20 degrees on a tilt table without lifting off; that all ROVs, loaded with two occupants, laterally tilt up to 28 degrees on a tilt table without tipping over; and that all ROVs, in an unloaded configuration, meet a

stability coefficient calculated from the vehicle's track width, center of gravity, and wheelbase that is at least 1.0.

CPSC staff does not believe the requirements in Section 8, *Lateral Stability*, are adequate to address vehicle rollover. As noted in part D.1.a of this preamble, CPSC staff believes that the lateral stability requirement for ROVs should be in an occupied configuration, and, at a minimum, should be in the 1.03 to 1.45 SSF range.

b. Vehicle Handling: The proposed voluntary standard does not include any requirements that address vehicle handling. CPSC staff believes ROVs should exhibit predictable understeering characteristics similar to passenger cars that will be familiar to and safer for drivers. As stated earlier in part D.1.b of this notice, understeering characteristics are safer and more familiar to drivers.

c. Occupant Retention and Protection: Section 4.7 of the draft voluntary standard, *Seat Belt*, requires that each seating position in a ROV have a minimum of a three-point seat belt that meets SAE J2292 *Combination Pelvic/Upper Torso (Type 2) Operator Restraint Systems for Off-Road Work Machines.*

The staff does not believe the requirement in section 4.7 is adequate to address occupant retention, especially in a rollover scenario. Occupant retention for ROVs is imperative

because the vehicles are used in an off-road environment and at a relatively high rate of speed. CPSC testing indicates the current minimum requirement for a three-point seat belt does not adequately protect the occupant and does not address occupant limbs, torso, and head coming out of the vehicle. The staff believes a number of factors, such as occupant seating location within a vehicle, physical side guards such as doors and shoulder guards, four-point seat belts, and technologies for increasing seat belt use, can improve occupant retention.

E. Regulatory Alternatives to Address the Risks of Injury

The Commission could address the risks of injury associated with ROVs through rulemaking. Alternatively, the Commission could defer to the voluntary standards process. Based on the continuing deaths and injuries involving ROVs and a review of the draft requirements currently proposed by ROHVA, the Commission has preliminarily determined that the draft voluntary standard will not adequately address the deaths and injuries associated with ROV rollovers and collisions.

F. Request for Information and Comments

In accordance with section 9(a) of the CPSA, the Commission invites comments on the following matters:

1. With respect to the risk of injury identified by the Commission, the regulatory alternatives being considered, and other possible alternatives for addressing the risk.

2. Any existing standard or portion of a standard which could be issued as a proposed regulation.

3. A statement of intention to modify or develop a voluntary standard to address the risk of injury discussed in this notice, along with a description of a plan (including a schedule) to do so.

In addition, the Commission is interested in receiving the following information:

1. Definition of an ROV.

2. Technical reports of testing, evaluation, and analysis of the dynamic stability, handling characteristics, and occupant protection characteristics for ROVs.

3. Technical reports or standards that describe the minimum performance requirements for stability, handling characteristics, and occupant protection characteristics for ROVs.

4. Technical information on test and evaluation methods for defining ROV characteristics that are specifically relevant to the vehicle's stability.

5. Technical reports and evaluations of any prototype ROVs with enhanced safety designs.

6. Technical information on ROV/vehicle design specific to vehicle handling (e.g., suspension design and the use of sway bars).

7. Minimum and maximum track width considerations in ROV design.

8. Minimum and maximum ground clearance considerations in ROV design.

9. Minimum and maximum speed considerations in ROV design.

10. Information on the center of gravity heights of occupied and unoccupied ROV models currently on the market.

11. Information about the applicability of sensor technology to improve the safety of ROVs.

12. Technical information on technologies for increasing seat belt use.

13. Technical information on technologies for increasing the performance of seat belts.

14. Technical studies and evaluations of three point, four point, and five point seat belts.

15. Technical information on ROPS design as it pertains to ground impact footprint and potential crushing injuries to the occupant.

16. Information on test procedures to evaluate occupant retention and protection performance during roll over.

17. Information on how non-fatal injuries associated with ROVs compare with those associated with ATVs in terms of severity and type of injury.

List of Relevant Documents

1. Briefing memorandum from Caroleene Paul, Project Manager, Directorate for Engineering Sciences, to the Commission, "Advance Notice of Proposed Rulemaking (ANPR) for Recreational Off-Highway Vehicles (ROVS)," September 25, 2009.

2. Memorandum from Caroleene Paul, Division of Mechanical Engineering, CPSC, to Robert J. Howell, Assistant Executive Director for Hazard Identification and Reduction, "Recreational Off-Highway Vehicles (ROVs)," September 25, 2009.

3. Memorandum from Sarah Garland, Mathematical Statistician, Division of Hazard Analysis, CPSC, and Robin Streeter, Mathematical Statistician, Division of Hazard Analysis, CPSC, to Caroleene Paul, Project Manager, Directorate for Engineering Sciences, "Review of Reported Injuries and Fatalities Associated with Recreational Off-Highway Vehicles (ROVs)," September 2009.

4. Memorandum from Robert Franklin, Economist, Directorate for Economic Analysis, CPSC, to Caroleene Paul, Project Manager, Directorate for Engineering Sciences, "Recreational Off-Highway Vehicles: Market Information," September 25, 2009.

Dated: _____

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