

Environmental Effects of Radio Frequency (RF) Chaff Released during Military Training Exercises: A Review of the Literature

Richard E. Farrell^{*}, Department of Soil Science, University of Saskatchewan
Saskatoon, SK S7N 5A8 Canada; Phone: (306) 966-2772, FAX: (306) 966-6881,
Email: richard.farrell@usask.ca

Steven D. Siciliano, Department of Soil Science, University of Saskatchewan
Saskatoon, SK S7N 5A8 Canada; Phone: (306) 966-4035, FAX: (306) 966-6881,
Email: steven.siciliano@usask.ca

Abstract

Chaff is a radiofrequency countermeasure released by military aircraft to confuse enemy radar. As with most acquired skills, the effective use of chaff can be maintained only by practicing in-flight deployments during training exercises. The release of chaff into the environment during these exercises has raised concerns among both public-interest groups and the government regarding the fate and environmental impact of chaff particles.

Here, we present a review of the literature together with the results of a modeling exercise to assess the environmental and ecotoxicological impact of RF chaff at the Goose Bay Military Training Area. The user-defined parameters used in the model included geographical region (Labrador), but with a reduced surface area (i.e., the 2,000 km² that make up the safety template area that surrounds the practice target area), and exclusion of coastal waters. It also was assumed that all the chaff released in a given year (ca. 7,125 kg) would settle over the PTA and would degrade to release its individual constituents into the environment. Consequently, our results should be viewed as being representative of the most extreme, or worst-case, scenario. Together with the information gleaned from the available literature, the model results indicate that—at the anticipated release/deposition rate of 3.56 mg m⁻² yr⁻¹—the occurrence of an adverse environmental or health impact associated with chaff deployments during flight training exercises is negligible. Whereas conditions conducive to chaff degradation (low soil pH, moist & warm conditions) are likely to occur during the summer months, the effects of an extended winter period on the environmental degradability of chaff is unknown. Regardless, from a chemical toxicity standpoint, it is highly unlikely that chaff releases will have any impact on ecosystem functioning. Likewise, human health issues associated with the inhalation or ingestion of chaff fibers are considered to be negligible because the chaff fibers are too large to pass through the nose or mouth, and because concentrations of suspended chaff are well below known toxic thresholds. There is some evidence to suggest that exposure to airborne chaff could cause dermal irritation; however, it is unlikely that concentrations of airborne chaff at ground level would ever reach the level needed to bring about this effect. The effects of chaff on the species of greatest concern in the Goose Bay region (woodland caribou, moose, sport fish, waterfowl, bald eagles, and osprey) have not been considered in previous studies. Having said that, however, it is worth noting that the available data does indicate that there is little or no threat to livestock and non-domestic grazers associated with the inhalation and ingestion of chaff fibers. As well, it is expected that there will be no toxicological effects associated with the ingestion of chaff by wildlife; i.e., deposition rates of chaff are much too low to yield toxic concentrations of elements such as aluminum, boron, zinc, vanadium, or manganese. In summary, the available data indicate it is highly unlikely that chaff releases during training exercises will have a significant adverse impact on either ecosystem functioning or human and wildlife health within the Goose Bay Military Training Area.

Key Words: RF chaff, glass fibers, environmental degradability, ecotoxicity, PM₁₀ & PM_{2.5}

^{*} Presenting author.