

Toxicity Studies

Ringelman *et al.* (1993) conducted a 32-day acute toxicity study that involved dosing game-farm mallards with tungsten-bismuth-tin shot in a relative composition of 39%, 44.5%, and 16.5% by weight, respectively. No dosed birds died during the trial, and their behavior was normal. Post-ethanization examination of tissues revealed no toxicity or damage related to shot exposure. Blood calcium differences between dosed and undosed birds were judged as unrelated to shot exposure. That study indicated that tungsten presented little hazard to waterfowl.

The Tier 1 application of TINT shot included analyses comparing corrosion data of TNI shot to TINT shot. Samples of both shot types were exposed to seawater for 10.8 days. The two seawater samples were then analyzed for nickel, iron, tungsten, and tin. Samples were then returned to fresh seawater and exposed for an additional 44.5 days, whereupon the seawater solutions were again analyzed for nickel, iron, tungsten, and tin.

The total release of nickel from TINT shot over the 55.3-day exposure was only 13% that of TNI shot. The results indicate that TINT shot shows lower rates of nickel release due to the collection of corrosive materials on surfaces that inhibit additional corrosion.

Assuming that a duck eats 10 No. 4 TINT shot in 1 day and that the shot are completely eroded in the gizzard in 24 hours, the duck would be exposed to .061g of nickel. This amount is slightly more than half of the .102g/day that Eastin and O'Shea (1981) found produced no ill effects on mallards. We believe, therefore, that consumption of nickel from TINT shot is unlikely to have detrimental effects on waterfowl.

Ingestion by Fish, Amphibians, Reptiles, or Mammals

Based on the best available information and past reviews of tungsten-based and tin shot, we expect no detrimental effects due to tungsten, iron, or tin on animals that might ingest TINT shot. We know of no studies of ingestion of nickel by reptiles or amphibians. The exposure of nickel to any animal in these taxa that might consume a TINT shot pellet would be lower, because the pellet likely would not be retained in most animals that might consume one. Their exposure to nickel would therefore be much lower than the worst-case scenario for waterfowl.

Nontoxic Shot Approval

The first condition for nontoxic shot approval is toxicity testing, Tiers 1, 2, or 3 (50 CFR § 20.134). Based on the results of past toxicity tests, we conclude that TINT shot does not pose a significant danger to migratory birds, other wildlife, or their habitats.

The second condition for approval is testing for residual lead levels. We determined that the maximum environmentally acceptable level of lead in shot is 1% (50 CFR § 20.134(b)(5)). ENVIRON—Metal, Inc. has documented that TINT shot meets this requirement.

The third condition for approval involves enforcement. Approval of any nontoxic shot is contingent upon the development and availability of a noninvasive field testing device (50 CFR § 20.134(b)(6)). TINT shotshells can be drawn to a magnet as a simple field detection method.

Public Comments

We received two comments on the May 10, 2002 proposed rule (67 FR 31754) to approve TINT shot for hunting waterfowl and coots. Both comments supported granting approval for use of the shot.

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