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Commitment to Environmental Excellence - Contrails

Chaff and Flares

Chaff and flares are defensive counter measures used on aircraft to confuse radar and heat seeking missiles. Chaff is used as a decoy for radar seeking missiles and is made of glass silicate fibers with an aluminum coating. The fibers are approximately 60% glass fiber and 40% aluminum by weight. The typical Air Force RR-188 chaff bundle contains about 150 g of chaff or about 5 million fibers. The fibers are 25 microns in diameter and typically 1 to 2 cm in length. In 1997, the Air Force used about 1.8 million bundles worldwide.

The amount of chaff released worldwide by all of the services is approximately 500 tons per year. Chaff falls to the earth at a settling velocity of approximately 30 cm per second. Atmospheric residence times range from 10 minutes for the majority of chaff released at 100 m to approximately 10 hours for chaff released at 10,000 feet. Chaff fibers experience little breakup before reaching the ground.

After the chaff is ejected from the aircraft and into the aircraft slipstream, the chaff packages burst open and the fibers scatter to form a radar-reflective cloud called a chaff corridor. Each chaff package is designed to simulate an aircraft. Several aircraft can create a chaff curtain, consisting of thousands of false targets, which confuse the radar guidance package on a missile so they are unable to locate the real targets within the chaff cloud.

Virtually all chaff fibers are 10-100 times larger than PM10 and PM2.5, the air particulates of concern for public health. The primary fiber size is usually too large to be inhaled by livestock, but if they are inhaled they do not penetrate far into the respiratory system and can be easily cleared out. The possible nutritional effects due to chaff ingestion and the risk is minimal to nil for both humans and livestock, considering the chemical composition of chaff (essentially identical to soil) and low chaff loading on the environment. Chaff decomposing in water has no adverse impacts on water chemistry or aquatic life.

Flares are of two types: decoy flares that protect aircraft from infrared missiles, and ground illumination flares. Decoy flares are typically made of magnesium that burns white-hot and are designed to defeat a missile's infrared (IR) tracking capability. The intense heat of the pyrotechnic candle consumes the flare housing. Common aerial flares are: ALA-17/B, M-206, MJU-2, MJU-7 A/B, MJU-10/B, MJU-23/B, and RR-119.

Ground illumination flares, are designed to descend by parachute and provide up to 30 minutes of illumination of ground targets or activities. Typical flares are the LUU-1, LLU-5, and LLU-2B. A typical LLU-2B sectional is shown below.