Shock, Vibration & Cleanroom Integrity in Transit: Protecting Satellites Across Rough Valley Detours

Pillar: Space Hardware | **Basis:** Engineering / Program Practice | **Primary Source:** BC ESG Segment & Quality Corpus | **As Of:** 2026-11-16

Diverting delicate satellite buses, optics, or solar arrays off smooth freeways onto rutted valley surface-street detours during SR 167 closures increases shock/vibration and moisture-intrusion risks.

Operational Continuity & Corridor Facts

• Satellite manufacturers in Redmond, Kent, Tukwila, and Bellevue ship precision optics, star trackers, and reaction wheels sensitive to road-shock and humidity.

• When SR 167 or I-5 closes, emergency detours push trucks onto uneven industrial surface streets with railroad grade crossings.

• Atmospheric-river flood events also spike ambient relative humidity, stressing unpurged shipping containers.

Flight-Hardware Transit Protection Matrix

Risk	Trigger	Container / Carrier Control
Vertical Shock / Grade Crossings	Surface-street flood detours	Air-ride trailer + damped shipping skid
Humidity / Condensation	Atmospheric-river delays	Dry N2 purge + sealed barrier bag + RH logger
Undetected Impact	Rough handling / pothole	Calibrated 3-axis shock & tilt indicators

Corridor Exposure, Triggers & Facility Actions

• Require continuous GPS-stamped tri-axial shock logging on all flight-hardware moves between Kent, Tukwila, Redmond, and SEA/BFI.

• Inspect shock indicators at receiving before breaking cleanroom double-bag seals.

• Avoid shipping unsealed optical assemblies during active flood-watch periods.

Cross-Cluster Links & Primary Sources

• **WA Space Cluster Hub (#1382):** https://bcesg.org/washington-space-cluster-census/

• **Satellite Mfg Continuity Exposure:** https://bcesg.org/wa-satellite-manufacturing-continuity-exposure/

• **In-Space Servicing Continuity Exposure:** https://bcesg.org/wa-in-space-servicing-continuity-exposure/

• **Power Systems Continuity Exposure:** https://bcesg.org/wa-space-power-systems-continuity-exposure/

• **Program Manager Desk Brief:** https://bcesg.org/wa-space-role-program-manager-desk-brief/

• **WSDOT Commercial Vehicles & OSOW:** https://wsdot.wa.gov/travel/commercial-vehicles

• **Port of Seattle SEA Air Cargo:** https://www.portseattle.org/sea/air-cargo

Provenance Note: Engineering transit controls aligned with AS9100D/NASA-STD-8739 quality gates in Batch 4/6; no specific company incident claimed.