

Within nine months (August 2022 to April 2023), two flyrock incidents occurred at Virginia mineral mines. Flyrock, defined as any uncontrolled material generated by a blast that was hazardous to persons or property not owned or controlled by the operator, represents a serious hazard to both mine employees and other persons who may be located at or near the mine. Fortunately, no one was seriously injured, though significant damage to property (vehicles and structures) did occur in each of these incidents.

In August 2022, a production blast resulted in uncontrolled rock and mud leaving the quarry, resulting in injuries to nearby members of the public and damage to vehicles, a power line, parking lots and to a building located off the mine site. Virginia Energy's Mineral Mining team's investigation concluded there was insufficient burden along the free-face. The alignment of an adjacent angled borehole was not adequately taken in consideration when loading a face borehole that contained a geologic anomaly (i.e., a void and mud seam).

In an April 2023 flyrock incident, uncontrolled rock from a production blast traveled approximately 2,300 feet from the blast site. Virginia Energy's Mineral Mining program is currently investigating this incident, but preliminary conclusions from the investigation indicate the flyrock came from a lack of sufficient burden on the open corner of the shot.

In both incidents, a Closure Order was issued to prohibit further blasting activities while the incident was being investigated and adequate safeguards were put in place to prevent reoccurrence.

Mine operators and blasters are reminded that rock can travel considerable distances and at a high velocity from a blast when not adequately controlled. It is the duty of the certified blaster to ensure that an adequate blast area is defined and cleared prior to detonating a blast - **including public roadways if necessary.**

## BLASTERS CAN ELIMINATE FLYROCK RISK BY:

- Accurately measuring the burden on the free-face for each front row blast hole and adjusting the stemming and/or using decking to maintain adequate burden throughout the powder column of each hole.
- Carefully reviewing the drill log and the blast bench and making appropriate adjustments to the blast plan for actual borehole conditions.
- Adjusting the loading of adjacent boreholes as necessary when blasting where voids or mud seams exist.
- Utilizing the latest technological advances in profiling and borehole tracking when blasting in critical areas.
- Video recording all blasts from a safe location and carefully review the video of each shot in order to note any issues that may need to be addressed going forward.
- When possible, turning working quarry faces away from highways, commercial structures and residential properties.



*Flyrock damaged vehicles and pavement - August 2022*



*Flyrock damaged shed - April 2023*



*Large rock next to highway from April 2023 flyrock incident*

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<https://energy.virginia.gov/mineral-mining/mineralmining.shtml>