This document has been electronically approved and signed.

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

**DATE:** April 28, 2021

**BALLOT VOTE SHEET**

**TO:** The Commission
Alberta E. Mills, Secretary

**THROUGH:** Jennifer Sultan, Acting General Counsel
Mary T. Boyle, Executive Director

**FROM:** Daniel Vice, Acting Assistant General Counsel, Regulatory Affairs
Barbara E. Little, Attorney, Regulatory Affairs

**SUBJECT:** Advance Notice of Proposed Rulemaking Regarding Off-Highway Vehicles

**BALLOT VOTE DUE**: Tuesday, May 4, 2021

Staff is forwarding a briefing package to the Commission recommending that the Commission issue an advance notice of proposed rulemaking (ANPR) in the *Federal Register* concerning the risk of fire and debris-penetration hazards associated with all-terrain vehicles (ATVs), recreational off-highway vehicles (ROVs), and Utility Terrain or Utility Task Vehicles (UTVs), collectively referred to as "off-highway vehicles," or "OHVs." The fire hazards are associated with all three vehicle types; the debris-penetration hazards are associated with ROVs and UTVs. The Office of the General Counsel is providing, for the Commission's consideration, the attached draft ANPR, which seeks comments and initiates rulemaking under the Consumer Product Safety Act (15 U.S.C. §§ 2051-2089).

Please indicate your vote on the following options:

I. Approve publication of the attached document in the *Federal Register,* as drafted.

_____ _____
(Signature) (Date)

II. Approve publication of the attached document in the *Federal Register,* with the specified changes:

_____

_____

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_____ _____

(Signature) (Date)

III. Do not approve publication of the attached document in the *Federal Register.*

_____ _____

(Signature) (Date)

IV. Take other action, specified below.

_____

_____

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_____ _____

(Signature) (Date)

Attachment: Draft *Federal Register* Notice: Off-Highway Vehicle (OHV) Fire and Debris-Penetration Hazards; Advance Notice of Proposed Rulemaking; Request for Comments and Information

[Billing Code 6355-01-P]

**CONSUMER PRODUCT SAFETY COMMISSION**

**16 CFR Chapter II**

**Docket No. CPSC-2021-XXXX**

**Off-Highway Vehicle (OHV) Fire and Debris-Penetration Hazards; Advance Notice of Proposed Rulemaking; Request for Comments and Information**

**AGENCY:** Consumer Product Safety Commission.

**ACTION:** Advance notice of proposed rulemaking.

**SUMMARY:** The Consumer Product Safety Commission (CPSC or Commission) is considering developing a rule to address the risk of injury associated with fire and debris-penetration hazards associated with off-highway vehicles (OHVs). This advance notice of proposed rulemaking (ANPR) initiates a rulemaking proceeding under the Consumer Product Safety Act (CPSA), 15 U.S.C. 2051–2084. We invite written comments from interested persons concerning the risk of injury associated with OHV fire and debris-penetration hazards, the regulatory alternatives discussed in this notice, other possible means to address this risk, and the economic impacts of the various alternatives. We also invite interested persons to submit an existing standard, or a statement of intent to modify or develop a voluntary standard, to address the risks of injury described in this ANPR.[1]

**DATES:** Written comments and submissions in response to this notice must be received by **[insert date that is 60 days after publication in the FEDERAL REGISTER]**.

**ADDRESSES:** You may submit comments, identified by Docket No. CPSC-2021-XXXX, by any of the following methods:

[1] [Commission vote.]

*Electronic Submissions:* Submit electronic comments to the Federal eRulemaking Portal at: *www.regulations.gov*. Follow the instructions for submitting comments. The Commission encourages you to submit electronic comments by using the Federal eRulemaking Portal, as described above.

*Written Submissions:* Submit written submissions by mail/hand delivery/courier to: Division of the Secretariat, Consumer Product Safety Commission, Room 820, 4330 East West Highway, Bethesda, MD 20814; telephone: (301) 504-7923. Alternatively, as a temporary option during the COVID-19 pandemic, you can email such submissions to: cpsc-os@cpsc.gov.

*Instructions*: All submissions received must include the agency name and docket number for this document. All comments received may be posted without change, including any personal identifiers, contact information, or other personal information provided, to *www.regulations.gov*. Do not submit confidential business information, trade secret information, or other sensitive or protected information that you do not want to be available to the public. If furnished at all, such information should be submitted in writing.

*Docket*: For access to the docket to read background documents or comments received, go to *www.regulations.gov*, and insert the docket number CPSC-2021-XXXX into the "Search" box, and follow the prompts.

**FOR FURTHER INFORMATION CONTACT:** Han Lim, Directorate for Engineering Sciences, U.S. Consumer Product Safety Commission, 5 Research Place, Rockville, MD 20850; telephone: (301) 987-2327; e-mail: *hlim@cpsc.gov*.

**SUPPLEMENTARY INFORMATION:**

**A. Background**

The CPSC) is aware of numerous injuries and deaths resulting from fire hazards associated with all-terrain vehicles (ATVs), recreational off-highway Vehicles (ROVs), and Utility Terrain or Utility Task Vehicles (UTVs), and from debris-penetration hazards associated with ROVs and UTVs. For the purposes of this rulemaking proceeding, we collectively refer to these three vehicle types as off-highway vehicles, or OHVs.

CPSC staff's review of incident data from January 1, 2003 through December 31, 2020 in CPSC's Consumer Product Safety Risk Management System (CPSRMS) identified 28 fatalities and 264 injuries from fire-related OHV hazards, and 6 fatalities and 20 injuries[2] from debris-penetration OHV hazards. From the National Electronic Injury Surveillance System (NEISS) database, CPSC staff estimates there were 14,200 emergency department-treated injuries from 2007 to 2019 (based on a sample size of 282) associated with OHV fire, thermal, and burn hazards without indication of a crash or related event.

The current voluntary standards for the three OHV types are:

- ANSI/SVIA 1-2017 *Four-Wheel All-Terrain Vehicles – Equipment, Configurations, and Performance Requirements* developed by Specialty Vehicle Institute of America (SVIA) for ATVs and incorporated by reference as a mandatory standard in 16 CFR 1420.3;
- ANSI/ROHVA 1-2016 *Recreational Off-Highway Vehicles*; and

[2] Note that two of the 20 injuries related to OHV debris-penetration hazards came from the NEISS data.

- ANSI/OPEI B71.9-2016—*American National Standard for Multipurpose Off-Highway Utility Vehicles*.

The current voluntary standards for ROVs and UTVs, ANSI/ROHVA-1-2016 and ANSI/OPEI B71.9-2016, respectively, do not have requirements that address fire hazards or debris-penetration hazards. The current voluntary standard for ATVs, ANSI/SVIA 1-2017, does not include requirements that address fire hazards.

CPSC staff has met with representatives from ROHVA, SVIA, and OPEI on multiple occasions, beginning in September 2018, to discuss the development of requirements to address the risk of fire and debris-penetration hazards. CPSC staff believes that significant progress has been made in discussing possible fire preventative standard requirements, but to date the standard development organizations have not proposed any fire preventative standard requirements. In addition, there has been no discussion on possible debris-penetration mitigation standard requirements.

The Commission is considering developing a mandatory standard (or standards) to reduce the risk of injury associated with OHV fire and debris-penetration hazards. Commission staff prepared a briefing package to describe the products at issue, assess the relevant incident data, describe the hazards, examine relevant voluntary standards, and discuss regulatory alternatives for addressing the risk associated with OHV fire and debris-penetration hazards. That briefing package is available at: [INSERT LINK].

**B. Statutory Authority**

A rulemaking addressing the fire and debris-penetration hazards associated with ROVs and UTVs falls under the authority of the CPSA. 15 U.S.C. 2051–2084. A rulemaking addressing the fire hazards associated with ATVs is subject to section

42(b)(3) of the CPSA. Section 42(b)(3) provides that for CPSC-initiated changes to the mandatory standard for ATVs, 15 U.S.C. 2089, the Commission must make findings required by sections 7 and 9 of the CPSA, 15 U.S.C. 2056 and 2058. Thus, a Commission-initiated rulemaking addressing the fire hazards associated with ATVs would also fall under sections 7 and 9 of the CPSA. Because of the three vehicle types and two different hazard patterns involved in this rulemaking, it is possible the Commission will divide this rulemaking into separate rulemakings at the notice of proposed rulemaking (NPR) stage.

Under section 7 of the CPSA, the Commission may issue a consumer product safety standard if the requirements of the standard are "reasonably necessary to prevent or reduce an unreasonable risk of injury associated with [a] product." 15 U.S.C. 2056(a). The safety standard may consist of performance requirements or requirements for warnings and instructions. *Id.* However, if there is a voluntary standard that would adequately reduce the risk of injury the Commission seeks to address, and there is likely to be substantial compliance with that standard, then the Commission must rely on the voluntary standard, instead of issuing a mandatory standard. 15 U.S.C. 2056(b)(1). To issue a mandatory standard under section 7, the Commission must follow the procedural and substantive requirements in section 9 of the CPSA. 15 U.S.C. 2056(a).

Under section 9 of the CPSA, the Commission may begin rulemaking by issuing an ANPR. 15 U.S.C. 2058(a). The ANPR must identify the product and the nature of the risk of injury associated with it; summarize the regulatory alternatives the Commission is considering; and include information about any relevant existing standards, and why the Commission preliminarily believes those standards would not adequately reduce the risk

of injury associated with the product. The ANPR must also invite comments concerning the risk of injury and regulatory or other possible alternatives for addressing the risk, and invite the public to submit existing standards or a statement of intent to modify or develop a voluntary standard to address the risk of injury. *Id.*

After publishing an ANPR, the Commission may proceed with rulemaking by reviewing the comments received in response to the ANPR and publishing an NPR. An NPR must include the text of the proposed rule, alternatives the Commission is considering, a preliminary regulatory analysis describing the costs and benefits of the proposed rule and the alternatives, and an assessment of any submitted standards. 15 U.S.C. 2058(c). The Commission would then review comments on the NPR and decide whether to issue a final rule, along with a final regulatory analysis.

**C. The Product**

For purposes of this rulemaking, OHVs include: ATVs, ROVs, and UTVs. The scope of this rulemaking does not include golf cars, personal transport vehicles (PTVs), low-speed vehicles, or dune buggies.

1. All-Terrain Vehicles

An all-terrain vehicle (ATV) is a motorized vehicle with three or four broad, low-pressure tires (less than 10 pounds per square inch), a seat designed to be straddled by the operator, handlebars for steering, and designed for off-highway use. Since the 1980s, the CPSC has addressed ATV safety through various activities, including rulemaking, recalls, consumer education, media outreach, and litigation. These efforts focused on stability and handling issues related to ATV overturn and collisions. Figure 1 shows an example of an ATV.

Figure 1: Example of an ATV

Currently, CPSC regulates ATVs through the incorporation by reference of ANSI/SVIA 1-2017 *Four-Wheel All-Terrain Vehicles – Equipment, Configuration, and Performance Requirements* as a mandatory standard (16 CFR 1420.3(a)).

2. Recreational Off-Highway Vehicles

An ROV is a motorized vehicle having four or more low-pressure tires designed for off-highway use and intended by the manufacturer primarily for recreational use by one or more persons. Other 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). ROVs are intended to be used on terrain similar to ATVs. ROVs 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. CPSC staff has worked on

stability, handling, and occupant protection issues related to ROVs since 2009.[3] Figure 2 shows an example of an ROV.

Figure 2: Example of an ROV

3. Utility Terrain Vehicles or Utility Task Vehicles

For this rulemaking, a UTV is a motorized vehicle having four or more low-pressure tires designed for off-highway use with the same characteristics as ROVs (bench seating, steering wheel, foot controls, ROPS, and seat belts). However, UTVs are intended for utility use, have larger cargo beds to accommodate hauling-type tasks, and they generally have maximum speeds between 25 and 30 mph. Figure 3 shows an example of a UTV.

[3] The NPR for ROVs is available at: 79 Fed. Reg. 68964 (Nov. 19, 2014); the accompanying briefing package is available at: https://cpsc.gov/s3fs-public/pdfs/foia_SafetyStandardforRecreationalOff-HighwayVehicles-ProposedRule.pdf.

Figure 3: Example of a UTV

**D. The Market**

*1. Market Size*

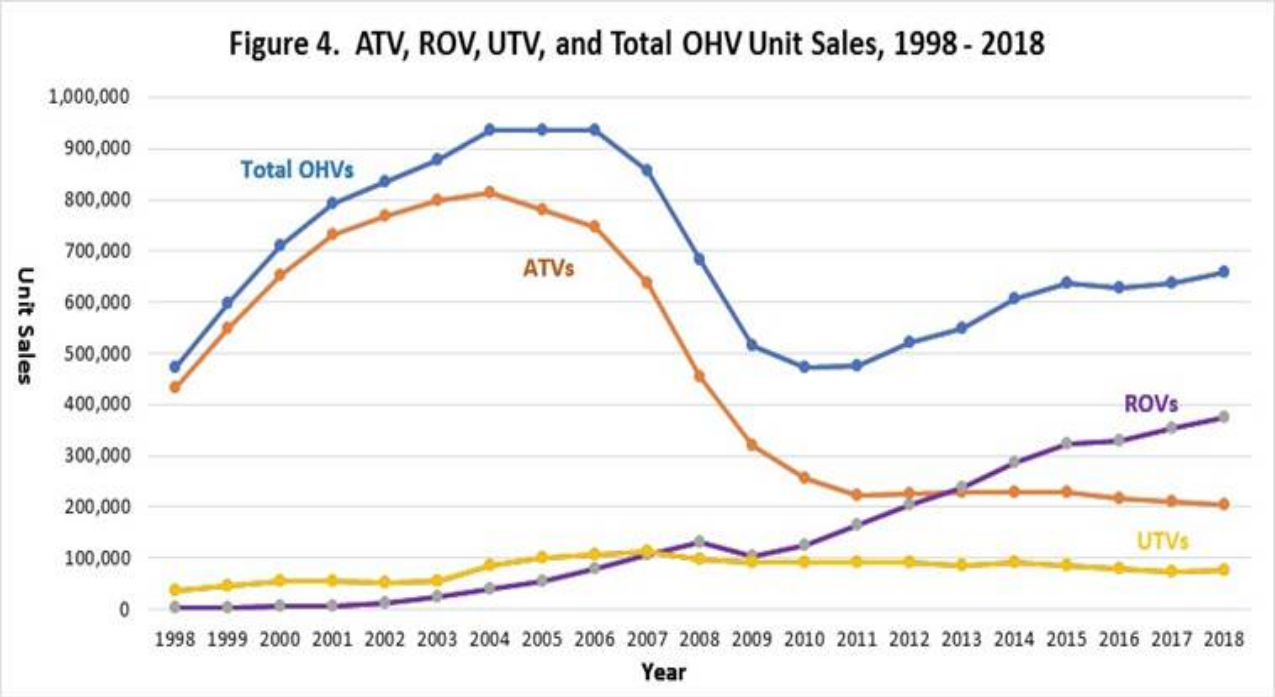
ATV sales have varied over the last 15 years. U.S. ATV sales peaked in 2004, at an estimated 812,000 units. Since 2004, ATV sales have declined steadily. The Commission estimates approximately 205,000 ATVs were sold in the United States in 2018: 177,000 adult models and 77,000 youth models, with sales revenue of approximately $1.35 billion. The Commission identified 13 manufacturers supplying ATVs to the U.S. market in 2018, six from the United States, five from Taiwan, and one each from Japan and Mexico. Nine manufacturers were responsible for all ATVs distributed into the U.S. market in 2018; four U.S. manufacturers distributed ATVs manufactured by Taiwanese firms, in addition to their own. U.S. manufacturers accounted for approximately 63 percent of 2018 U.S. ATV sales; all ATVs were manufactured and/or distributed by current members of the Specialty Vehicle Institute of America (SVIA).

Except for 2009, annual U.S. ROV sales have increased steadily, from an estimated 2,700 units in 1998, to an estimated 376,000 units in 2018. The Commission estimates 2018 U.S. ROV sales revenue at approximately $5.85 billion. The Commission identified 35 manufacturers known to have supplied ROVs to the U.S. market in 2018, 20

from China (including Taiwan); 13 from the United States, and 1 each from Mexico and South Korea. The Commission identified 53 distributers/brands. CPSC staff estimates U.S. manufacturers accounted for approximately 79 percent of 2018 U.S. ROV sales, and estimates approximately 90 percent of ROVs sold in the United States in 2018 were manufactured by current members of the Recreational Off-highway Vehicle Association (ROHVA) or the Outdoor Power Equipment Institute (OPEI).

U.S. UTV sales peaked in 2007, at an estimated 112,000 units, before gradually declining. Approximately 76,000 UTVs were sold in the United States in 2018, with sales revenue of approximately $700 million. The Commission identified 22 manufacturers known to have supplied UTVs to the U.S. market in 2018, 14 from the United States, 6 from China (including Taiwan), and 1 each from Canada and South Korea; and 27 distributers/brands were identified. The Commission estimates U.S. manufacturers accounted for approximately 92 percent of 2018 U.S. UTV sales. Current ROHVA and OPEI members accounted for approximately 90 percent of U.S. 2018 UTV sales.

Total U.S. OHV unit sales peaked in 2004, at approximately 937,000. OHV sales then declined, to approximately 475,000 by 2011, before beginning a partial recovery. Figure 4 illustrates ATV, ROV, UTV, and total OHV unit sales from 1998 through 2018. The Commission identified as many as 52 manufacturers and 68 distributors/brands of OHVs supplying an estimated 657,000 OHVs to the U.S. market in 2018, with sales revenue exceeding $7.87 billion. The Commission estimates U.S. manufacturers accounted for approximately 75 percent of 2018 U.S. OHV sales; SVIA, ROHVA, and OPEI members accounted for approximately 93 percent of 2018 U.S. OHV sales.




*2. Retail Prices*

The Commission identified 115 different ATV model variants and configurations in two product segments sold in the United States in 2018: youth and adult. Youth ATV manufacturer suggested retail prices (MSRPs) ranged from a minimum of $1,999, to a maximum of $3,799, with an average of approximately $2,650. Adult ATV model MSRPs ranged from a minimum of $3,799, to a maximum of $15,349, with a mean of approximately $7,400. The mean MSRP for all U.S. ATV sales in 2018 was approximately $6,750.[4]

As with ATVs, there is significant variation in ROV design, weight, engine displacement, and other characteristics and accessories. The Commission identified 396 different ROV model variants and configurations that were sold in the United States in

[4] Unless otherwise noted, OHV product and market information is based upon CPSC staff analysis of 1998-2018 sales data provided by Power Products Marketing, Minneapolis, MN.

2018. ROV MSRPs ranged from a minimum of $3,299, to a maximum of $53,700, with an average of approximately $15,400.

The Commission identified 138 different UTV model variants and configurations that were sold in the United States in 2018. UTV MSRPs ranged from a minimum of $3,499 to a maximum of $49,900, with an average of approximately $12,000.

3. *Number of Off-Highway Vehicles in Use*

The Commission is unable to provide an accurate estimate of the number of OHVs currently in use, due to a lack of reliable estimates of ATV, ROV, and UTV product life. Table 1 illustrates a range of estimates possible under different assumptions of product life. In each case, the estimate is constructed using a gamma distribution, a common distribution for estimating failure rates, with shape = 5 and β = 1, applied to 1998–2018 OHV sales data. Table 1 provides estimates for ATVs, ROVs, UTVs, and total OHVs under three product-life assumptions (10, 15, and 20 years).[5]

**Table 1. Estimates of OHVs in Use**
(Gamma Distribution w/ Shape = 5 and beta = 1)

| Life Expectancy | 10 Years | 15 Years | 20 Years |
|---|---|---|---|
| **ATV** | 3,217,376 | 5,782,667 | 7,467,359 |
| **ROV** | 2,419,854 | 2,725,373 | 2,853,372 |
| **UTV** | 895,474 | 1,226,299 | 1,417,666 |
| **TOTAL** | 6,532,704 | 9,734,340 | 11,738,397 |

4. *Small Businesses Subject to Rulemaking*

OHV manufacturers might be classified in the North American Industrial Classification System (NAICS) category 336999 (All Other Transportation Equipment

[5] Implied in the total OHV estimates is the assumption that ATVs, ROVs, and UTVs have the same expected product life. This assumption likely does not hold, because product life is dependent upon annual mileage, terrain driven upon, and other usage characteristics, which are not homogenous across OHV categories.

Manufacturing), or possibly, 336112 (Light Truck and Utility Vehicle Manufacturing), 333111 (Farm Machinery and Equipment), 333112 (Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing), and 333120 (Construction Machinery Manufacturing). According to size standards established by the U.S. Small Business Administration (SBA) for these NAICS, firms with fewer than 1,000, 1,500, 1,250, 1,500, and 1,250 employees, respectively, are considered to be small firms. OHV distributers may be classified in NAICS categories 423110 (Automobile and Other Motor Vehicle Merchant Wholesalers) or 441228 (Motorcycle, ATV, and All Other Motor Vehicle Dealers). The SBA size standard for these NAICS classifications is 500 employees. The Commission identified eight U.S. OHV manufacturers that meet these SBA size standards, nine that do not, and four for which a determination could not be made. CPSC staff also identified 27 OHV distributors that meet these SBA size standards, 24 that do not, and 17 for which a determination could not be made.

**E. Risk of Injury**

*1. Incident Data*

CPSC staff conducted a review of incidents, injuries, and fatalities associated with OHV fire and debris-penetration hazards. The reported incidents from CPSC's Consumer Product Safety Risk Management System (CPSRMS) are from January 1, 2003 through December 31, 2020; the National Electronic Injury Surveillance System (NEISS) –based injury estimates are from January 1, 2007 to December 31, 2019.

Fire and debris-penetration hazards are generally unrelated to one another. Out of the 4,792 incidents staff identified as related to debris-penetration or fire hazards, only

two exhibited *both* debris-penetration and fire-related hazards. Table 2 shows the breakout of hazards by data sources and severity of incidents.

**Table 2: Incident Records Relevant to Debris-Penetration and/or Fire Hazards as Presented in this Report**

| Relevant Hazards | Total Records Reviewed | CPSRMS (2003-2020) | | | NEISS (2007-2019) |
|---|---|---|---|---|---|
| | | Fatal Reported Incidents | Injury Reported Incidents | No Injury Reported Incidents | Injury Cases in Sample |
| Debris Penetration | **107** | 6 | 18 | 81 | 2 |
| Fire Hazard (fire, thermal, leaks) | **4,683** | 28 | 264 | 4,109 | 282 |
| Both hazard of Debris-Penetration and Thermal, Fuel, or Fire-Related Hazards | **2** | 0 | 1 | 1 | 0 |
| **Total** | **4,792** | **34** | **283** | **4,191** | **284** |

Sources: CPSRMS and NEISS.

a) Fire Hazard Incidents

CPSC staff's assessment of the fire hazard incidents excludes fires ignited by external sources (*e.g.*, overtaken by a controlled burn or bonfire, even if the OHV ignites) refueling incidents, and incidents in which it is ambiguous about whether the source of the fire may have come from a source outside the OHV. The analysis of reported incidents in CPSRMS with incident dates from 2003 through 2020 is detailed below.

*CPSRMS Incident Data (2003–2020)*

CPSC staff categorized reports in CPSRMS with incident dates from 2003 through 2020 into one of several mutually exclusive categories.

Sometimes OHV fires occur after a crash, and because these events may involve multiple complicating factors, they are set aside in their own category. It is very plausible that in some of these instances, occupants may still have been injured or killed

from the crash, even if the vehicle had not ignited. For instances of a fire igniting before or without a crash, it is generally clearer to attribute resulting injuries or deaths specifically to the fire. In many other instances, there may be thermal events that do not involve actual ignition of fire; but such events can still be harmful or hazardous. Leaks or spraying of oil or fuel do not necessarily constitute a thermal event, because these flammable liquids not only have the potential to ignite and release thermal energy; but even without ignitions, such leaks can present a hazard.

Table 3 presents the fire hazard subtypes by the severity of the outcome as seen in the CPSRMS incident data.

**Table 3: Reported Incidents by Fire Hazard Subtype and Severity; 2003-2020**

| Type of Fire, Thermal, or Leak Hazard | Reported Incidents | Reported Incident Severity | | |
|---|---|---|---|---|
| | | Fatal | Injury | No Injury |
| Post-Crash Fire Ignition | 51 | 28 | 18 | 5 |
| Fire Ignited (without/prior to crash) | 1,626 | 0 | 129 | 1,497 |
| Thermal Event or burn (without Fire Ignition) | 2,451 | 0 | 105 | 2,346 |
| Leak or spray of oil or fuel (without other burn, thermal event, or fire) | 273 | 0 | 12 | 261 |
| **Total** | **4,401** | **28** | **264** | **4,109** |

Source: CPSRMS

*NEISS-Based National Injury Estimates (2007–2019)*

There are an estimated 14,200 (sample size = 282) emergency department-treated injuries from 2007 to 2019, associated with OHV fire, thermal, and burn hazards *without* indication of a crash or related event. "Crash-type events" are defined in this review to include vehicle wrecks, rollovers, entrapments, traffic collisions, and victims falling or jumping from the vehicle, for example.

Although crash-type events coinciding with burns and other thermal-, fuel- and fire-related hazards are of concern, such cases were already considered and discussed among the reported incidents. For the assessment of NEISS injury cases, they are excluded to

focus on injuries more directly attributable to heat and thermal events. This narrowing of scope is not intended to suggest that overheating or other malfunctioning of the OHV occurred, or even that other additional factors were not involved, but simply to indicate that a burn, or other thermal-related event occurred without a crash-type event.

Staff is unable to present the annual estimates of the injuries over the period from 2007 through 2019, because estimates for many of the individual years fall below the NEISS publication criteria.[6] However, staff did not see any increasing or decreasing trend in the data.

The 14,200 estimated thermal-, fuel-, and fire-related injuries are based on a sample size of 282 cases. The vast majority of these estimated injuries indicate burns (as the primary diagnosis), without necessarily involving the ignition of any fire or flame. Of the injuries involving burns, around 12,800 injuries (about 91 percent) were classified as thermal burns, while the remainder consisted of scald burns, chemical burns, or burns that were not specified. None of the incidents reviewed involved any fatalities. Only around 3 percent of estimated injuries mentioned any sort of fire ignition. Less than 2 percent of estimated injuries did not mention burns, but instead involved exploding projectiles lacerating or penetrating the body, or a gasoline explosion.

Most of the injuries were suffered in the lower body, with an estimated 5,900 (42%) of injuries affecting the lower leg in particular. About 1,800 (13%) of the injuries affected the ankle, foot, or toe, and about 1,500 (11%) involved the knee, upper leg and/or lower trunk. Many of these injuries suffered at the leg and neighboring body parts were described as involving burns from the muffler, exhaust pipe, and/or hot exhaust. It

[6]According to the NEISS publication criteria, an estimate must be 1,200 or greater, the sample size must be 20 or greater, and the coefficient of variation must be 33 percent or smaller.

was not always clear whether the burns were suffered due to direct contact or proximity. An estimated 3,200 (23%) of the injuries involved hands and fingers. Injuries between the shoulders and wrists (including arms and elbows) were attributed to an estimated 1,300 (9%) of the injuries. Several reported injuries also occurred on or near the eyes and face, but the sample size is too small to project an estimate specific to that region of the body. Table 4 presents the estimated injuries by body parts grouped as described above.

**Table 4: U.S. Emergency Room-Treated Injuries Related to Fire/Thermal/Fuel Hazards without Indication of Crash-Type Events by Body Parts; 2007-2019**

| Body Part | Body Parts Group Estimate | Percentage of Estimated Injuries for Body Part Group |
|---|---|---|
| Leg, lower*** | 5,900 | 42% |
| Ankle*** | 1,800 | 13% |
| Foot | | |
| Toe | | |
| Trunk, lower | 1,500 | 11% |
| Leg, upper | | |
| Knee | | |
| Hand | 3,200 | 23% |
| Finger | | |
| Shoulder | 1,300 | 9% |
| Arm, upper | | |
| Elbow | | |
| Arm, lower | | |
| Wrist | | |
| Eyeball | ** | ** |
| Face* | | |
| **Total** | **14,200** | **100%** |

Source: NEISS
*"Face" includes eyelid, eye area, nose, and forehead.
**Sample size is too small to report estimate specific to this group of body parts.
***Almost all injuries in this dataset are classified under a single primary (*e.g.*, most severely injured) body part. Only one injury is counted only as a lower leg injury (and not as an ankle injury) which also involved a burn at the lower leg in combination with a "popped" ankle when the vehicle "blew out."

An overwhelming majority of the emergency room patients (94%, or an estimated 13,500) were treated and released, or released without treatment. The remainder were treated and admitted for hospitalization, held for observation, or left without treatment or being seen.

Although the majority of these injuries appear to have involved burns due simply to proximity or contact with heat sources, some other relevant hazards are observed among the NEISS cases. There were several incidents relating to fuel or gasoline, battery or some form of "explosion"; and as previously mentioned, there were a few incidents in which ignition or fire was mentioned. Staff does not have data about which burn cases resulted from overheating, as compared to components operating at normal hot temperatures. However, given that many of the injuries involving the hand and fingers appear to have involved contact with components that are expected to be heated at normal operational conditions, staff infers that many of the hand burns likely occurred without the OHV overheating, or otherwise functioning outside of normal design parameters.

b) Debris-Penetration Incidents

Debris penetration involves debris (usually a tree branch or stick) penetrating an OHV (usually the floorboard of underside of an ROV or UTV). When such penetration occurs, there is a potential hazard of the branch or other debris to penetrate not only the floor or body of the OHV, but also occupants of the OHV. None of the incidents staff identified were found to involve ATV debris-penetration incidents. Given that ATVs lack floorboards, this result was not unexpected; but staff did search OHV incidents for this hazard, regardless of whether it was indicated to involve an ATV, ROV, UTV, or unknown type of OHV.

In the NEISS data, staff identified only two cases with sufficient descriptive information to conclude that the injuries were specifically associated with a debris-penetration hazard. Due to this small sample size, staff cannot report any estimate of

injuries. Instead, for the debris-penetration-hazard scenario, staff counted the two injuries from NEISS with the other reported injuries from CPSRMS.

For the six fatal incidents, two involved a passenger's death, while the other four involved the driver's death. Four involved a tree branch, one a large stick, and the other a 2-inch to 3-inch piece of wood. At least three involved penetration of the chest.

The list below paraphrases text written by the respective CPSC investigators for each of the six fatal incidents:

- tree limb penetrated the floor board and struck passenger in chest (driven in water);
- tire over tree limb that pierces fender, nylon mesh door, and left side of driver (driven in woods);
- passed over a large stick that was sticking up in the ground, which passed through brake pedal arm through bottom edge of seat and into lower abdomen of driver (driven in power line clearing);
- impaled by a 2- to 3-inch-size piece of wood in upper right thigh, causing exsanguination of driver (driven on heavily forested public land);
- branch penetrated UTV bottom and struck passenger in chest (driven along trail);
- ran over large tree branch that struck driver in chest (driven in mountains).

Table 2 presents the severity of the 20 nonfatal injury incidents from debris penetration.

**Table 5: Debris Penetration by Injury Severity: 2003-2020**

| **Injury Severity** | **Incidents** |
|---|---|
| Hospital Admission | 4 |
| Emergency Department Treatment Received | 3 |
| First Aid Received by Non-Medical Professional | 1 |
| No First Aid or Medical Attention Received | 2 |
| Level of care not known | 10 |
| **Total Injury Incidents** | **20** |

Sources: CPSRMS and NEISS.

*2. Hazard Patterns and Analysis of In-Depth Investigations*

a) Fire Hazard Review and Assessment

Since 2018, CPSC staff has collaborated with the three standards development organizations (SDOs): ROHVA, OPEI, and SVIA, to examine fire hazard causations of OHV-related incidents investigated by CPSC staff and reported as in-depth investigations (IDIs). All three vehicle types, ROVs, UTVs, and ATVs, were associated with fire hazards. Staff provided the SDOs with 121 redacted IDIs related to fire hazards in OHVs for review and analysis. These 121 redacted IDIs are a subset of the more comprehensive list of IDI data analyzed by the CPSC Epidemiology staff and detailed in section E.1 of this preamble. Of the 121 redacted IDIs, CPSC staff and the SDOs concluded that 84 IDIs contained sufficient information to determine cause of fire origin, and they agreed to categorize these IDIs. This discussion provides staff's insight into this subset of 121 incidents discussed by and the SDOs. When cause or categorization of incidents are discussed here, we discuss only the 84 incidents for which CPSC staff and SDOs agreed there was sufficient information for categorization. Fuel leaks are considered fire hazards because ignition of flammable fluids contributes to the severity of an incident. The fire

and fuel leak origins identified in the 84 IDIs include a breach in the fuel system, electrical component failure, exhaust overheat, and debris (grass/dry vegetation) ignition.

The majority (44 of the 84) of the causations involved fuel system components (29) and exhaust overheat (15). The others involved specific electronic components (voltage regulator, wiring harness, electronic control module, or battery), debris (grass or dry vegetation) ignition from contacting exhaust heat, oil leaks, and unknown causes. Those that were deemed unknown involved either two or more possible combined causations or instances where causations could not be determined due to insufficient information from particular IDIs. Twenty-seven of the 121 IDIs involved burn injuries when consumers contacted hot surfaces or suffered burns from open flames. Neither CPSC staff, nor the SDOs, identified any fires due to the lack of a spark arrester.

Of the 37 IDIs that had unknown fire causations, 20 involved total-OHV losses. A total loss fire refers to an OHV that has been completely consumed by the fire, leaving only a metal frame and other non-combustible metal parts. A total loss can occur when a smaller fire spreads into a fuel-fed fire, so that the entire vehicle becomes engulfed in flames. This often makes it difficult to determine the origin of the fire. The smaller fire can originate from various sources, such as an overheating exhaust that burns a plastic body panel, a fuel leak fire, or a fire from an electrical short, where a portion of a plastic body panel may catch fire, then that fire can spread to the entire vehicle because the majority of the OHV body panels are generally made of flammable plastics. Total loss incidents, as shown in Figure 5, represent the most severe fire hazard of an OHV.

Figure 5: ROV Prior to the Fire Incident (Left), ROV on Fire (Middle), and ROV Post-Total Loss Fire (Right)

Each OHV is equipped with subsystems that have combustible or flammable sources that can lead to fires and/or fire hazards (*i.e.*, fuel leaks). These subsystems are the fuel system (fuel tank, fuel pump, fuel rail, fuel filter, hoses, shutoff valves, and fuel caps), electrical system (voltage regulator, wire harnesses, battery, fuse boxes, and alternator), and the exhaust system (exhaust piping, catalytic converter, muffler, and all surrounding componentry).

With respect to the fuel system, a breach in the fuel system can cause a fuel leak and pose a risk of fire. A breach can be a crack/hole in the fuel tank, damaged fuel hose, crack/hole in a fuel filter, or unsecured fuel connection to a fuel rail. For example, in one IDI involving an ATV, a passenger received second- and third-degree burns to the right wrist and right leg when the ATV burst into flames from an overheated gasoline line that melted and spilled fuel onto the hot engine.

Other fuel-related fire hazards can be due to over-pressurization of the fuel system and inadequate ventilation. Inadequate ventilation and over-pressurization of the fuel

system can result in boiling gasoline, which can expel abruptly when opening the fuel cap, potentially splashing hot gasoline onto consumers. Figure 6 shows an example from an IDI of an over-pressurization scenario with an ROV. Unbeknownst to the consumer, opening the fuel cap released pressurized gasoline and a brief fire resulted. Black soot can be seen surrounding the fuel cap.

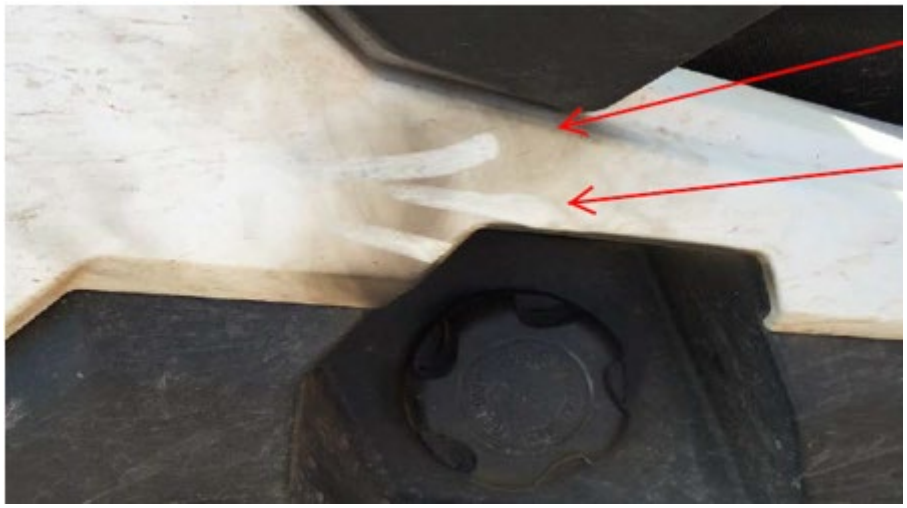


Figure 6 – Soot on the Frame of the ROV (Red Arrows) Resulted from Flames that Shot Out from the Fuel Tank When the Consumer Opened the Gas Cap

An electrical failure, such as an electrical short or an electronic component overheating, can lead to fires. Figure 7 illustrates a fire that started due to an overheated electronic control module (ECM), which ignited the ECM and wiring.

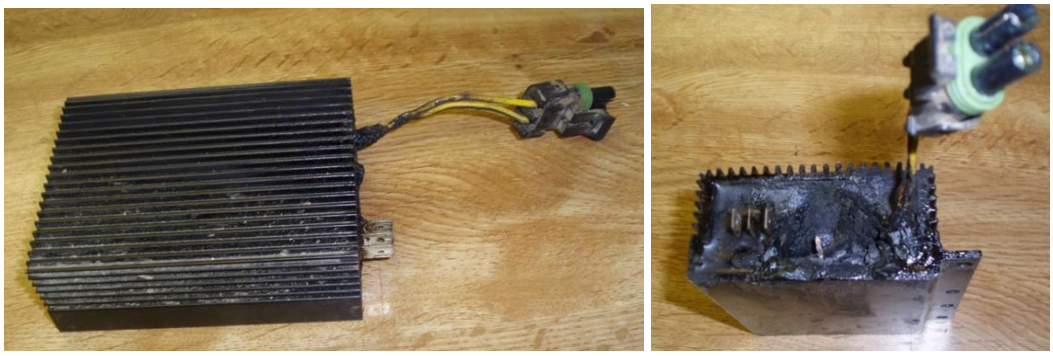


Figure 7 – Example of Burned ATV ECM; Left Photo – Top View, Right Photo – Side View

Excessive exhaust heat near flammable plastics can cause melting and subsequently fires, if the exhaust systems do not manage the exhaust heat sufficiently, via heat shielding and/or adequate ventilation. It is not uncommon for modern ROV exhaust surface temperatures to exceed 800°F. Insufficient heat shielding between the exhaust pipes and plastic paneling can cause the plastic to melt. Figure 8 illustrates a fire that ignited when melted plastic paneling dripped onto the exhaust pipe and burned a hole through the panel.

Of the 121 IDIs examined, 27 IDIs involved burned victims. Of these 27 IDIs, 10 specified first-, second-, and/or third-degree burn injuries. The other 17 IDIs did not specify the severity of the burn injuries. These burn injuries occurred when victims had direct contact with a hot surface or when an open flame burned the victims.

Figure 8 – Example of Fire Damage Caused by Excessive Exhaust Heat

b) Debris-Penetration Hazard Review and Assessment

Debris-penetration hazards are unique to ROVs and UTVs because the wheel-well areas on these vehicles are generally larger and more open, compared to ATVs. The larger space exposes more floorboard and wheel-well surface to branches that can and do penetrate into the occupant compartment. Debris penetration through the floorboard or wheel well can impale the occupants of the vehicle and has caused severe injuries and deaths. An example of debris penetration is shown in Figure 9. CPSC staff did not find any ATV-related debris-penetration incidents in the injury/death data searches or debris-penetration recalls.

Figure 9: Example of Tree Branch (Yellow Arrows) Penetrating ROV floorboard; Left Photograph Shows View from the Cabin (Passenger Seat); Right Photograph Shows Front View of ROV

CPSC staff shared eight redacted IDIs involving debris penetration, which is a subset of the more comprehensive list of IDI data analyzed by the CPSC Epidemiology staff, with the SDOs for review and analysis. CPSC staff's review revealed four IDIs involved fatal impalement of the occupant. A summary of the IDI data shown in Table 6 suggests the debris penetrations occurred at relatively low speeds, *i.e.*, 25 mph or less.

Table 6 – Summaries of Eight Debris-Penetration IDIs

| Vehicle | Injury Type | Estimated speed, mph | Injured Body part(s) | Description |
|---|---|---|---|---|
| A | Death | 25 | heart | Consumer drove into a creek when water splashed onto the windshield; tree limb broke through the floor and struck passenger who died as a result of the impalement |
| B* | No Injury | 5 | none | Consumer was driving on a slight hill; rocks punctured the floorboard |
| C | Death | 10 | viscera | Consumer drove on a wooded trail (dirt road) with various debris (rocks and limbs); tree limb pierced fender and nylon mesh door and impaled the driver |
| D** | Death | Not available | no information | Not available |
| E | Contusion/ No Medical Attention | 20 | abdomen | Consumer drove in the dark (12:30am) on a leaf covered trail; tree branch punctured driver's side floor, struck his abdomen, but did not impale the driver due to the driver wearing thick clothing. |
| F | Abrasions | 25 | ankle | IDI involved 2 occasions – on one occasion snow was on ground, could not see branches thus a debris penetration occurred; other occasion ROV traveled |

| | | | | |
|---|---|---|---|---|
| | | | | on paved road and a tree branch punctured rear passenger floor |
| G | Death | Not available | thigh | Not available |
| H | Abdomen impaled | 25 | Liver, stomach, spleen, pancreas | Consumer drove on dirt/gravel road lined with 3-foot-tall grass on both sides; when attempting to avoid debris from a downed tree, a branch penetrated passenger side floor, struck passenger and impaled the driver. |
| *All vehicles are ROVs, except vehicle B, which is a UTV. Vehicle B involved rocks penetrating the floorboard; all other vehicles involved tree branches penetrating the floorboards.<br>**It is unknown whether vehicle D is an ROV or UTV due to the lack of model information. | | | | |

There were four deaths and three injuries associated with debris penetration. Many of these incidents occurred when there was reduced visibility or the driver was unable to see the debris (*e.g.*, driving in the dark, snow-covered terrain), but overall the incidents occurred during what staff considers reasonably foreseeable, normal use of the vehicles.

*3. OHV Recalls*

From 2002 to 2019, there were 68 OHV fire and debris-penetration hazard recalls. The fire hazard recalls involved ATVs, ROVs, and UTVs. The debris-penetration recalls involved ROVs.

CPSC recall data include the number of affected vehicles, number of incidents, and injuries associated with the recalls. An incident is considered a penetration through the floorboard, an actual fire, a fuel leak, or other thermal event (*e.g.*, melted plastic, overheated component).

There have been 26 ATV fire hazard recalls, of which 18 involved fuel system components; 4 involved electronic control modules; 2 involved oil leaks; 1 involved brake fires due to friction; and 1 involved inadequate heat shielding. Collectively, there were 462,372 recalled vehicles, 3,325 incidents, 83 fires, and 24 injuries associated with 26 recalls from 2002 to 2018. There were no deaths associated with ATV fire hazard recalls.

With respect to ROVs, there were 33 ROV fire hazard recalls, of which 9 involved fuel system components; 3 involved electrical wiring/electrical components; 10 involved exhaust heat-inadequate heat shielding; 3 involved grass/dry vegetation debris ignition; 5 involved oil leaks; 1 involved improper throttle body installation; and 2 involved multiple sources (engine misfire, brake fires). Collectively, there were 709,886 recalled vehicles, 1,022 incidents, 327 fires, and 32 injuries associated with 33 recalls from 2008 to 2019. There was one death associated with one fire hazard recall.

There were 6 UTV fire hazard recalls; 1 involved grass/dry vegetation debris ignition; and 5 involved fuel system components. Collectively, there were 43,340 recalled vehicles, 144 incidents, and 11 fires associated with 6 recalls from 2008 to 2017. There were no injuries or deaths associated with UTV fire hazard recalls.

There were 3 ROV debris penetration hazard recalls. Collectively, there were 44,500 recalled vehicles, 630 incidents, and 9 injuries associated with three recalls from 2014 to 2016. There were no deaths associated with ROV debris penetration hazard recalls.

**F. Existing Standards**

*1. ATVs*

SVIA developed the voluntary standard for ATVs, ANSI/SVIA 1 *Four-Wheel All-Terrain Vehicles – Equipment, Configuration, and Performance Requirements standard.* SVIA published ANSI/SVIA 1 in 1990, and revised the standard in 2001, 2007, 2010, and 2017. In 2008, the Consumer Product Safety Improvement Act (CPSIA) required the Commission to make mandatory the voluntary standard for ATVs, ANSI/SVIA 1-2007. The Commission adopted the voluntary standard as a mandatory

standard; the standard is codified in 16 CFR part 1420. The Commission amended 16 CFR part 1420 in 2011 and 2018, to reference the latest revision of ANSI/SVIA 1-2010 and ANSI/SVIA 1-2017, respectively.

The requirements ANSI/SVIA 1-2017 include warning label requirements, various mechanical requirements, such as static stability, braking distances, maximum speeds for the various age group ATVs, and various component construction requirements such as those for handlebars, foot rests, suspension, and most recently, lights.

*2. ROVs*

The Recreational Off-Highway Vehicle Association (ROHVA) developed ANSI/ROHVA 1 *American National Standard for Recreational Off-Highway Vehicles* for recreation-oriented ROVs. The Outdoor Power Equipment Institute (OPEI) developed ANSI/OPEI B71.9 *American National Standard for Multipurpose Off-Highway Utility Vehicles* for utility-oriented vehicles; ANSI/OPEI B71.9 includes requirements for vehicles that exceed 30 mph (and thus meet CPSC's definition of "ROVs").

The ROV requirements in ANSI/ROHVA 1-2016 and ANSI/OPEI B71.9-2016 include static and dynamic stability, vehicle handling, ROPS, speed limiter function when seat belts are not fastened, and various component construction requirements such as for steering, brakes, and seat belts.

*3. UTVs*

OPEI developed ANSI/OPEI B71.9 American National Standard for utility-oriented vehicles; ANSI/OPEI B71.9 includes requirements for vehicles that exceed 30

mph (and thus meet CPSC definition of "ROVs"). For this rulemaking, the Commission defines "UTVs" to have maximum speeds below 30 mph. The UTV requirements in ANSI/OPEI B71.9-2016 for vehicles with maximum speed below 30 mph include minimum static stability, rollover protection structure (ROPS), brake configuration and performance, and lighting.

All three of these standards reference the U.S. Forest Service standard, USDA-FS 5100-1, which requires OHVs to be equipped with spark arrestors. A spark arrestor is a metal screen installed in the exhaust tail pipe to mitigate sparks exiting the tail pipe to reduce the risk of forest fires. This requirement does not address other sources of fire hazards to riders and passengers of OHVs; and thus, the Commission views this requirement as ineffective to address OHV fire hazards to consumers.

In addition, the ANSI/OPEI B71.9 – 2016 standard has a general requirement that "all fuel system components shall be located, routed, and contained in such a manner as to provide clearance to heat-generating components and to avoid damage from obstacles or projections that may be encountered during normal operation." This requirement lacks specificity, and thus, the Commission views this requirement as ineffective.

The Commission does not believe the two preceding requirements adequately address the fire hazards associated with OHVs. The incident data and recall data suggest OHV fires due to fire sources, such as electrical shorts, exhaust overheat, and fuel leaks cannot be addressed by the spark arrestor requirement or the general ANSI/OPEI B71.9 – 2016 statement regarding fuel system component location. None of the aforementioned standards contain requirements to mitigate the debris penetration hazard. Thus, the

Commission believes additional requirements are needed to address OHV fire and debris penetration hazards.

CPSC staff met with representatives of the three SDOs, ROHVA, SVIA, and OPEI on multiple occasions to discuss recall data, categorizing IDIs fire causations, and possible requirements for fuel system, electrical, and exhaust system requirements to reduce the risk of fire hazards. After discussing and categorizing fire causations of IDIs, CPSC staff and SDOs initiated discussions of possible fire preventative standards requirements starting with the fuel system component examination. However, to date, there have been no proposed fire and debris-penetration requirements to update the current ANSI/ROHVA 1-2016, ANSI/SVIA 1-2017, and ANSI/OPEI B71.9-2016 standards to address fire and debris penetration hazards. Thus, the Commission concludes that the current OHV standards will not adequately address the deaths and injuries associated with OHV fire and debris-penetration hazards.

**G. Regulatory Alternatives**

The Commission could proceed with rulemaking under the CPSA establishing performance requirements and/or warnings and instructions for OHVs to address the risks of injury associated with OHV fire and debris-penetration hazards. Alternatively, the Commission could continue to address the hazards through the voluntary standards, and continue to work to develop more effective voluntary standard requirements to address the identified hazards, instead of issuing a mandatory rule. However, as previously discussed, the Commission preliminarily believes that the existing standards do not adequately address the risk of injury associated with fire and debris-penetration hazards in OHVs. The Commission has recalled OHVs for fire and debris penetration hazards.

The fire hazard recalls involved ATVs, ROVs, and UTVs. The debris-penetration recalls involved ROVs. The Commission could continue to conduct recalls, both voluntary and mandatory, instead of promulgating a mandatory rule. However, recalls are not likely to be as effective at reducing the risk of injury as a mandatory standard. Recalls only apply to an individual manufacturer and product and do not extend to similar products. Product recalls occur only after consumers have purchased and used such products and have been exposed to the hazard to be remedied by the recall. Additionally, recalls can only address products that are already on the market, and cannot prevent unsafe products from entering the market. Finally, the Commission could issue news releases warning consumers about the fire and debris-penetration hazards association with OHVs. As with recalls, this alternative is not likely to be as effective at reducing the risk of injury as a mandatory standard.

**H. Request for Information and Comments**

This ANPR is the first step in a proceeding that could result in a mandatory safety standard(s) to address fire and debris-penetration hazards associated with OHVs. The Commission requests comments on all aspects of this ANPR, but specifically requests comments regarding:

1. 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 that 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;
4. Studies, tests, or surveys performed to analyze fire and/or debris penetration hazard injuries, including severity and costs associated with injury;
5. Studies, tests, or descriptions of technologies or design changes that address OHV fire and/or debris penetration hazard, and estimates of costs associated with incorporation of the technologies and their impact on wholesale or retail prices;
6. Information on ATV, ROV, and UTV expected lifespans and/or the number of ATVs, ROVs, and UTVs in use;
7. Information on the number of hours driven, miles driven, and/or other exposure metrics for OHVs;
8. Studies, test, or surveys performed to analyze use of aftermarket products that address OHV fire and/or debris-penetration hazards, and their effectiveness at reducing OHV fire and/or debris-penetration hazard injuries, and means by which their use by consumers could be increased;
9. Information on the expected impact of technologies or design changes that address OHV fire and/or debris-penetration hazard injuries on manufacturing costs or wholesale prices;
10. Information on the potential impact of technologies or design changes to address OHV fire and/or debris-penetration hazards on consumer utility.

Comments and other submissions should be identified by identified by Docket No. CPSC-2021-XXXX and submitted in accordance with the instructions provided above. All comments and other submissions must be received by **[insert date that is 60 days after publication in the FEDERAL REGISTER]**.

Dated: _____

_____
Alberta A. Mills, Secretary
U.S. Consumer Product Safety Commission.

Briefing Package

# Off-Highway Vehicle (OHV) Fire and Debris Penetration Hazards

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## CONTENTS

**UNITED STATES**
**CONSUMER PRODUCT SAFETY COMMISSION**
**WASHINGTON, D.C. 20207**

This document has been electronically approved and signed.

**Memorandum**

Date: April 28, 2021

TO: The Commission
Alberta Mills, Secretary

THROUGH: Jennifer Sultan, Acting General Counsel
Mary Boyle, Executive Director

FROM: Duane Boniface, Assistant Executive Director Office of Hazard Identification and Reduction
Han Lim, Mechanical Engineer, Division of Mechanical and Combustion Engineering

SUBJECT: Advance Notice of Proposed Rulemaking (ANPR) for Off Highway Vehicle (OHV) Fire and Debris Penetration Hazards

## I. INTRODUCTION

U.S. Consumer Product Safety Commission (CPSC) staff prepared this briefing package for the Commission as it considers regulatory action to address fire hazards and debris hazards on off-highway vehicles (OHVs). All-terrain vehicles (ATVs), recreational off-highway vehicles (ROVs), and utility terrain vehicles or utility task vehicles (UTVs) constitute OHVs. This package presents information on OHVs, including related injuries and deaths, market information, risk and hazard analyses, CPSC recall data, and voluntary standard activities. Staff recommends that the Commission publish an advance notice of proposed rulemaking (ANPR) to address fire and debris hazards presented by OHVs.

## II. BACKGROUND

### A. The Product (Tab A)

1. All-Terrain Vehicles

An ATV is a motorized vehicle with three or four broad, low-pressure tires (less than 10 pounds per square inch), a seat designed to be straddled by the operator, handlebars for steering, and designed for off-highway use. Since the 1980s, the CPSC has addressed ATV safety through

various activities, including rulemaking, recalls, consumer education, media outreach, and litigation. These efforts focused on stability and handling issues related to ATV overturn and collisions.

Figure 1: Example of an ATV

Currently, CPSC regulates ATVs through the incorporation by reference of ANSI/SVIA 1-2017[1] *Four-Wheel All-Terrain Vehicles – Equipment, Configuration, and Performance Requirements* as a mandatory standard (16 CFR 1420.3(a)).

Past CPSC regulatory activities focused on vehicle stability and passenger use (especially by children) to address severe injury or death associated with loss of control of the vehicle or vehicle collision Past regulatory action did not address fire hazards in ATVs.[2]

2. Recreational Off-Highway Vehicles

An ROV is a motorized vehicle having four or more low-pressure tires designed for off-highway use and intended by the manufacturer primarily for recreational use by one or more persons. Other 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). ROVs are intended to be used on terrain similar to where all-terrain vehicles (ATVs) are used. ROVs are distinguished from ATVs, however, 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. CPSC staff has worked on stability, handling, and occupant protection issues related to ROVs since 2009.[3]

[1] ANSI/SVIA: American National Standards Institute/Specialty Vehicle Institute of America.
[2] ATVs do not pose debris penetration hazards. Debris penetration hazards are unique to ROVs and UTVs, as explained in section 4 of this memorandum, "Hazards."
[3] The NPR for ROVs is available at 79 Fed. Reg. 68964 (Nov. 19, 2014); the accompanying briefing package is available at: https://cpsc.gov/s3fs-public/pdfs/foia_SafetyStandardforRecreationalOff-HighwayVehicles-ProposedRule.pdf.

Figure 2: Example of an ROV

The Recreational Off-Highway Vehicle Association (ROHVA) developed ANSI/ROHVA 1 *American National Standard for Recreational Off-Highway Vehicles* for recreation-oriented ROVs, and the Outdoor Power Equipment Institute (OPEI) developed ANSI/OPEI B71.9 *American National Standard for Multipurpose Off-Highway Utility Vehicles* for utility-oriented ROVs and includes requirements for vehicles that exceed 30 mph (and thus meet CPSC's definition of "ROVs").

Past CPSC regulatory activities on ROVs focused on severe injury or death associated with vehicle rollover and occupant ejection; and therefore, staff focused on vehicle stability and passenger use of seat belts. Past regulatory action did not address fire hazards and debris penetration hazards in ROVs.

3. Utility Terrain Vehicles or Utility Task Vehicles

A UTV is a motorized vehicle having four or more low-pressure tires designed for off-highway use with the same characteristics (bench seating, steering wheel, foot controls, ROPS, and seat belts) as ROVs, but are intended for utility use, have larger cargo beds to accommodate hauling-type tasks, and they generally have maximum speeds between 25 and 30 mph.

Figure 3: Example of a UTV

The Outdoor Power Equipment Institute (OPEI) developed ANSI/OPEI B71.9 *American National Standard for Multipurpose Off-Highway Utility Vehicles* for utility-oriented ROVs.

There have been no past CPSC regulatory actions on UTVs.

The scope of this briefing package is limited to ATVs, ROVs, and UTVs, which are collectively referred to as "OHVs." The scope of the rule does not include golf cars,[4] personal transport vehicles (PTVs), low-speed vehicles, or dune buggies.

4. Hazards

All three OHV types--ROVs, UTVs, and ATVs--are susceptible to fire hazards. OHVs are equipped with internal combustion engines, electrical systems, and exhaust systems, and all have combustible or flammable components that have a potential for fire hazards.

Fires and fire hazards (*e.g.*, fuel leaks) are caused by many different sources, including breach in the fuel system, electrical component failure, exhaust overheat, and debris (grass/dry vegetation) ignition when contacting exhaust systems. Figure 4 illustrates an ROV fire where flames have engulfed the entire vehicle prior to a total loss.

Figure 4: Example of ROV on Fire Prior to a Total Loss

Debris penetration hazards are unique to ROVs and UTVs. These hazards involve foreign objects, usually tree branches that puncture through the floorboard, which can impale the occupants. An example of debris penetration is shown in Figure 5. Debris impalements have caused deaths and serious injuries. CPSC staff did not find any ATV debris penetration incidents in the injury/death data searches or any ATV debris penetration recalls. ROVs and UTVs generally have larger open wheel well areas when compared to ATVs, which presents a higher probability and opportunity for debris penetration to occur on ROVs and UTVs.

[4] Although golf cars are often referred to as golf "carts," carts are not self-propelled, and the ANSI/ILTVA (International Light Transportation Vehicle Association) Z130.1 voluntary standard title uses the proper term "cars" in its title.

Figure 5: Example of Tree Branch (Yellow Arrows) Penetrating ROV Floorboard; Left Photograph Shows View from the Cabin (Passenger Seat); Right Photograph Shows Front View of ROV

Tab A of this briefing package includes analyses regarding OHV fire and debris penetration hazards.

## B. Incident Data and Hazard Patterns (Tab B)

CPSC Epidemiology staff reviewed National Electronic Injury Surveillance System (NEISS) injury cases from 2007 to 2019 and CPSC's Consumer Product Safety Risk Management System (CPSRMS) injury cases with incident dates between January 1, 2003 and December 31, 2020.

Table 1 below summarizes the injuries and deaths associated with OHV fire and debris penetration hazards. CPSC staff identified two incidents (out of 4,792 incidents) that involved both fire and debris penetration hazards.

Table 1 – Summary of Incident Records Relevant to OHV Fire and/or Debris Penetration Hazards

| Relevant Hazards | Total Records Relevant to Report | CPSRMS (2003-2020) | | | NEISS (2007-2019) |
|---|---|---|---|---|---|
| | | Fatal Reported Incidents | Injury Reported Incidents | No Injury Reported Incidents | Injury Cases in Sample |
| Debris Penetration | **107** | 6 | 18 | 81 | 2 |
| Fire Hazard (fire, thermal, leaks) | **4,683** | 28 | 264 | 4,109 | 282 |
| Hazard Overlap: Incidents Reported Indicating Both hazard of | **2** | 0 | 1 | 1 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| Debris Penetration and Thermal, Fuel, or Fire Related Hazards | | | | | |
| **Total** | **4,792** | **34** | **283** | **4,191** | **284** |

Sources: CPSRMS and NEISS.

1. Fire Hazard (fire, thermal, fluid leaks)

*CPSRMS Analysis*

Staff analyzed reports in CPSRMS with incident dates from 2003 to 2020 and categorized incidents into one of several mutually exclusive categories. Staff excluded incidents in which the source of fire was out of scope, such as fires ignited by external sources (*e.g.*, overtaken by a controlled burn or bonfire, even if the OHV ignites) and refueling incidents.

Sometimes OHV fires occur after a crash, and because these events may involve multiple complicating factors, staff categorized those incidents separately. It is plausible in some of these instances that occupants may still have been injured or killed from the crash even if the vehicle did not ignite. For instances in which a fire ignited prior to or without a crash, it is generally clearer to attribute resulting injuries or deaths specifically to the fire. In many other instances, there may be thermal events that do not involve actual ignition of fire, but such events can still be harmful or hazardous. Another related hazard category involves leaks or spraying of fluids (oil or fuel), which do not necessarily constitute a fire or thermal event because these flammable liquids only have the potential to ignite and release thermal energy. Even without ignitions such leaks are, however, a hazard.

Table 2 – Reported Incidents by Fire Hazard Subtype and Severity (2003-2020)

| Type of Fire, Thermal, or Leak Hazard | Reported Incidents | Reported Incident Severity | | |
|---|---|---|---|---|
| | | Fatal | Injury | No Injury |
| Post-Crash Fire Ignition | 51 | 28 | 18 | 5 |
| Fire Ignited (without/prior to crash) | 1,626 | 0 | 129 | 1,497 |
| Thermal Event or burn (without Fire Ignition) | 2,451 | 0 | 105 | 2,346 |
| Leak or spray of oil or fuel (without other burn, thermal event, or fire) | 273 | 0 | 12 | 261 |
| **Total** | **4,401** | **28** | **264** | **4,109** |

Source: CPSRMS

*NEISS Analysis*

There are an estimated 14,200 (sample size = 282) emergency department-treated injuries associated with OHV fire, thermal, and burn hazards ***without*** indication of a crash or related event from 2007 to 2019. "Crash-type events" are defined in this review to include vehicle wrecks, rollovers, entrapments, traffic collisions, and victims falling or jumping from the vehicle, for example.

Although crash-type events coinciding with burns and other thermal, fuel- and fire-related hazards are of concern, such cases were already considered and discussed among the reported

incidents. For the assessment of NEISS injury cases, crash-type events were excluded. This was to allow focus on injuries more directly attributable to heat and thermal events without introducing subjectivity or confusion about which factors were really the most important in contributing to the injury outcomes. This narrowing of scope is not intended to suggest that overheating or other malfunctions of the OHV occurred, or even that other additional factors were not involved, but simply that a burn or other thermal-related event occurred without a crash-type of event.

Staff is unable to present the annual estimates of the injuries from the 2007 through 2019 period because estimates for many of the individual years fall below the NEISS publication criteria. See Tab B for details about the criteria. However, staff did not see any increasing or decreasing trend in the data.

These 14,200 estimated thermal, fuel, fire-related injuries are based on a sample size of 282 cases. The vast majority of these estimated injuries indicate burns (as the primary diagnosis), without necessarily involving the ignition of any fire or flame. Of the injuries involving burns, around 12,800 injuries (about 91%) were classified as thermal burns, while the remainder consisted of scald burns, chemical burns, or burns that were not specified. None of the NEISS incidents reviewed involved any fatalities. Only around 3 percent of estimated injuries mentioned any sort of fire ignition. Less than 2 percent of estimated injuries did not mention burns, but instead involved exploding projectiles lacerating or penetrating the body, or a gasoline explosion.

Most of the injuries were suffered in the lower body, with an estimated 5,900 (42%) of injuries affecting the lower leg in particular. About 1,800 (13%) of the injuries affected the ankle, foot, or toe and about 1,500 (11%) the knee, upper leg and/or lower trunk. Many of these injuries suffered at the leg and neighboring body parts were described as involving burns from the muffler, exhaust pipe, and/or hot exhaust. It was not always clear whether the burns were suffered due to direct contact or proximity. Hands and fingers contributed an estimated 3,200 (23%) of the injuries. Injuries between the shoulders and wrists (including arms and elbows) contributed an estimated 1,300 (9%) of the injuries. Several reported injuries also occurred on or near the eyes and face, but the sample size is too small to project an estimate specific to that region of the body.

Table 3 presents the distribution of estimated injuries by age groups. The majority (58%) of estimated injuries occurred among people under the age of 18. Many of these injuries can be attributed to incidents where a child accidentally touched or contacted a hot surface of an OHV, usually resulting in a thermal burn of the hand or arm. Fewer injuries occurred among adults over the age of 40.

Table 3 - U.S. Emergency Room-Treated Injuries Related to Fire/Thermal/Fuel Hazards Without Indication of Crash-Type Events by Age Group; 2007-2019

| Age Group | Estimated Injuries for Age Group | Percentage of Estimated Injuries for Age Group |
|---|---|---|
| 0 – 5 years | 3,800 | 27% |
| 6 – 17 years | 4,500 | 32% |
| 18 – 24 years | 1,800 | 13% |

| | | |
|---|---|---|
| 25 – 39 years | 2,600 | 18% |
| 40 years & older | 1,600 | 11% |
| **Total** | **14,200*** | **100%*** |

Source: NEISS
*Rows do not add to the total due to rounding.

An overwhelming majority of the emergency room patients (94%, or an estimated 13,500) were either treated and released, or released without treatment. The remainder were either treated and admitted for hospitalization, held for observation, or left without treatment or being seen.

Although the majority of these injuries appear to have involved burns due simply to proximity or contact with heat sources, some other relevant hazards are observed among the NEISS cases. There were several incidents relating to fuel or gasoline, battery, or some form of "explosion;" and as previously mentioned, there were a few incidents where ignition or fire was mentioned. Staff does not have data on which burn cases resulted from overheating as compared to components operating at normal hot temperatures. However, given that many of the injuries involving the hand and fingers appear to involve contact with components that are expected to be heated at normal operational conditions, staff infers that many of the hand burns likely occurred without the OHV overheating or otherwise functioning outside of normal design parameters.

2. Debris Penetration Incidents

Debris penetration involves debris (usually a tree branch or stick) penetrating an OHV (usually the floorboard of underside of an ROV or UTV). When such penetration occurs, there is a potential hazard of the branch or other debris to penetrate far enough to harm not only the floor or body of the OHV, but also occupants of the OHV. None of the incidents staff identified was found to involve ATV debris penetration (other than an ROV mischaracterized as an "ATV"). Given that ATVs lack floorboards, this result was not unexpected, but staff did search OHV incidents for this hazard, regardless of whether the incident was indicated to involve an ATV, ROV, UTV, or unknown type of OHV.

In the NEISS data, staff identified only two cases with sufficient descriptive information to conclude that the injuries were specifically associated with debris penetration hazard. Due to this small sample size, staff cannot report any estimate of injuries.[5] Instead, for the debris penetration hazard scenario, staff counted the two injuries from NEISS with the other reported injuries from CPSRMS.

For the six fatal incidents, two involved death of a passenger, while the other four involved death of the driver. Four involved a tree branch, one a large stick, and the other a 2- to 3-inch piece of wood. At least three involved penetration of the chest.
Paraphrasing text written by the respective CPSC investigators for each of the six fatal incidents:

- **tree limb** penetrated the floor board and struck **passenger** in ***chest*** (driven in water);
- tire over **tree limb** that pierces fender, nylon mesh door, and left side of driver (driven in woods);

[5] According to the NEISS publication criteria, an estimate must be 1,200 or greater, the sample size must be 20 or greater, and the coefficient of variation must be 33 percent or smaller.

- passed over a **large stick** that was sticking up in the ground that passed through brake pedal arm through bottom edge of seat and into ***lower abdomen*** of driver (driven in power line clearing);
- impaled by a **2- to 3-inch size piece of wood** in ***upper right thigh,*** causing exsanguination of driver (driven on heavily forested public land);
- **branch** penetrated UTV bottom and struck **passenger** in ***chest*** (driven along trail);
- ran over **large tree branch** that struck **driver** in ***chest*** (driven in mountains).

Table 2 presents the severity of the 20 nonfatal injury incidents from debris penetration.

Table 2 – Debris Penetration by Injury Severity: 2003-2020

| **Injury Severity** | **Incidents** |
|---|---|
| Hospital Admission | 4 |
| Emergency Department Treatment Received | 3 |
| First Aid Received by Non-Medical Professional | 1 |
| No First Aid or Medical Attention Received | 2 |
| Level of care not known | 10 |
| **Total Injury Incidents** | **20** |

Sources: CPSRMS and NEISS.

## C. OHV Market (Tab C)

1. Market Data

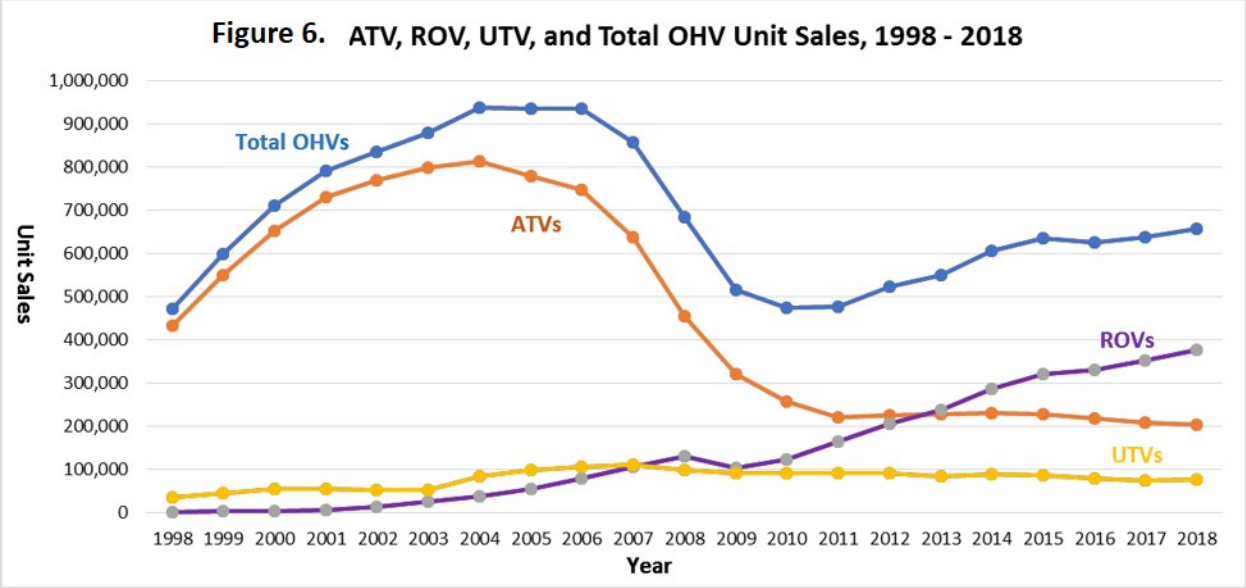
ATV sales have varied throughout the last 15 years. U.S. ATV sales peaked in 2004, at an estimated 812,000 units. Since 2004, ATV sales have declined steadily. CPSC staff estimates approximately 205,000 ATVs were sold in the United States in 2018, 177,000 adult models and 77,000 youth models, and estimates sales revenue of approximately $1.35 billion. CPSC staff identified 13 manufacturers supplying ATVs to the U.S. market in 2018, six from the United States, 5 from Taiwan, and 1 each from Japan and Mexico. Nine manufacturers were responsible for all ATV distribution into the U.S. market in 2018; four U.S. manufacturers distributed ATVs manufactured by Taiwanese firms in addition to their own. U.S. manufacturers accounted for approximately 63 percent of U.S. ATV sales in 2018; all ATVs were manufactured and/or distributed by current members of the Specialty Vehicle Institute of America (SVIA).

With the exception of 2009, annual U.S. ROV sales have increased steadily from an estimated 2,700 units in 1998 to an estimated 376,000 units in 2018. CPSC staff estimates 2018 U.S. ROV sales revenue at approximately $5.85 billion. CPSC staff identified 35 manufacturers known to have supplied ROVs to the U.S. market in 2018: 20 from China (including Taiwan), 13 from the United States, and 1 each from Mexico and South Korea; 53 distributers/brands were identified. CPSC staff estimates U.S. manufacturers accounted for approximately 79 percent of 2018 U.S. ROV sales; approximately 90 percent of ROVs sold in the United States in 2018 were manufactured by current members of ROHVA or OPEI.

U.S. UTV sales peaked in 2007, at an estimated 112,000 units before gradually declining (see Figure 6 below). Approximately 76,000 UTVs were sold in the United States in 2018, with sales

revenue of approximately $700 million. CPSC staff identified 22 manufacturers known to have supplied UTVs to the U.S. market in 2018, 14 from the United States, 6 from China (including Taiwan), and 1 each from Canada and South Korea; 27 distributers/brands were identified. CPSC staff estimates U.S. manufacturers accounted for approximately 92 percent of 2018 U.S. UTV sales. Current ROHVA and OPEI members accounted for approximately 90 percent of U.S. 2018 UTV sales.

Total U.S. OHV unit sales peaked in 2004 at approximately 937,000. OHV sales then declined, to approximately 475,000 by 2011, before beginning a partial recovery. CPSC staff identified as many as 52 manufacturers and 68 distributors/brands of OHVs supplying an estimated 657,000 OHVs to the U.S. market in 2018, with sales revenue exceeding $7.87 billion. CPSC staff estimates U.S. manufacturers accounted for approximately 75 percent of 2018 U.S. OHV sales; SVIA, ROHVA, and OPEI members accounted for approximately 93 percent of 2018 U.S. OHV sales.




2. Retail Prices

CPSC staff identified 115 different ATV model variants and configurations in two product segments that were sold in the United States in 2018: youth and adult ATVs. Youth ATV manufacturer suggested retail prices (MSRPs) ranged from a minimum of $1,999 to a maximum of $3,799, with an average of approximately $2,650. Adult ATV model MSRPs ranged from a minimum of $3,799 to a maximum of $15,349, with an average of approximately $7,400. The average MSRP for all 2018 U.S. ATV sales was approximately $6,750.

As with ATVs, there is significant variation in ROV design, weight, engine displacement, and other characteristics and accessories. CPSC staff identified 396 different ROV model variants and configurations that were sold in the United States in 2018. ROV MSRPs ranged from a minimum of $3,299 to a maximum of $53,700, with an average of approximately $15,400.

CPSC staff identified 138 different UTV model variants and configurations that were sold in the United States in 2018. UTV MSRPs ranged from a minimum of $3,499 to a maximum of $49,900, with an average of approximately $12,000.

## D. Compliance Activities – OHV Recalls (Tab D)

From 2002 to 2019, there were 68 OHV fire and debris penetration hazard recalls. The fire hazard recalls involved ATVs, ROVs, and UTVs. The debris penetration recalls involved ROVs.

CPSC recall data include the number of affected vehicles, number of incidents, and injuries associated with the recalls. An incident is considered a penetration through the floorboard, an actual fire, a fuel leak, or other thermal event (*e.g.*, melted plastic, overheated component). OHV manufacturers generated the recall data and are not associated or related to CPSC Epidemiology staff's injury and death analyses (Tab B) or Engineering Sciences assessment (Tab A).

The Office of Compliance staff reported 26 ATV fire hazard recalls, of which 18 involved fuel system components; 4 involved electronic control modules; 2 involved oil leaks; 1 involved brake fires due to friction; and 1 involved inadequate heat shielding. Collectively, there were 462,372 recalled vehicles, 3325 incidents, 83 fires, and 24 injuries associated with 26 recalls from 2002 to 2018. There were no deaths associated with ATV fire hazard recalls.

With respect to ROVs, there were 33 ROV fire hazard recalls, of which 9 involved fuel system components; 3 involved electrical wiring/electrical components; 10 involved exhaust heat-inadequate heat shielding; 3 involved grass/dry vegetation debris ignition; 5 involved oil leaks; 1 involved improper throttle body installation; and 2 involved multiple sources (engine misfire, brake fires). Collectively, there were 709,886 recalled vehicles, 1022 incidents, 327 fires, and 32 injuries associated with 33 recalls from 2008 to 2019. There was one death associated with one fire hazard recall.

There were 6 UTV fire hazard recalls; one involved grass/dry vegetation debris ignition; and 5 involved fuel system components. Collectively, there were 43,340 recalled vehicles, 144 incidents, and 11 fires associated with 6 recalls from 2008 to 2017. There were no injuries or deaths associated with UTV fire hazard recalls.

There were 3 ROV debris penetration hazard recalls. Collectively, there were 44,500 recalled vehicles, 630 incidents, and 9 injuries associated with three recalls from 2014 to 2016. There were no deaths associated with ROV debris penetration hazard recalls.

Tab D contains the Compliance recall information pertaining to OHVs.

## E. CPSC Enforcement Actions

There were two civil penalties involving OHV fire and debris penetration issues.

Polaris Industries was penalized for failure to immediately report information reasonably supporting the conclusion that a substantial product hazard existed with their model year 2013-2016 Polaris RZR 900 and 1000 ROVs (RZRs) and model year 2014-2015 Ranger XP 900, XP 900 EPS and CREW 900 ROVs (Rangers). [6] These vehicle models posed fire and burn hazards. Polaris settled[7] with CPSC to pay a civil penalty of $27.25 Million.

Similarly, Kawasaki[8] was penalized for failing to immediately report information reasonably supporting the conclusion that a substantial product hazard existed. CPSC entered into a Settlement Agreement with Kawasaki[9]. The ROV models involved were the model year 2012-2013 Teryx4 750 4x4s (Teryx4 750), 2014-2016 model year Teryx4 800 4x4s (Teryx4 800) and Teryx 800 4x4s (Teryx 800). The above models posed debris penetration hazards. Kawasaki agreed to pay a civil penalty of $5.2 Million.

These penalties are examples that support the need for standard requirements to help reduce the risk of fire and debris penetration hazards.

## III. DISCUSSION

### A. Voluntary Standards Assessment (Tab A)

The current voluntary standards for the three OHV types are:

- ATVs - ANSI/SVIA 1-2017 *American National Standard for Four-Wheel All-Terrain Vehicles – Equipment, Configuration, and Performance Requirements* developed by Specialty Vehicle Institute of America (SVIA) for ATVs and incorporated by reference as mandatory standard in 16 CFR 1420.3(a),
- ROVs - ANSI/ROHVA 1-2016 *American National Standard for Recreational Off-Highway Vehicles* developed by Recreational Off-Highway Vehicle Association (ROHVA) for ROVs, and ANSI/OPEI B71.9-2016 – *American National Standard for Multipurpose Off-Highway Utility Vehicles* developed by Outdoor Power Equipment Institute (OPEI) for ROVs (vehicles with maximum speed in excess of 30 mph)
- UTVs - ANSI/OPEI B71.9-2016 – *American National Standard for Multipurpose Off-Highway Utility Vehicles* developed by Outdoor Power Equipment Institute (OPEI) for UTVs.

All of these standards reference the U.S. Forest Service standard, USDA-FS 5100-1, which requires that OHVs be equipped with spark arrestors. A spark arrestor is a metal screen installed in the exhaust tail pipe to mitigate sparks exiting the tail pipe to reduce the risk of forest fires.

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[6] CPSC webpage describing Polaris civil penalty: https://www.cpsc.gov/Newsroom/News-Releases/2018/Polaris-Agrees-to-Pay-27-25-Million-Civil-Penalty-for-Failure-to-Report-Defective

[7] 83 Fed. Reg. 14447 (Apr. 4, 2018); the Settlement Agreement is available at: https://www.cpsc.gov/s3fs-public/18-C0001-Polaris%20-prov-033018.pdf?Kuwft.YrTn63DPlGvFJ7usO3TDDdWM9Y. The Commission Order accepting the agreement was entered on March 20, 2018, and is incorporated in and attached to the Settlement Agreement.

[8] CPSC webpage describing Kawasaki civil penalty: https://cpsc.gov/zhT-CN/node/35540.

[9] 82 Fed. Reg. 25779 (June 5, 2017); the Settlement Agreement and Order are also available at: https://www.cpsc.gov/s3fs-public/Kawasaki_Settlement_Agreement.pdf?_q4HBv2I.VrvDjtDLMgGm9Ie9bNzqb7Y

This requirement does not address other sources of fire hazards to riders and passengers of OHVs, and thus, CPSC staff views this requirement as ineffective for consumer safety.

In addition, the ANSI/OPEI B71.9 – 2016 standard has a general requirement that "all fuel system components shall be located, routed, and contained in such a manner as to provide clearance to heat-generating components and to avoid damage from obstacles or projections that may be encountered during normal operation." This requirement lacks specificity, and thus, CPSC staff views this requirement as ineffective.

As identified in the incident data hazard patterns and past CPSC recalls, OHVs are susceptible to fire hazards posed by breach of the fuel system, failure of the electrical system, or failure of exhaust heat management. The current voluntary standard for ATVs does not address fire hazards from these sources, and the only requirement related to fire hazards is intended to prevent forest fires. The current voluntary standards for ROVs and UTVs do not address fire hazards from these sources, other than a general statement in ANSI/OPEI B71.9 – 2016 that CPSC staff concludes is too vague to meaningfully address fire hazards in UTVs and ROVs.

CPSC staff met with representatives of the three SDOs--ROHVA, SVIA, and OPEI--on multiple occasions to discuss recall data, categorizing in-depth investigation (IDIs) fire causations, and possible requirements for fuel system, electrical, and exhaust system requirements to reduce the risk of fire hazards. Although the SDOs and CPSC staff discussed IDIs, standard requirements have not been proposed or discussed, to date.

Tab A details all the voluntary standards activities, to date. After discussing and categorizing fire causations of IDIs, CPSC staff and SDOs initiated discussions of possible fire preventative standards requirements, starting with the fuel system component examination. On March 26, 2021, CPSC staff received a letter from SVIA and a letter from ROHVA indicating that the respective standards (ANSI/SVIA 1-2017 and ANSI/ROHVA 1-2016) are open for revision. However, to date, there have been no proposed fire and debris penetration requirements to update the current ANSI/SVIA 1-2017, ANSI/ROHVA 1-2016, and ANSI/OPEI B71.9-2016 standards to address fire and debris penetration hazards. Thus, CPSC staff concludes that the current OHV standards will not adequately address the deaths and injuries associated with OHV fire and debris penetration hazards.

## IV. CONCLUSION

CPSC staff is aware of 246 injuries and 4,350 incidents[10] due to OHV fire hazards over the period 2003 to 2020. These fire hazard injuries and incidents are based on CPSRMS data analysis, in which vehicle crashes did not occur or the fire ignited prior to a crash. CPSC staff estimates 14,200 injuries related to fire hazards based on NEISS data projections.
In addition, CPSC staff is aware of 6 deaths and 20 injuries due to debris penetration hazards based on CPSRMS and NEISS data analyses. The number of deaths and injuries is likely higher, because not all deaths and injuries are reported.

[10] The 4,350 incidents are based on 51 post-crash incidents subtracted from the total 4,401 incidents. The 246 injuries are based on 16 post-crash injuries subtracted from the 268 total injuries.

CPSC staff's review of the current voluntary standards for ATVs, ROVs, and UTVs indicates that the fire and debris hazards are not adequately addressed by the standards.

## V. REGULATORY AND OTHER ALTERNATIVES

The Commission could pursue one or more of the following alternatives to reduce the risks of injury associated with OHV fire and debris penetration hazards:

1. **Voluntary standards.** The Commission could continue to address the hazards through the voluntary standards, and continue to work to develop more effective voluntary standard requirements to address the identified hazards, instead of issuing a mandatory rule. However, as previously discussed, the Commission believes preliminarily that the existing standards do not adequately address the risk of injury associated with fire and debris penetration hazards in OHVs.

2. **Reliance on recalls.** The Commission has recalled OHVs for fire and debris penetration hazards. The fire hazard recalls involved ATVs, ROVs, and UTVs. The debris penetration recalls involved ROVs. The Commission could continue to conduct recalls, both voluntary and mandatory, instead of promulgating a mandatory rule. As with recalls, this alternative is not likely to be as effective at reducing the risk of injury as a mandatory standard. Recalls only apply to an individual manufacturer and product and do not extend to similar products. Additionally, recalls can only address products that are already on the market, and cannot prevent unsafe products from entering the market.

3. **Information and education campaign.** The Commission could issue news releases warning consumers about the fire and debris penetration hazards associated with OHVs. As with recalls, this alternative may not be as effective at reducing the risk of injury as a mandatory standard.

4. **Mandatory rule.** The Commission could develop a rule or rules under the Consumer Product Safety Act (CPSA) establishing performance requirements and/or warnings and instructions for OHVs to prevent or reduce an unreasonable risk of death or injury associated with the fire and debris penetration hazards associated with these products.

## VI. STAFF RECOMMENDATION

CPSC staff recommends that the Commission proceed with the rulemaking process for OHV fire and debris penetration hazards by publishing an advance notice of proposed rulemaking (ANPR) as drafted by the Office of the General Counsel.

# TAB A

**UNITED STATES**
**CONSUMER PRODUCT SAFETY COMMISSION**
**WASHINGTON, D.C. 20207**

**Memorandum**

Date: March 26, 2021

TO: Duane Boniface, Assistant Executive Director, Office of Hazard Identification and Reduction

THROUGH: Mark Kumagai, Assistant Executive Director, Directorate for Engineering Sciences

FROM: Han Lim, Mechanical Engineer, Division of Mechanical and Combustion Engineering

SUBJECT: Off-Highway Vehicle (OHV) Fire and Debris Penetration Hazards

## Background

CPSC staff identified three types of off-highway vehicles (OHVs) that can pose fire and debris penetration hazards: all-terrain vehicles (ATVs), recreational off-highway vehicles (ROVs), and utility terrain vehicles or utility task vehicles (UTVs). The scope of this memorandum is limited to ATVs, ROVs and UTVs, collectively referred to here as "OHVs." Golf cars, personal transport vehicles (PTVs), low-speed vehicles, and dune buggies, are not included in the scope of this rulemaking.

*Products and applicable standards*

ATVs

An ATV is a motorized vehicle with three or four broad, low-pressure tires (less than 10 pounds per square inch), a seat designed to be straddled by the operator, handlebars for steering, and it is designed for off-highway use. Since the 1980s, the CPSC has addressed ATV safety through various activities, including rulemaking, recalls, consumer education, media outreach, and litigation. These efforts focused on stability and handling issues related to ATV overturn and collisions, and with the Consumer Product Safety Improvement Act of 2008, the voluntary standard for ATVs, ANSI/SVIA-1, has been incorporated by reference in 16 CFR 1420.3(a) since November 2008.

Figure 1: Example of an ATV

SVIA developed the voluntary standard for ATVs, ANSI/SVIA 1 *Four-Wheel All-Terrain Vehicles – Equipment, Configuration, and Performance Requirements standard.* SVIA published ANSI/SVIA 1 in 1990, and revised the standard in 2001, 2007, 2010, and 2017. In 2008, the Consumer Product Safety Improvement Act (CPSIA) required the Commission to make mandatory the voluntary standard for ATVs, ANSI/SVIA 1-2007. The Commission adopted the voluntary standard as a mandatory standard which is codified in 16 CFR part 1420. The CFR was amended in 2011 and 2018, to reference the latest revision of ANSI/SVIA 1-2010 and ANSI/SVIA 1-2017, respectively.

The requirements ANSI/SVIA 1-2017 include warning label requirements, various mechanical requirements, such as static stability, braking distances, maximum speeds for the various age group ATVs, and various component construction requirements, such as those for handlebars, foot rests, suspension, and most recently, lights.

ROVs

An ROV is a motorized vehicle having four or more low-pressure tires designed for off-highway use and intended by the manufacturer primarily for recreational use by one or more persons. Other 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). ROVs are intended to be used on terrain to what ATVs are used on, but they 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. CPSC staff has worked on stability, handling, and occupant protection issues related to ROVs since 2009.[1]

[1] The NPR for ROVs is available at: 79 Fed. Reg. 68964 (Nov. 19, 2014); the accompanying briefing package is available at: https://cpsc.gov/s3fs-public/pdfs/foia_SafetyStandardforRecreationalOff-HighwayVehicles-ProposedRule.pdf.

Figure 2: Example of an ROV

ROHVA developed ANSI/ROHVA-1 *American National Standard for Recreational Off-Highway Vehicles* for recreation-oriented ROVs and the OPEI-developed ANSI/OPEI B71.9 *American National Standard for Multipurpose Off-Highway Utility Vehicles* for utility-oriented vehicles and includes requirements for vehicles that exceed 30 mph (and thus meet CPSC definition of "ROVs"). ROHVA published ANSI/ROHVA 1 in 2010, and revised the standard in 2011, 2014, and 2016. OPEI published ANSI/OPEI B71.9 in 2012 and revised the standard in 2016.

The ROV requirements in ANSI/ROHVA 1-2016 and ANSI/OPEI B71.9-2016 include static and dynamic stability, vehicle handling, ROPS, speed limiter function when seat belts are not fastened, and various component construction requirements, such as for steering, brakes, and seat belts.

<u>UTVs</u>

A UTV is a motorized vehicle having four or more low-pressure tires designed for off-highway use with the same characteristics (bench seating, steering wheel, foot controls, ROPS and seat belts) as ROVs, but are intended for utility use, have larger cargo beds to accommodate hauling type tasks, and generally have maximum speeds between 25 and 30 mph.

Figure 3: Example of a UTV

OPEI developed ANSI/OPEI B71.9 *American National Standard for Multipurpose Off-Highway Utility Vehicles* for utility-oriented vehicles and includes requirements for vehicles that exceed 30 mph (and thus meet CPSC definition of "ROVs"). The UTV requirements in ANSI/OPEI B71.9-2016 for vehicles with maximum speed below 30 mph include minimum static stability, rollover protection structure (ROPS), brake configuration and performance, and lighting.

All three standards reference the U.S. Forest Service standard, USDA-FS 5100-1, which requires OHVs to be equipped with spark arrestors. A spark arrestor is a metal screen installed in the exhaust tail pipe to mitigate sparks exiting the tail pipe to reduce the risk of forest fires.

The ANSI/OPEI B71.9 – 2016 standard has a general requirement that "all fuel system components shall be located, routed, and contained in such a manner as to provide clearance to heat-generating components and to avoid damage from obstacles or projections that may be encountered during normal operation." This requirement lacks specificity, and thus, CPSC staff views this requirement as ineffective.

CPSC staff does not believe the two requirements above adequately address the fire hazards associated with OHVs. The incident data and recall data suggest OHV fires due to sources, such as electrical shorts, exhaust overheat, and fuel leaks cannot be addressed by the spark arrestor requirement or the general ANSI/OPEI B71.9 – 2016 statement regarding fuel system component location. None of the aforementioned standards contain requirements to mitigate the debris penetration hazard. Thus, CPSC staff believes additional requirements are needed to address OHV fire and debris penetration hazards.

*Fire Hazard Review*

Since 2018, CPSC staff collaborated with the three standards development organizations (SDOs), ROHVA, OPEI, and SVIA, to examine fire hazard causations of OHV-related incidents investigated by CPSC staff and reported as in-depth investigations (IDIs). All three vehicle types, ROVs, UTVs, and ATVs, were associated with fire hazards. Staff provided 121 redacted IDIs related to fire hazards in OHVs, which is a subset of the more comprehensive list of IDI data analyzed by the CPSC Epidemiology staff, detailed in Tab B of the briefing package, to the SDOs for review and analysis. Of the 121 redacted IDIs, CPSC staff and the SDOs determined 84 IDIs contained sufficient information to determine cause of fire origin and agreed to categorize these IDIs. This Tab provides staff insights into this subset of 121 incidents that staff and the SDOs had discussed. In this Tab, when cause or categorization of incidents are discussed, only the 84 incidents for which staff and SDOs agreed there was sufficient information for categorization are discussed. Fuel leaks are considered fire hazards because ignition of flammable fluids contributes to the severity of an incident. The fire and fuel leak origins identified in the 84 IDIs include a breach in the fuel system, electrical component failure, exhaust overheat, and debris (grass/dry vegetation) ignition.

The majority (44 of the 84) of the causations involved fuel system components (29) and exhaust overheat (15). The others involved specific electronic components (voltage regulator, wiring harness, electronic control module, or battery), debris (grass or dry vegetation) ignition from contacting exhaust heat, oil leaks, and unknown causes. Those that were deemed unknown

involved either two or more possible combined causations or instances where causations could not be determined due to insufficient information from particular IDIs. Twenty-seven of the 121 IDIs involved burn injuries when consumers contacted hot surfaces or suffered burns from open flames. Neither CPSC staff, nor the SDOs, identified any fires due to the lack of a spark arrester.

Of the 37 IDIs that had unknown fire causations, 20 involved total OHV losses. A total-loss fire refers to an OHV that has been completely consumed by the fire, leaving only a metal frame and other non-combustible metal parts. A total loss can occur when a smaller fire spreads into a fuel-fed fire, so that the entire vehicle becomes engulfed in flames. This often makes it difficult to determine the origin of the fire. The smaller fire can originate from various sources, such as an overheating exhaust that burns a plastic body panel, a fuel leak fire, or a fire from an electrical short, where a portion of a plastic body panel may catch fire, then that fire can spread to the entire vehicle because the majority of the OHV body panels are generally made of flammable plastics. Total-loss incidents represent the most severe fire hazard of an OHV. Figure 4 shows an example of an ROV total-loss fire. Photos from Figure 4 are from an IDI that had an unknown fire causation.

Figure 4: ROV Prior to the Fire Incident (Left), ROV on Fire (Middle), and ROV Post-Total Loss Fire (Right)

Each OHV is equipped with subsystems that have combustible or flammable sources that can lead to fires and/or fire hazards (*i.e.*, fuel leaks). These subsystems are the fuel system (fuel tank, fuel pump, fuel rail, fuel filter, hoses, shutoff valves, and fuel caps), electrical system (voltage regulator, wire harnesses, battery, fuse boxes, and alternator), and the exhaust system (exhaust piping, catalytic converter, muffler, and all surrounding componentry). The following examples and photographs were taken from redacted IDIs that were analyzed jointly with the SDOs.

With respect to the fuel system, a breach in the fuel system can cause a fuel leak and pose a risk of fire. A breach can be a crack/hole in the fuel tank, damaged fuel hose, crack/hole in a fuel filter, or unsecured fuel connection to a fuel rail. For example, in an IDI that involved an ATV, a passenger received second- and third-degree burns to the right wrist and right leg, when the ATV

burst into flames from an overheated gasoline line that melted and spilled fuel onto the hot engine.

Other fuel-related fire hazards can be due to over-pressurization of the fuel system and inadequate ventilation. Inadequate ventilation and over-pressurization of the fuel system can result in boiling gasoline, which can expel abruptly when opening the fuel cap, potentially splashing hot gasoline onto consumers. Figure 5 shows an example from an IDI of an over-pressurization scenario with an ROV. Unbeknownst to the consumer, opening the fuel cap released pressurized gasoline and a brief fire resulted. Black soot can be seen surrounding the fuel cap.

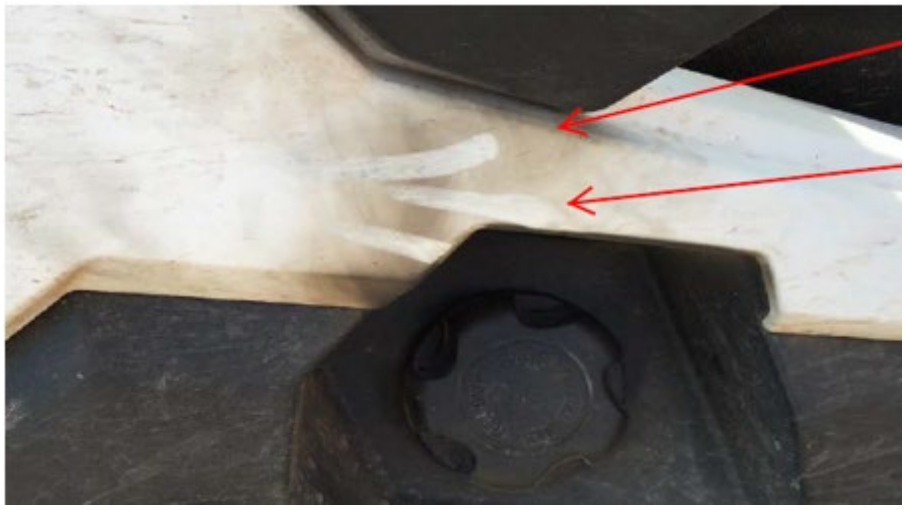

Figure 5 – Soot on the Frame of the ROV (Red Arrows) Resulted from Flames that Shot Out from the Fuel Tank When the Consumer Opened the Gas Cap

An electrical failure, such as an electrical short, or an electronic component overheating, can lead to fires. Figure 6 illustrates a fire that started due to an overheated electronic control module (ECM), which ignited the ECM and wiring.

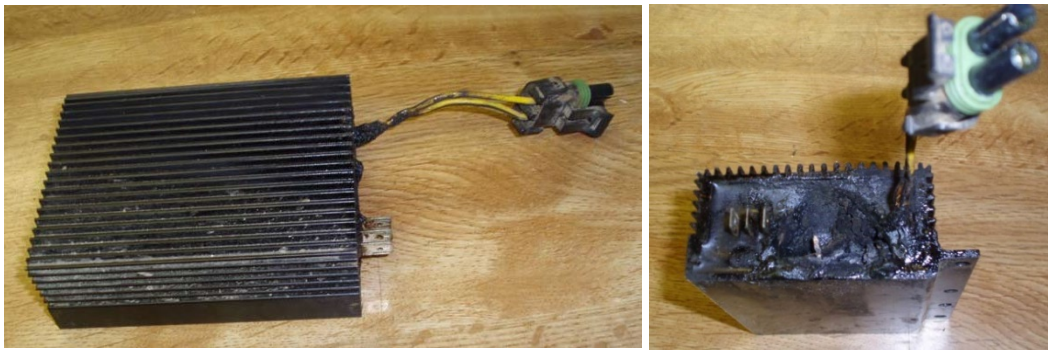

Figure 6 – Example of Burned ATV ECM; Left Photo – Top View, Right Photo – Side View

Excessive exhaust heat near flammable plastics can cause melting and subsequently fires if the exhaust systems do not manage the exhaust heat sufficiently, via heat shielding and/or adequate ventilation. It is not uncommon for modern ROV exhaust surface temperatures to exceed 800°F.

Insufficient heat shielding between the exhaust pipes and plastic paneling can cause the plastic to melt. Figure 7 illustrates a fire that ignited when melted plastic paneling dripped onto the exhaust pipe and burned a hole through the panel.

Of the 121 IDIs examined, 27 IDIs involved burned victims. Of the 27 IDIs, 10 involved first-, second-, and/or third-degree burn injuries. The other 17 IDIs did not specify the severity of the burn injuries. These burn injuries occurred when victims had direct contact with a hot surface or when an open flame burned the victims.

Figure 7 – Example of Fire Damage Caused by Excessive Exhaust Heat

*Debris Penetration Hazard Review*

Debris penetration hazards are unique to ROVs and UTVs because the wheel well areas on these vehicles are generally larger and more open compared to ATVs. The larger space exposes more floorboard and wheel well surface to branches that can and do penetrate into the occupant compartment. Debris penetration through the floorboard or wheel well can impale the occupants of the vehicle and has caused severe injuries and deaths. An example of debris penetration is shown in Figure 6. CPSC staff did not find any ATV-related debris penetration incidents in the injury/death data searches or debris penetration recalls.

Figure 6: Example of Tree Branch (Yellow Arrows) Penetrating ROV floorboard; Left Photograph Shows View from the Cabin (Passenger Seat); Right Photograph Shows Front View of ROV

CPSC staff shared eight redacted IDIs involving debris penetration, which is a subset of the more comprehensive list of IDI data analyzed by the CPSC Epidemiology staff, detailed in Tab B of the briefing package, with the SDOs for review and analysis. CPSC staff's review revealed four IDIs involved fatal impalement of the occupant. A summary of the IDI data shown in Table 1 suggests the debris penetrations occurred at relatively low speeds, *i.e.*, 25 mph or less.

Table 1 – Summaries of Eight Debris Penetration IDIs

| Vehicle | Injury Type | Estimated speed, mph | Injured Body part(s) | Description |
|---|---|---|---|---|
| A | Death | 25 | heart | Consumer drove into a creek when water splashed onto the windshield; tree limb broke through the floor and struck passenger who died as a result of the impalement |
| B* | No Injury | 5 | none | Consumer was driving on a slight hill; rocks punctured the floorboard |
| C | Death | 10 | viscera | Consumer drove on a wooded trail (dirt road) with various debris (rocks and limbs); tree limb pierced fender and nylon mesh door and impaled the driver |
| D** | Death | Not available | no information | Not available |
| E | Contusion/ No Medical Attention | 20 | abdomen | Consumer drove in the dark (12:30am) on a leaf covered trail; tree branch punctured driver's side floor, struck his abdomen, but did not impale the driver due to the driver wearing thick clothing. |
| F | Abrasions | 25 | ankle | IDI involved 2 occasions – on one occasion snow was on ground, could not see branches thus a debris penetration occurred; other occasion ROV traveled on paved road and a tree branch punctured rear passenger floor |
| G | Death | Not available | thigh | Not available |
| H | Abdomen impaled | 25 | Liver, stomach, | Consumer drove on dirt/gravel road lined with 3-foot-tall grass on both sides; when attempting to avoid debris from a downed tree, a branch penetrated |

| | | | | |
|---|---|---|---|---|
| | | | spleen, pancreas | passenger side floor, struck passenger and impaled the driver. |
| *All vehicles are ROVs, except vehicle B, which is a UTV. Vehicle B involved rocks penetrating the floorboard; all other vehicles involved tree branches penetrating the floorboards.<br>**It is unknown whether vehicle D is an ROV or UTV due to the lack of model information. | | | | |

There were four deaths and three injuries associated with debris penetration. Many of these incidents occurred when there was reduced visibility or the driver was unable to see the debris (*e.g.*, driving in the dark, snow covered terrain); but overall, the incidents occurred during what staff considers reasonably foreseeable, normal use of the vehicles.

**Voluntary Standards**

CPSC staff met with representatives of ROHVA, SVIA, and OPEI on multiple occasions to discuss the development of requirements for fuel system, electrical, and exhaust system requirements to reduce the risk of fire hazards. The three SDOs are industry groups that represent the majority of the OHVs in the United States. Although debris penetration IDIs were provided to the SDOs, standard requirements have not been discussed, to date.

During the initial meeting on September 19, 2018,[2] CPSC staff presented a list of CPSC fire and debris penetration recalls. CPSC staff identified various fire sources indicated in the recalls: fuel tank leaks, fuel/oil hose leaks, debris (dry grass/vegetation) ignitions, electrical components, exhaust overheating, fuel filter leaks, overheating plastic panels, and multiple sources (some combination of two or more of the causes above).

CPSC staff discussed the lack of fire preventive requirements in the ROHVA, SVIA, and OPEI standards. Although all three standards reference the U.S. Department of Agriculture Forest Service FS 5100-1 standard requirement for spark arrestors, and the OPEI standard has a general requirement for fuel systems to be located away from heat generating components, the causations of fire and fuel leaks detailed in the IDIs were not due to the lack of spark arrestors. The general OPEI requirement lacks specific metrics, making such requirement ineffective. CPSC staff concludes that the general statement in ANSI/OPEI B71.9 – 2016 is too vague to address meaningfully fire hazards in UTVs and ROVs.

CPSC staff recommended that the SDOs perform a literature search to determine if standards for similar vehicles, such as golf cars, or other applicable standards, have fire preventative requirements. CPSC staff recommended that the SDOs form task groups to study specific categories for both fire and debris penetration hazards.

In subsequent meetings, CPSC staff and SDOs discussed 84 redacted IDIs. CPSC staff and the SDOs collectively assigned specific causations for each IDI. For IDIs with insufficient information to determine a fire causation, those IDIs' causations were deemed unknown. The categories for fire causations differed somewhat from the list of recalls that were presented in

[2] CPSC Staff meeting with ROHVA, OPEI, and SVIA to discuss OHV fire and debris penetration recall data. Meeting Log Webpage URL: https://www.cpsc.gov/s3fs-public/2018-09-19%20Voluntary%20Standards%20Meeting%20on%20Off-Highway%20Vehicles.pdf?GhlbD87TF1W8m6F9B10g2CpZTCNzSrjP

September 19, 2018. However, there was overall agreement that the three general categories were fuel system, electrical system, and exhaust system.

Once the IDI discussions concluded, CPSC staff and the SDOs discussed possible fire preventative standard requirements during the meeting on September 9, 2020.[3] The scope of this meeting was limited to fuel systems. The group examined specific sections from various related standards, such as the ANSI/OPEI B71.10-2018 standard for Outdoor Ground Supported Gasoline Powered Equipment, the Society of Automotive Engineers (SAE) J288 standard for snowmobile fuel tanks, ANSI/ILTVA (International Light Transportation Vehicle Association) Z130.1-2012 standard for Golf Cars, ANSI/ILTVA Z135-2012 standard for Personal Transport Vehicles, and SAE J2044 Standard for Quick Connect Coupling Specification for Liquid Fuel and Vapor/Emissions Systems to determine their possible applicability to OHVs. CPSC staff believes significant progress was made during this meeting and that the SDOs may propose some possible fire preventative standard requirements. However, it is uncertain when the SDOs may propose possible fire preventative standard requirements. On March 26, 2021, CPSC staff received a letter from SVIA and a letter from ROHVA indicating that the respective standards (ANSI/SVIA 1-2017 and ANSI/ROHVA 1-2016) are open for revision. Thus far, there have been no discussions on possible debris penetration mitigation standard requirements.

**Conclusion**

ATVs, ROVs, and UTVs pose fire hazards. ROVs and UTVs pose debris penetration hazards. Incident data indicated OHV occupants experienced burn injuries when they contacted hot surfaces or were burned in a fire. Based on an analysis of 121 IDIs that were shared with the SDOs, CPSC staff is aware of at least 27 burn injuries. Of the 27 burn injuries, there were 10 injuries with enough information to determine the degree of burns, which ranged from first- to third-degree burns. Based on analysis of eight debris penetration IDIs, CPSC staff is aware of at least four deaths due to debris penetrations through ROV floorboards. The current mandatory standard for ATVs, ANSI/SVIA-1-2017, does not have requirements to address fire hazards. The current voluntary standards for ROVs and UTVs, ANSI/ROHVA-1-2016 and ANSI/OPEI B71.9-2016, respectively, do not have requirements that address fire hazards and do not have requirements that address debris penetration hazards.

To date, there have been no proposed fire and debris penetration requirements to update the current ANSI/ROHVA 1-2016, ANSI/SVIA 1-2017, and ANSI/OPEI B71.9-2016 standards to address fire and debris penetration hazards. Therefore, CPSC staff concludes that the current OHV standards will not adequately address the deaths and injuries associated with OHV fire and/or debris penetration hazards.

[3] CPSC staff's virtual meeting with ROHVA, OPEI, and SVIA to discuss possible performance standard requirements to address fire hazards. Meeting Log Webpage URL: https://www.cpsc.gov/s3fs-public/2020-9-9VoluntaryStandardsMeetingtoDiscussPossibleFuelSystemRequirementsforOff-HighwayVehiclesOHVs.pdf?Goe4B867L2Gbl8gkw6KtELIZ7qDiQ3e6

# TAB B

**UNITED STATES**
**CONSUMER PRODUCT SAFETY COMMISSION**
**WASHINGTON, D.C. 20207**

**Memorandum**

Date: March 16, 2021

TO: Han Lim
Off-Highway Vehicles Project Manager
Division of Mechanical and Combustion Engineering
Directorate for Engineering Sciences

THROUGH: Risana Chowdhury
Director, Division of Hazard Analysis
Directorate for Epidemiology

FROM: John Topping
Division of Hazard Analysis
Directorate for Epidemiology

Chao Zhang
Division of Hazard Analysis
Directorate for Epidemiology

SUBJECT: Review of Incidents, Injuries, and Fatalities Associated with Off-Highway Vehicle (OHV) Fire and Debris Penetration Hazards

## I. INTRODUCTION

U.S. Consumer Product Safety Commission (CPSC) staff prepared this review in its consideration of regulatory action to address fire hazards and debris penetration hazards on off-highway vehicles (OHVs). All-terrain vehicles (ATVs), recreational off-highway vehicles (ROVs), and utility terrain vehicles or utility task vehicles (UTVs) comprise OHVs. This review presents information on OHV-related deaths, injuries, and non-injury incidents. The National Electronic Injury Surveillance System (NEISS) –based injury estimates are from January 1, 2007 to December 31, 2019; the reported incidents from CPSC's Consumer Product Safety Risk Management System (CPSRMS) are from January 1, 2003 through December 31, 2020. Finalized NEISS data for 2020 will be available in spring 2021.

## II. RESULTS

This review focuses on debris penetration and fire-related hazards. These hazards are generally unrelated to one another. Out of the 4,792 incidents staff identified as related to debris penetration or fire hazards, only two exhibit *both* debris penetration and fire-related hazards. Table 1 shows the breakout of hazards by data sources and severity of incidents. Following Table 1, this memorandum addresses these hazards separately.

**Table 1: Incident Records Relevant to Debris Penetration and/or Fire Hazards as Presented in this Report**

| Relevant Hazards | Total Records Reviewed | CPSRMS (2003-2020) | | | NEISS (2007-2019) |
|---|---|---|---|---|---|
| | | Fatal Reported Incidents | Injury Reported Incidents | No Injury Reported Incidents | Injury Cases in Sample |
| Debris Penetration | **107** | 6 | 18 | 81 | 2 |
| Fire Hazard (fire, thermal, leaks) | **4,683** | 28 | 264 | 4,109 | 282 |
| Both hazard of Debris Penetration and Thermal, Fuel, or Fire Related Hazards | **2** | 0 | 1 | 1 | 0 |
| **Total** | **4,792** | **34** | **283** | **4,191** | **284** |

Sources: CPSRMS and NEISS.

### Debris Penetration Incidents

Debris penetration involves debris (usually a tree branch or stick) penetrating an OHV (usually the floorboard of underside of an ROV or UTV). When such penetration occurs, there is a potential hazard of the branch or other debris to penetrate far enough to harm not only the floor or body of the OHV, but also occupants of the OHV. None of the incidents staff identified were found to involve ATV debris penetrations incidents (other than an ROV mischaracterized as an "ATV"). Given that ATVs lack floorboards, this result was not unexpected, but staff did search OHV incidents for this hazard, regardless of whether it was indicated to involve an ATV, ROV, UTV, or unknown type of OHV.

In the NEISS data, staff identified only two cases with sufficient descriptive information to conclude that the injuries were specifically associated with debris penetration hazard. Due to this small sample size, staff cannot report any estimate of injuries.[1] Instead, for the debris penetration hazard scenario, staff counted the two injuries from NEISS with the other reported injuries from CPSRMS.

[1] According to the NEISS publication criteria, an estimate must be 1,200 or greater, the sample size must be 20 or greater, and the coefficient of variation must be 33 percent or smaller.

In all six fatal incidents, it appears that only one victim died per incident. Two involved death of a passenger, while the other four involved death of the driver. Four involved a tree branch, one a large stick, and the other a 2- to3-inch piece of wood. At least three involved penetration of the chest.
Paraphrasing text written by the respective CPSC investigators for each of the six fatal incidents:

- **tree limb** penetrated the floor board and struck **passenger** in ***chest*** (driven in water);
- tire over **tree limb** that pierces fender, nylon mesh door, and left side of driver (drove in woods);
- passed over a **large stick** that was sticking up in the ground, which passed through brake pedal arm through bottom edge of seat and into ***lower abdomen*** of driver (driven in power line clearing);
- Impaled by a **2-3-inch size piece of wood** in ***upper right thigh***, causing exsanguination of driver (driven on heavily forested public land);
- **Branch** penetrated UTV bottom and struck **passenger** in ***chest*** (driven along trail);
- Ran over **large tree branch**, which struck **driver** in ***chest*** (driven in mountains).

Table 2 presents the severity of the 20 injury incidents due to debris penetration.

**Table 2: Debris Penetration by Injury Severity: 2003-2020**

| **Injury Severity** | **Incidents** |
|---|---|
| Hospital Admission | 4 |
| Emergency Department Treatment Received | 3 |
| First Aid Received by Non-Medical Professional | 1 |
| No First Aid or Medical Attention Received | 2 |
| Level of care not known | 10 |
| **Total Injury Incidents** | **20** |

Sources: CPSRMS and NEISS.

**Fire Hazard (fire, thermal, leaks)**

This assessment excludes fires ignited by external sources (*e.g.*, overtaken by a controlled burn or bonfire, even if the OHV ignites) refueling incidents, and incidents in which it is ambiguous about whether the source of the fire may have come from sources outside the OHV. The NEISS estimated injuries pertaining to this hazard are reportable; as such, the injury estimates for 2007–2019, are presented separately. First, the analysis of reported incidents in CPSRMS with incident dates from 2003–2020 is presented.

*CPSRMS Incident Data (2003–2020)*

Reports in CPSRMS with incident dates from 2003–2020 are categorized into one of several mutually exclusive categories.

Sometimes OHV fires occur after a crash, and because these events may involve multiple complicating factors, they are set aside in their own category. It is very plausible that in some of

these instances occupants may still have been injured or killed from the crash, even if the vehicle did not ignite. For instances of a fire igniting before or *without* a crash, it is generally clearer to attribute resulting injuries or deaths specifically to the fire. In many other instances, there may be thermal events that do not involve actual ignition of fire, but such events can still be harmful or hazardous. Leaks or spraying oil or fuel do not necessarily constitute a thermal event, because these flammable liquids only have the potential to ignite and release thermal energy; but even without ignitions, such leaks can present a hazard.

Table 3 presents the fire hazard subtypes by the severity of the outcome as seen in the CPSRMS incident data.

**Table 3: Reported Incidents by Fire Hazard Subtype and Severity; 2003-2020**

| Type of Fire, Thermal, or Leak Hazard | Reported Incidents | Reported Incident Severity | | |
|---|---|---|---|---|
| | | Fatal | Injury | No Injury |
| Post-Crash Fire Ignition | 51 | 28 | 18 | 5 |
| Fire Ignited (without/prior to crash) | 1,626 | 0 | 129 | 1,497 |
| Thermal Event or burn (without Fire Ignition) | 2,451 | 0 | 105 | 2,346 |
| Leak or spray of oil or fuel (without other burn, thermal event, or fire) | 273 | 0 | 12 | 261 |
| **Total** | **4,401** | **28** | **264** | **4,109** |

Source: CPSRMS

*NEISS-Based National Injury Estimates (2007–2019)*

There are an estimated 14,200 (sample size = 282) emergency department-treated injuries from 2007 to 2019 associated with OHV fire, thermal, and burn hazards ***without*** indication of a crash or related event. "Crash-type events" are defined in this review to include vehicle wrecks, rollovers, entrapments, traffic collisions, victims falling or jumping from the vehicle, for example.

Although crash-type events coinciding with burns and other thermal-, fuel- and fire-related hazards are of concern, such cases were already considered and discussed among the reported incidents. For the assessment of NEISS injury cases, they are excluded to focus on injuries more directly attributable to heat and thermal events without subjectivity or confusion about which factors were really the most important in contributing to the injury outcomes. This narrowing of scope is not intended to suggest that overheating or other malfunction of the OHV occurred, or even that other additional factors were not involved, but simply to demonstrate that a burn, or other thermal-related event occurred without a crash-type of event.

Staff is unable to present the annual estimates of the injuries over the period from 2007 through 2019, because estimates for many of the individual years fall below the NEISS publication criteria.[2] However, staff did not see any increasing or decreasing trend in the data.

[2]According to the NEISS publication criteria, an estimate must be 1,200 or greater, the sample size must be 20 or greater, and the coefficient of variation must be 33 percent or smaller.

These 14,200 estimated thermal-, fuel-, and fire-related injuries are based on a sample size of 282 cases. The vast majority of these estimated injuries indicate burns (as the primary diagnosis), without necessarily involving the ignition of any fire or flame. Of the injuries involving burns, around 12,800 injuries (about 91%) were classified as thermal burns, while the remainder consisted of scald burns, chemical burns, or burns that were not specified. None of the incidents reviewed involved any fatalities. Only around 3 percent of estimated injuries mentioned any sort of fire ignition. Less than 2 percent of estimated injuries did not mention burns, but instead involved exploding projectiles lacerating or penetrating the body, or a gasoline explosion.

Most of the injuries were suffered in the lower body, with an estimated 5,900 (42%) of injuries affecting the lower leg in particular. About 1,800 (13%) of the injuries affected the ankle, foot, or toe, and about 1,500 (11%) involved the knee, upper leg, and/or lower trunk. Many of these injuries suffered at the leg and neighboring body parts were described as involving burns from the muffler, exhaust pipe, and/or hot exhaust. It was not always clear whether the burns were suffered due to direct contact or proximity. An estimated 3,200 (23%) of the injuries involved hands and fingers. Injuries between the shoulders and wrists (including arms and elbows) were attributed to an estimated 1,300 (9%) of the injuries. Several reported injuries also occurred on or near the eyes and face, but the sample size is too small to project an estimate specific to that region of the body. Table 4 presents the estimated injuries by body parts, grouped as described above.

**Table 4: U.S. Emergency Room-Treated Injuries Related to Fire/Thermal/Fuel Hazards without Indication of Crash-Type Events by Body Parts; 2007-2019**

| Body Part | Body Parts Group Estimate | Percentage of Estimated Injuries for Body Part Group |
|---|---|---|
| Leg, lower*** | 5,900 | 42% |
| Ankle*** | 1,800 | 13% |
| Foot | | |
| Toe | | |
| Trunk, lower | 1,500 | 11% |
| Leg, upper | | |
| Knee | | |
| Hand | 3,200 | 23% |
| Finger | | |
| Shoulder | 1,300 | 9% |
| Arm, upper | | |
| Elbow | | |
| Arm, lower | | |
| Wrist | | |
| Eyeball | ** | ** |
| Face* | | |
| **Total** | **14,200** | **100%** |

Source: NEISS
*"Face" includes eyelid, eye area, nose, and forehead.

**Sample size is too small to report estimate specific to this group of body parts.
***Almost all injuries in this dataset are classified under a single primary (*e.g.*, most severely injured) body part. Only one injury is counted only as a lower leg injury (and not as an ankle injury) which also involved a burn at the lower leg in combination with a "popped" ankle when the vehicle "blew out."

Table 5 presents the distribution of estimated injuries by age groups. The majority (58%) of estimated injuries occurred among people under the age of 18. Many of these injuries can be attributed to incidents where a child accidentally touched or made contact with a hot surface of an OHV, usually resulting in a thermal burn of the hand or arm. Fewer injuries occurred among adults over the age of 40.

**Table 5: U.S. Emergency Room Treated Injuries Related to Fire/Thermal/Fuel Hazards without Indication of Crash-Type Events by Age Group; 2007-2019**

| Age Group | Estimated Injuries for Age Group | Percentage of Estimated Injuries for Age Group |
|---|---|---|
| 0 – 5 years | 3,800 | 27% |
| 6 – 17 years | 4,500 | 32% |
| 18 – 24 years | 1,800 | 13% |
| 25 – 39 years | 2,600 | 18% |
| 40 years & older | 1,600 | 11% |
| **Total** | **14,200*** | **100%*** |

Source: NEISS
*Rows do not add to the total due to rounding.

An overwhelming majority of the emergency room patients (94%, or an estimated 13,500) were either treated and released, or released without treatment. The remainder were treated and admitted for hospitalization, held for observation, or left without treatment or being seen.

Although the majority of these injuries appear to have involved burns due simply to proximity or contact with heat sources, some other relevant hazards are observed among the NEISS cases. There were several incidents relating to fuel or gasoline, battery, or some form of "explosion"; and as previously mentioned, there were a few incidents where ignition or fire was mentioned. Staff does not have data about which burn cases resulted from overheating, as compared to components operating at normal hot temperatures. However, given that many of the injuries to the hand and fingers appear to involve contact with components that are expected to be heated at normal operational conditions, staff infers that many of the hand burns likely occurred without the OHV overheating, or otherwise functioning outside of normal design parameters.

## III. CONCLUSION

Staff reviewed OHV data over multi-year timeframes, from two databases: 2003–2020 for CPSRMS, and 2007–2019 for NEISS. For this data review, staff focused only on two specific hazards: debris-penetration and fire-related hazards associated with off-highway vehicles (consisting of ATVs, ROVs, and UTVs).

Staff identified:

- 34 reported fatalities—28 from fire-related hazards, 6 from debris penetration;
- 284 reported injuries—264 from fire-related hazards, 20 from debris penetration (including 2 injuries treated at hospital emergency departments);
- 14,200 estimated injuries treated at U.S. hospital emergency departments related to fire/thermal/fuel hazards, excluding any crash-type events—almost 91% were burns;
- For national injury estimates, CPSC staff focused *only* on the above subcategory of fire hazards;
- staff observed no trends in the annual injury estimates from 2007–2019;
- 58 percent of the estimated injuries were under the age of 18 years.

Based on the reported incidents, while fire-related hazards appear to be the dominant hazard with higher number of fatalities and injuries reported, debris penetration incidents appear to result proportionally in more fatalities and injuries, compared to fire incidents.

# TAB C

**UNITED STATES**
**CONSUMER PRODUCT SAFETY COMMISSION**
**WASHINGTON, D.C. 20207**

**Memorandum**

DATE: December 1, 2020

TO: Han Lim
Project Manager, Off-Highway Vehicles
Directorate for Engineering Sciences

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

Robert Franklin
Supervisory Economist
Directorate for Economic Analysis

FROM: Rodney R. Row, Ph.D.
Economist
Directorate for Economic Analysis

SUBJECT: Off-Highway Vehicles: Preliminary Discussion of the OHV Market

## BACKGROUND

The Consumer Product Safety Commission's (CPSC) Fiscal Year 2021 Operating Plan directs staff to prepare a briefing package to support an advance notice of proposed rulemaking (ANPR) addressing the injuries and deaths associated with off-highway vehicle (OHV) fire and debris penetration hazards. The purpose of this memorandum is to provide a brief description of the product, an estimate of the size of the OHV market and number of participating firms, and discussions of the number of OHVs in use, and small businesses subject to rulemaking. This memorandum also describes additional information needed to support a regulatory analysis, should the Commission eventually issue a proposed rule.

## The Product

OHVs include one of three vehicle classifications: "All-terrain Vehicles" (ATVs), "Recreational Off-Highway Vehicles" (ROVs), and "Utility Terrain Vehicles" (UTVs). CPSC staff defines an "ATV" as an off-road, motorized vehicle having three, four, or more low-pressure tires, a straddle seat for the operator, and a handlebar for steering control.[1] This definition is consistent with the mandatory CPSC standard, ANSI/SVIA 1-2017 Four-Wheel All-Terrain Vehicles – Equipment, Configuration, and Performance Requirement, developed by Specialty Vehicle Institute of America (SVIA).

ATVs vary in design, weight, engine displacement, and other characteristics and accessories. CPSC staff identified 115 different ATV model variants and configurations in two product segments sold in the United States in 2018: youth and adult. Youth ATV manufacturer suggested retail prices (MSRPs) ranged from a minimum of $1,999 to a maximum of $3,799, with an arithmetic mean of approximately $2,650. Adult ATV model MSRPs ranged from a minimum of $3,799 to a maximum of $15,349, with a mean of approximately $7,400. The mean MSRP for all U.S. ATV sales in 2018, was approximately $6,750.[2] ROVs and UTVs have many features in common with ATVs, such as four or more tires designed for off-road vehicles, and may compete with ATVs for some market segments, particularly recreational use. However, ROVs and UTVs are distinguished from ATVs by features such as non-straddle or "side-by-side" seating, and automotive-type controls for steering, throttle, and braking (*e.g.*, steering wheel and pedals).

CPSC staff defines an "ROV" as a motorized vehicle with four or more pneumatic tires designed for off-highway use, bench or bucket seats for two or more occupants, automotive-type controls for steering, throttle, and braking, and a maximum vehicle speed greater than 30 miles per hour (mph). ROVs are also equipped with rollover protective structures (ROPS), seat belts, and other restraints (such as doors, nets, and shoulder barriers) for the protection of occupants (ROV NPR, 79 Fed. Reg. 68,964, 2014). As with ATVs, there is significant variation in ROV design, weight, engine displacement, and other characteristics and accessories. CPSC staff identified 396 different ROV model variants and configurations that were sold in the United States in 2018. ROV MSRPs ranged from a minimum of $3,299 to a maximum of $53,700, with an arithmetic mean of approximately $15,400.

CPSC staff defines "UTVs" as motorized vehicles designed for off-highway use with four or more pneumatic tires designed for such use, bench or bucket seats for two or more occupants, automotive-type controls for steering, throttle, and braking, and a maximum speed of 30 mph or less. UTVs are generally equipped with larger cargo beds, and by definition, travel at slower

[1] Section 232 of the Consumer Product Safety Improvement Act of 2008, Public Law No. 110–314 (2008) prohibits the import or distribution into commerce in the United States of new 3-wheeled all-terrain vehicles, effective August 14, 2008. Continued use of existing 3-wheeled all-terrain vehicles is not prohibited.
[2] Unless otherwise noted, OHV product and market information is based upon CPSC staff analysis of 1998–2018 sales data provided by Power Products Marketing, Minneapolis, MN.

speeds than ROVs, and may be equipped with ROPS and other safety devices. UTVs also exhibit significant variation in design, weight, engine displacement, cargo capacity, ROPS, and other safety characteristics, and accessories. CPSC staff identified 138 different UTV model variants and configurations which were sold in the United States in 2018. UTV MSRPs ranged from a minimum of $3,499 to a maximum of $49,900, with an arithmetic mean of approximately $12,000.

**Market Size**

U.S. ATV sales peaked in 2004, at an estimated 812,000 units. Since 2004, ATV sales have declined steadily. CPSC staff estimates just under 205,000 ATVs were sold in the United States in 2018, 177,000 adult models and 77,000 youth models, and sales revenue of approximately $1.35 billion.[3] CPSC staff identified 13 manufacturers supplying ATVs to the U.S. market in 2018, 6 from the United States, 5 from Taiwan, and 1 each from Japan and Mexico. Nine manufacturers were responsible for all ATV distribution into the U.S. market in 2018; four US manufacturers distributed ATVs manufactured by Taiwanese firms in addition to their own. US manufacturers accounted for approximately 63 percent of 2018 U.S. ATV sales; all were manufactured and/or distributed by current members of the Specialty Vehicle Institute of America (SVIA).

With the exception of 2009, annual U.S. ROV sales have increased steadily, from an estimated 2,700 units in 1998, to an estimated 376,000 units in 2018. CPSC staff estimates 2018 U.S. ROV sales revenue at approximately $5.85 billion. CPSC staff identified 35 manufacturers known to have supplied ROVs to the U.S. market in 2018, 20 from China (including Taiwan), 13 from the United States, and 1 each from Mexico and South Korea; 53 distributers/brands were identified.[4] CPSC staff estimates U.S. manufacturers accounted for approximately 79 percent of 2018 U.S. ROV sales, and approximately 90 percent were manufactured by current members of the Recreational Off-highway Vehicle Association (ROHVA) or the Outdoor Power Equipment Institute (OPEI).

U.S. UTV sales peaked in 2007, at an estimated 112,000 units, before gradually declining. Approximately 76,000 UTVs were sold in the United States in 2018, and sales revenue of approximately $700 million. CPSC staff identified 22 manufacturers known to have supplied UTVs to the U.S. market in 2018, 14 from the United States, 6 from China (including Taiwan), and 1 each from Canada and South Korea; 27 distributers/brands were identified. CPSC staff estimates U.S. manufacturers accounted for approximately 92 percent of 2018 U.S. UTV sales. Current ROHVA and OPEI members accounted for approximately 90 percent of U.S. 2018 UTV sales.

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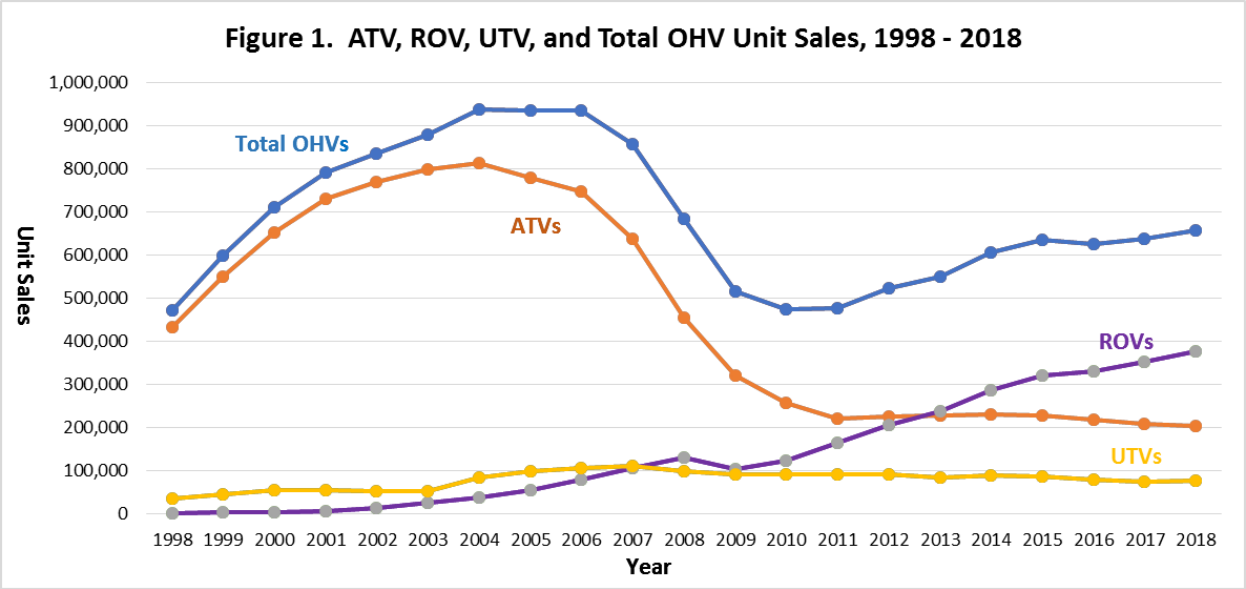
[3] Sales revenue is estimated by summing the products of unit sales and MSRP for those models sold in 2018 for which this information is available.

[4] As with ATVs, many ROV and UTV manufacturers are also distributers. Unlike the ATV market, not all distributers are manufacturers and several ROV and UTV manufacturers produce vehicles for more than one distributer and/or brand.

Total U.S. OHV unit sales peaked in 2004 at approximately 937,000. OHV sales then declined, to approximately 475,000 by 2011, before beginning a partial recovery. Figure 1 below illustrates ATV, ROV, UTV, and total OHV unit sales from 1998 through 2018. CPSC staff identified as many as 52 manufacturers and 68 distributors/brands of OHVs supplying an estimated 657,000 OHVs to the U.S. market in 2018, with sales revenue exceeding $7.87 billion. CPSC staff estimates U.S. manufacturers accounted for approximately 75 percent of 2018 U.S. OHV sales; SVIA, ROHVA, and OPEI members accounted for approximately 93 percent of 2018 U.S. OHV sales.




**Number of Off-highway Vehicles in Use**

Lacking reliable estimates of ATV, ROV, and UTV product life, CPSC staff is unable to provide an accurate estimate of the number of OHVs currently in use. Table 1 illustrates a range of estimates possible under different assumptions of product life. In each case, the estimate is constructed using a gamma distribution, a common distribution for estimating failure rates, with shape = 5 and β = 1, applied to 1998 – 2018 OHV sales data. Estimates are provided for ATVs, ROVs, UTVs, and total OHVs under three product life assumptions (10, 15, and 20 years).[5]

**Table 1. Estimates of OHVs in Use**
(Gamma Distribution w/ Shape = 5 and beta = 1)

| Life Expectancy | 10 Years | 15 Years | 20 Years |
|---|---|---|---|
| **ATV** | 3,217,376 | 5,782,667 | 7,467,359 |
| **ROV** | 2,419,854 | 2,725,373 | 2,853,372 |

[5] Implied in the total OHV estimates is the assumption that ATVs, ROVs, and UTVs have the same expected product life. This assumption likely does not hold, because product life depends upon annual mileage, terrain driven upon, and other usage characteristics, which are not homogenous across OHV categories.

| | | | |
|---|---|---|---|
| **UTV** | 895,474 | 1,226,299 | 1,417,666 |
| **TOTAL** | 6,532,704 | 9,734,340 | 11,738,397 |

**Small Businesses Subject to Rulemaking**

OHV manufacturers might be classified in the North American Industrial Classification System (NAICS) category 336999 (All Other Transportation Equipment Manufacturing), or possibly, 336112 (Light Truck and Utility Vehicle Manufacturing), 333111 (Farm Machinery and Equipment), 333112 (Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing), and 333120 (Construction Machinery Manufacturing). According to size standards established by the Small Business Administration (SBA) for these NAICS, firms with fewer than 1,000, 1,500, 1,250, 1,500, and 1,250 employees, respectively, are considered to be small firms. OHV distributers may be classified in NAICS categories 423110 (Automobile and Other Motor Vehicle Merchant Wholesalers) or 441228 (Motorcycle, ATV, and All Other Motor Vehicle Dealers). The SBA size standard for these NAICS classifications is 500 employees. CPSC staff identified 8 U.S. OHV manufacturers which meet these SBA size standards, 9 which do not, and 4 for which a determination could not be made. CPSC staff also identified 27 OHV distributers which meet these SBA size standards, 24 which do not, and 17 for which a determination could not be made.

## REQUEST FOR INFORMATION

CPSC EC staff requests the following information regarding ways to address the risk of injury associated with OHV fire and debris penetration hazard injuries.

1. Studies, tests, or surveys performed to analyze fire and/or debris penetration hazard injuries, including severity and costs associated with injury;
2. Studies, tests, or descriptions of technologies or design changes that address OHV fire and/or debris penetration hazard, and estimates of costs associated with incorporation of the technologies and their impact on wholesale or retail prices;
3. Information on ATV, ROV, and UTV expected lifespans and/or the number of ATVs, ROVs, and UTVs in use;
4. Information on the number of hours driven, miles driven, and/or other exposure metrics;
5. Studies, test, or surveys performed to analyze use of aftermarket products that address OHV fire and/or debris penetration hazards, and their effectiveness at reducing OHV fire and/or debris penetration hazard injuries, and means by which their use by consumers could be increased;
6. Information on the expected impact of technologies or design changes that address OHV fire and/or debris penetration hazard injuries on manufacturing costs or wholesale prices;
7. Information on the potential impact of design changes to address OHV fire and/or debris penetration hazards on consumer utility.

## REFERENCES

American National Standards Institute. (2016a). *ANSI/OPEI B71.9-2016 American National Standard for Multipurpose Off-Highway Utility Vehicles (MOHUV*).

American National Standards Institute. (2016b). *ANSI/ROHVA 1-2016 American National Standard for Recreational Off-Highway Vehicles (ROV).*

American National Standards Institute. (2017). *ANSI/SVIA 1-2017 American National Standard for All-Terrain Vehicles (ATV).*

NAICS Organization. (2020). *NAICS Identification Tools*. Accessed at https://www.naics.com/search/ on November 10, 2020.

Power Products Marketing. (2020). *USATVDBAdultYouth'94-18 – CPSC* [database]. Unpublished Raw Data.

Power Products Marketing. (2019a). 2018 North American Utility Vehicle Market Report.

Power Products Marketing. (2019b). *UtilVehNoAmDB'18-Consolidated No. Am. – CPSC* [database]. Unpublished Raw Data

U.S. Consumer Product Safety Commission. (2006). *Standards for All-Terrain Vehicles and Ban of Three-Wheeled All-Terrain Vehicles; Notice of Proposed Rulemaking.* Federal Register, Volume 71, Number 154, Pages 45904–45962. August 10, 2006.

U.S. Small Business Administration. (2019), *Table of Size Standards* [database). Accessed at https://www.sba.gov/document/support--table-size-standards on November 10, 2020.

# TAB D

**UNITED STATES**
**CONSUMER PRODUCT SAFETY COMMISSION**
**WASHINGTON, D.C. 20207**

**Memorandum**

DATE: January 26, 2021

TO: Han Lim, Mechanical Engineer, Division of Mechanical and Combustion Engineering (ESME), Directorate for Engineering Sciences

THROUGH: Blake Rose, Supervisory Program Analyst, Office of Compliance and Field Operations

FROM: Jeffrey Jauschneg, Field Investigator, Office of Compliance and Field Operations

SUBJECT: Off-Highway Vehicle (OHV) Fire and Debris Penetration Recalls

## BACKGROUND:

To support the Advanced Notice of Proposed Rulemaking (ANPR) to address fire and debris penetration hazards associated with Off-Highway Vehicles (OHVs), the Office of Compliance and Field Operations (EXC) staff prepared this memorandum that provides CPSC recall data. The recall data were compiled from current and legacy databases.

## SCOPE OF THE RECALLS

The scope of OHVs is all-terrain vehicles (ATVs), recreational off-highway vehicles (ROVs), and utility terrain vehicles or utility task vehicles (UTVs). Vehicles that are out of scope are dune buggies, golf cars, personal transport vehicles, or any other vehicles that are not identified as ATVs, ROVs, or UTVs. See Tab A of this briefing package for additional information regarding the scope of vehicles. The recall search for all three vehicle types spanned from 2002 to 2019.

## CPSC RECALL DATA

*ATV Fire Hazard Recalls*

Table 1 below lists the recalls associated with ATV fire hazards. For convenience, each recall is hyperlinked to the recall number. All of the information in the table are consistent with the associated CPSC recall webpage. An incident constitutes a component failure, fuel leak, plastic

melt, an actual fire, or other thermal event. Fires are considered ignition with an open flame. Injuries are burns (the degree of burns is not known for every recall). Collectively, there were 462,372 recalled vehicles, 3325 incidents, 83 fires, and 24 injuries associated with 26 recalls from 2002 to 2018.

Table 1 – ATV Fire Hazard Recalls

| Recall Number | Recall Date | Number of Affected Vehicles | Number of Injuries | Number of Fires | Number of Incidents | Hazard per the Description on the CPSC webpage |
|---|---|---|---|---|---|---|
| 03-501 | 10/1/2002 | 950 | 0 | 0 | 0 | The hose barbs that are used for the fuel fittings on the bottom of the fuel tank may have been overly tightened and possibly the wrong sealer was used during assembly |
| 03-536 | 4/15/2003 | 56,000 | 20 | 0 | 1290 | The ATVs may have loose or leaking oil cooler line clamps, that can release hot, pressurized oil. |
| 04-509 | 11/12/2003 | 14,000 | 0 | 1 | 265 | Damage to the fuel tank grommet can cause a fuel leak, posing a serious fire hazard to consumers. |
| 04-585 | 9/27/2004 | 12,170 | 0 | 0 | 31 | The fuel line may rub against the vehicle chassis, resulting in a fuel line leak which could be a fire hazard. |
| 05-521 | 12/7/2004 | 27,000 | 0 | 0 | 0 | ATVs were assembled with an incorrectly sized mounting bolt under the fuel tank. This could result in fuel leakage presenting a fire safety hazard and risk of injury or death. |
| 05-557 | 3/24/2005 | 16,200 | 0 | 0 | 0 | The fuel tank used on some all-terrain vehicles could develop a fuel leak |
| 05-567 | 4/29/2005 | 1,540 | 0 | 0 | 0 | The fuel petcock inserts were made with incorrect material that does not correctly bond the fuel tank and petcock insert, |
| 05-568 | 5/3/2005 | 14,882 | 0 | 0 | 26 | Control Modules (ECM) may fail and overheat |
| 05-583 | 6/24/2005 | 61,020 | 0 | 0 | 68 | ATVs were assembled with possibly defective Electronic Control Modules (ECM) which may fail and overheat. |
| 06-534 | 3/9/2006 | 1,900 | 0 | 0 | 0 | ATVs were assembled with an improperly manufactured plastic fuel tank |
| 06-561 | 7/3/2006 | 11,300 | 0 | 8 | 8 | he operator could ride with their foot engaging the rear brake without noticing. This can cause the rear brake to overheat and possibly ignite, posing a risk of serious injury or death. |
| 07-560 | 6/20/2007 | 930 | 0 | 0 | 4 | The recalled ATVs may have a loose fuel valve within the fuel tank, |
| 07-561 | 6/28/2007 | 6,000 | 0 | 0 | 60 | The flange, which holds the fuel pump in the fuel tank, can fail to stay connected to the tank itself |
| 08-193 | 2/14/2008 | 95,000 | 0 | 20 | 392 | The ATVs can have defective Electronic Control Modules (ECM) that overheat, posing a fire and burn hazard to riders. |
| 08-580 | 6/4/2008 | 700 | 0 | 0 | 6 | The ATVs can have defective Electronic Control Modules (ECM) that overheat, posing a fire and burn hazard to riders. |
| 09-755 | 7/22/2009 | 4,700 | 0 | 3 | 6 | The valve assembly can fail in freezing temperatures, causing oil to leak into the exhaust system. This could pose a fire and burn hazard to the rider. |
| 11-727 | 3/10/2011 | 29,000 | 0 | 0 | 19 | ATV's plastic fuel tanks were improperly manufactured and can develop a fuel leak, posing a fire hazard. |
| 15-701 | 10/7/2014 | 540 | 0 | 0 | 0 | the fuel cap can fail to vent properly, causing the fuel to heat up and pressure to build up in the tank. |
| 16-701 | 10/7/2015 | 240 | 0 | 0 | 8 | The fuel filter can break and leak, posing a fire hazard |

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|---|---|---|---|---|---|---|
| 17-061 | 12/29/2016 | 9,900 | 0 | 0 | 35 | The air intake duct can contact the fuel rail and cause a fuel leak, posing a fire hazard. |
| 17-112 | 3/21/2017 | 19,200 | 4 | 47 | 793 | The right-side panel heat shield can melt, posing burn and fire hazards to riders |
| 17-190 | 7/19/2017 | 25,600 | 0 | 4 | 30 | Fuel can leak into the headlight pod, posing fuel leak and fire hazards. |
| 17-204 | 8/10/2017 | 15,000 | 0 | 0 | 18 | The fuel tap can leak, posing a fire hazard |
| 17-218 | 9/6/2017 | 20,000 | 0 | 0 | 260 | The fuel tap or carburetor can leak fuel, posing a fire hazard. |
| 18-750 | 6/29/2018 | 13,300 | 0 | 0 | 6 | Fuel can spray from the fuel tank when opening the gas cap, posing a fuel leak and fire hazard. |
| 18-233 | 9/26/2018 | 5,300 | 0 | 0 | 0 | The fuel hose can crack and fuel can leak from the vehicle, posing a fire hazard |
| TOTALS | | 462,372 | 24 | 83 | 3325 | |

*ROV Fire Hazard Recalls*

Table 2 below lists the recalls associated with ROV fire hazards. For convenience, each recall is hyperlinked to the recall number. All of the information in the table are consistent with the associated CPSC recall webpage. An incident constitutes a component failure, fuel leak, plastic melt, an actual fire, or other thermal event. Fires are considered ignition with an open flame. Injuries are burns (the degree of burns is not known for every recall). Collectively, there were 709,886 recalled vehicles, 1022 incidents, 327 fires, and 32 injuries associated with 33 recalls from 2008 to 2019. There was one death associated with recall 16-146.

Table 2 – ROV Fire Hazard Recalls

| Recall Number | Recall Date | Number of Affected Vehicles | Number of Injuries | Number of Fires | Number of Incidents | Hazard per the Description on the CPSC webpage |
|---|---|---|---|---|---|---|
| 08-521 | 12/6/2007 | 330 | 0 | 0 | 4 | The utility vehicle's fuel tank can leak, posing fire and burn hazards to consumers. |
| 08-583 | 6/11/2008 | 700 | 0 | 0 | 5 | Excessive heat melts wiring harness |
| 09-762 | 8/4/2009 | 3,800 | 0 | 22 | 46 | An electrical short can lead to overheating in the rear tail light wiring harnesses, posing a fire hazard to consumers. |
| 12-713 | 1/26/2012 | 1,876 | 0 | 3 | 3 | An exposed portion of the exhaust system can allow debris such as leaves, brush or other flammable materials to enter the opening and ignite, posing a fire hazard. |
| 13-717 | 1/10/2013 | 4,650 | 0 | 0 | 3 | The fuel line can separate, posing a fire hazard. |
| 13-103 | 1/29/2013 | 25,000 | 1 | 18 | 18 | Debris ignition |
| 13-725 | 2/14/2013 | 4,700 | 0 | 4 | 4 | The oil filter can leak, posing a fire hazard. Pinholes or cracks have been identified in oil filters installed by the engine supplier which were not manufactured to specification. |
| 13-740 | 6/19/2013 | 4,500 | 1 | 0 | 1 | The firewall behind the driver and passenger seats can overheat and melt, posing a burn hazard to consumers. |
| 14-724 | 3/18/2014 | 2,300 | 0 | 0 | 0 | Fuel can leak from the fuel fitting at the throttle body of the vehicle, posing a fire hazard |
| 14-753 | 9/11/2014 | 5,600 | 0 | 1 | 60 | Oil can leak from the oil cooler lines, posing a fire hazard |
| 15-706 | 10/16/2014 | 15,400 | 0 | 10 | 10 | Vegetation and debris can accumulate on the middle skid plate and make contact with the vehicle's exhaust system. Dried debris can ignite, resulting in smoke or fire. |

| | | | | | | |
|---|---|---|---|---|---|---|
| 15-744 | 7/28/2015 | 2,700 | 0 | 0 | 0 | Fuel can leak from the fuel fitting at the throttle body, posing a fire hazard |
| 16-702 | 10/6/2015 | 53,000 | 1 | 2 | 31 | The vehicles' fuel tank vent line can be misrouted, causing it to become pinched. This can cause the fuel tank to pressurize and leak fuel, posing a fire hazard. |
| 16-713 | 12/10/2015 | 2,230 | 0 | 2 | 4 | The vehicles' oil drain line can leak, posing a fire hazard. |
| 16-146 | 4/19/2016 | 133,000 | 19 | 160 | 160 | The recalled ROVs can catch fire while consumers are driving, posing fire and burn hazards to drivers and passengers |
| 16-755 | 6/28/2016 | 43,000 | 0 | 7 | 7 | The ROVs can overheat during heavy engine loading, slow-speed intermittent use and/or high outdoor temperatures and catch fire. |
| 16-763 | 7/28/2016 | 240 | 0 | 0 | 0 | Fuel hose could leak or separate when the fuel system is pressurized, posing a fire hazard. |
| 16-257 | 9/1/2016 | 13,000 | 6 | 19 | 19 | The vehicles' engine can overheat and turbo system's drain tube can loosen, posing a fire hazard. |
| 16-264 | 9/15/2016 | 42,500 | 4 | 36 | 36 | The heat shield can fall off the vehicle, posing fire and burn hazards to riders. |
| 17-102 | 3/2/2017 | 13,500 | 0 | 15 | 17 | The vehicle engine can misfire and the temperatures of the exhaust and nearby components can get too hot and cause the components to melt, and/or a contaminated brake master cylinder may cause unintended brake drag, posing burn and fire hazards. |
| 17-132 | 4/13/2017 | 51,000 | 0 | 5 | 13 | A heat shield can fall off the vehicle, posing fire and burn hazards to riders |
| 17-751 | 6/20/2017 | 6,600 | 0 | 0 | 0 | The fuel gauge retainer can collapse and leak fuel, posing a fire hazard. |
| 18-011 | 10/17/2017 | 6,300 | 0 | 0 | 6 | The exhaust header pipe can crack and release hot exhaust gases into the engine compartment, posing fire and burn hazards. |
| 18-017 | 10/27/2017 | 14,100 | 0 | 5 | 444 | Heat from the exhaust can melt the plastic panels behind the operator and passenger seat, posing a fire hazard |
| 18-037 | 11/16/2017 | 300 | 0 | 5 | 49 | Winch solenoid located under the operator seat can overheat |
| 18-708 | 12/21/2017 | 560 | 0 | 0 | 1 | The return fuel line can be improperly secured which can cause fuel to leak, posing a fire hazard |
| 18-757 | 9/8/2018 | 2,700 | 0 | 0 | 7 | The utility vehicle's exhaust header pipe can crack, posing burn and fire hazards |
| 18-758 | 8/8/2018 | 2,100 | 0 | 0 | 7 | Exhaust header pipe can crack, posing fire and burn hazards. |
| 18-133 | 4/2/2018 | 107,000 | 0 | 3 | 30 | If the exhaust silencer fatigues and cracks, the heat shield may not manage heat, which may lead to melting of nearby components or fire. |
| 18-742 | 5/15/2018 | 65,000 | 0 | 3 | 25 | The muffler can overheat, causing the plastic heat shield to melt or catch fire, posing a fire and burn hazard to consumers. |
| 19-714 | 11/8/2018 | 56,000 | 0 | 0 | 5 | An incorrectly installed throttle body can ignite, posing fire and burn hazards to consumers. |
| 19-726 | 3/5/2019 | 200 | 0 | 0 | 0 | Fuel can leak from the fuel line, posing a fire hazard. |
| 19-728 | 3/14/2019 | 26,000 | 0 | 7 | 7 | The vehicle's oil cooler hoses can separate and the fuel tank cap gasket can crack allowing fuel to leak, posing a fire hazard. |
| TOTALS | | 709,886 | 32 | 327 | 1022 | |

*UTV Fire Hazard Recalls*

Table 3 below lists the recalls associated with UTV fire hazards. For convenience, each recall is hyperlinked to the recall number. All of the information in the table are consistent with the associated CPSC recall webpage. An incident constitutes a component failure, fuel leak, plastic melt, an actual fire, or other thermal event. Fires are considered ignition with an open flame. Collectively, there were 43,340 recalled vehicles, 144 incidents, and 11 fires associated with six recalls from 2008 to 2017. There were no injuries or deaths associated with UTV fire hazard recalls.

Table 3 – UTV Fire Hazard Recalls

| Recall Number | Recall Date | Number of Affected Vehicles | Number of Fires | Number of Incidents | Hazard per the Description on the CPSC webpage |
|---|---|---|---|---|---|
| 08-606 | 9/16/2008 | 2,500 | 0 | 7 | The fuel tank can leak from a gap in the seam at the base of the filler neck, posing a fire hazard. |
| 12-727 | 3/15/2012 | 3,900 | 0 | 0 | The fuel tube can scrape against the air cleaner housing and develop holes, posing a fire hazard |
| 13-706 | 11/15/2012 | 4340 | 0 | 0 | fuel filter leak |
| 15-743 | 7/23/2015 | 4300 | 0 | 0 | Loose fuel tank retainer ring |
| 16-710 | 12/8/2015 | 11,500 | 7 | 7 | Combustible debris can make contact with the exhaust manifold and ignite, posing a fire hazard. |
| 17-195 | 7/25/2017 | 16,800 | 4 | 130 | The fuel tank neck can crack or the wiring harness can overheat or short circuit, posing fuel leak and fire hazards. |
| TOTALS | | 43,340 | 11 | 144 | |

*ROV Debris Penetration Hazard Recalls*

Table 4 below lists the recalls associated with ROV debris penetration hazards. For convenience, each recall is hyperlinked to the recall number. All of the information in the table are consistent with the associated CPSC recall webpage. An incident constitutes a floorboard that is punctured by foreign objects, usually tree branches. Collectively, there were 44,500 recalled vehicles, 630 incidents, and nine injuries associated with three recalls from 2014 to 2016. There were no deaths associated with ROV debris penetration hazard recalls.

Table 4 – ROV Debris Penetration Hazard Recalls

| Recall Number | Recall Date | Number of Affected Vehicles | Number of Injuries | Number of Incidents | Hazard per the Description on the CPSC webpage |
|---|---|---|---|---|---|
| 14-741 | 7/30/2014 | 11,000 | 2 | 4 | The vehicle's floor boards can allow a stick or other debris to break through and protrude into the foot rest area, posing an injury hazard to the operator and front passenger |
| 16-714 | 12/15/2015 | 19,500 | 8 | 628 | Sticks or other debris can break through the vehicle's floor board and protrude into the foot rest area, posing an injury hazard to the operator and front passenger. |

| | | | | | |
|---|---|---|---|---|---|
| 16-221 | 7/7/2016 | 25,000 | 1 | 2 | The front floor cover can be punctured by a foreign object, posing an injury hazard to riders. |
| TOTALS | | 44,500 | 9 | 630 | |