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Donald S. Welsh,

Regional Administrator, Region III.

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 20

RIN 1018–AT32

Migratory Bird Hunting; Approval of Three Shot Types—Tungsten-Bronze-Iron, Tungsten-Iron, and Tungsten-Tin-Bismuth—as Nontoxic for Hunting Waterfowl and Coots

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We (Fish and Wildlife Service) propose to approve three shot types, Tungsten-Bronze-Iron [formulated of tungsten, bronze (copper and tin), and iron], Tungsten-Iron (formulated of tungsten and iron), and Tungsten-Tin-Bismuth (formulated of tungsten, tin, and bismuth), as nontoxic for hunting waterfowl and coots. We assessed possible effects of all three shot types, and have determined that none of the types presents any significant toxicity threat to wildlife or their habitats; therefore, further testing is not necessary for any of the types. In addition, approval of these shot types may encourage greater numbers of waterfowl hunters to refrain from the illegal use of lead shot, thereby reducing lead risks to species and habitats.

DATES: We must receive comments on the proposed rule no later than April 14, 2004.

ADDRESSES: You may submit comments, identified by RIN 1018–AT32, by any of the following methods:

- Federal eRulemaking Portal: *http://www.regulations.gov.* Follow the instructions for submitting comments.
- E-mail: *migratorybirds@fws.gov.*
- Fax: 703–358–2272.
- Mail: Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Mail Stop MBSP–4107, Arlington, Virginia 22203–1610. You may inspect comments during normal business hours at the same address.
- Hand Delivery/Courier: Division of Migratory Bird Management, U.S. Fish and Wildlife Service, 4501 North Fairfax Drive, Room 4091, Arlington, Virginia 22203–1610.

Instructions: All submissions received must include Regulatory Information Number (RIN) 1018–AT32 at the beginning. All comments received, including any personal information provided, will be available for public inspection at the above (''Hand Delivery/Courier'') address. For detailed instructions on submitting comments and additional information on the rulemaking process, see the ''Public Participation'' heading in the **SUPPLEMENTARY INFORMATION** section of this document.

FOR FURTHER INFORMATION CONTACT: Brian Millsap, Chief, Division of Migratory Bird Management, telephone (703) 358–1714; Dr. George T. Allen, Wildlife Biologist, Division of Migratory Bird Management, telephone (703) 358–1825; or John J. Kreilich, Jr., Wildlife Biologist, Division of Migratory Bird Management, (703) 358–1928.

SUPPLEMENTARY INFORMATION:

Background

The Migratory Bird Treaty Act of 1918 (Act) (16 U.S.C. 703–712 and 16 U.S.C. 742 a–j) implements migratory bird treaties between the United States and Great Britain for Canada (1916 and 1996 as amended), Mexico (1936 and 1972 as amended), Japan (1972 and 1974 as amended), and Russia (then the Soviet Union, 1978). These treaties protect certain migratory birds from take, except as permitted under the Act. The Act authorizes the Secretary of the Interior to regulate take of migratory birds in the United States. Under this authority, the Fish and Wildlife Service controls the hunting of migratory game birds through regulations in 50 CFR part 20.

Deposition of shot and release of shot components in waterfowl hunting locations are potentially harmful to many organisms. Research has shown that the effects of ingestion of spent lead shot causes significant mortality in migratory birds. Since the mid-1970s, we have sought to identify shot types that do not pose significant toxicity hazards to migratory birds or other wildlife. We first addressed the issue of lead poisoning in waterfowl in a 1976 Environmental Impact Statement (EIS), and later readdressed the issue in a 1986 supplemental EIS. The 1986 document provided the scientific justification for a ban on the use of lead shot and the subsequent approval of steel shot for hunting waterfowl and coots that began that year, and set a ban on lead for waterfowl and coot hunting beginning in 1991. Since then, we have sought to consider other potential nontoxic shot candidates; we believe that other nontoxic shot types should be made available for public use in hunting. Steel, bismuth-tin, tungsten-iron, tungsten-polymer, tungsten-matrix, tungsten-nickel-iron, and tungsten-tin-iron-nickel types are now approved as nontoxic. [Our previously approved tungsten-iron shot, an alloy of approximately 40 percent tungsten and 60 percent iron, announced with a final rule in the **Federal Register** on August 19, 1999 (64 FR 45399), differs in composition from the newly proposed tungsten-iron shot, which is an alloy of approximately 22 percent tungsten and 78 percent iron.] Compliance with the use of nontoxic shot for waterfowl hunting has increased over the last few years (Anderson *et al.* 2000). We believe that it will continue to increase as other nontoxic shot types are approved and available in growing numbers.

The purpose of this proposed rule is to approve the use of Tungsten-Bronze-Iron (TBI) shot, Tungsten-Iron (TI) shot, and Tungsten-Tin-Bismuth (TTB) shot for waterfowl and coot hunting.

Applications for Approval as Nontoxic Shot Types

The following applicants have applied to us for approval of the following shot types and compositions, and we have announced these applications in the **Federal Register:**

Applicant	Shot type (abbreviation in this document)	Shot formulation by weight	Density	**Federal Register** citation
International Nontoxic Composites Corporation.	tungsten-bronze-iron (TBI)	51.1% tungsten, 44.4% copper, 3.9% tin, 0.6% iron.	12.1 grams (g)/centimeter (cm)³.	68 FR 65023, November 18, 2003
ENVIRON-Metal, Inc.	tungsten-iron (TI) (under product name HEVI-Steel™).	22% tungsten, 78% iron	9 g/cm³	68 FR 60897, October 24, 2003

Applicant	Shot type (abbreviation in this document)	Shot formulation by weight	Density	Federal Register citation
Victor Oltrogge	tungsten-tin-bismuth (TTB) (under product name Silvex™).	49-–71% tungsten, 29–51% tin, 0.5–6.5% bismuth.	10.5 to 13.0 g/cm³	68 FR 60898, October 24, 2003

For each of the three shot types, the initial application (Tier 1) included information on chemical characterization, production variability, use volume, toxicological effects, environmental fate and transport, and evaluation. After reviewing the initial (tier 1) application for and assessing the possible effects of each of the three shot types, we have concluded that none of the shot types poses a significant toxicity threat to wildlife or their habitats. Therefore, we propose to amend 50 CFR 20.21(j), which describes approved types of shot for waterfowl and coot hunting.

Waterfowl Populations

The taxonomic family Anatidae, principally subfamily Anatinae (ducks) and their habitats, comprise the affected environment. Waterfowl habitats and populations in North America this year were described by the U.S. Fish and Wildlife Service (2003).

In the Breeding Population and Habitat Survey for the traditional waterfowl survey area in North America, the total duck population estimate was 36.2 ± 0.7 (±1 standard error) million birds, 16 percent above the 2002 estimate of 31.2 ± 0.5 million birds (P<0.001), and 9 percent above the 1955–2002 long-term average (P<0.001). There were 7.9 ± 0.3 million mallards (*Anas platyrhynchos*) in the traditional survey area, a value similar to the 2002 estimate of 7.5 ± 0.2 million birds (P=0.220) and to the long-term average (P=0.100). Blue-winged teal (*Anas discors*) were at 5.5 ± 0.3 million birds, 31 percent above the 2002 estimate of 4.2 ± 0.2 million birds (P=0.001) and 23 percent above the long-term average (P=0.001). Shovelers (*Anas clypeata*) at 3.6 ± 0.2 million (+56 %) and pintails (*Anas acuta*) at 2.6 ± 0.2 million (+43 %) were above their 2002 estimates (P<0.001). Gadwall (*Anas strepera*) at 2.5 ± 0.2 million, American wigeon (*Anas americana*) at 2.6 ± 0.2 million, green-winged teal (*Anas crecca*) at 2.7 ± 0.2 million, redheads (*Aythya americana*) at 0.6 ± 0.1 million, canvasbacks (*Aythya valisineria*) at 0.6 ± 0.1 million, and scaup (*Aythya marila* and *Aythya affinis*) at 3.7 ± 0.2 million were unchanged from their 2002 estimates (P=0.149). Gadwall (+55%) and shovelers (+72%) were above their long-term averages (P<0.001). Green-winged teal were at their second highest level since 1955, 46 percent above their long-term average (P<0.001). Pintails (−39%) and scaup (−29%) remained well below their long-term averages (P<0.001). American wigeon, redheads, and canvasbacks were unchanged from their long-term averages (P=0.582).

The 2003 total duck population estimate for the eastern survey area was 3.6 ± 0.3 million birds. This was 17 percent lower than in 2002 (4.4 ± 0.3 million birds, P=0.065), but similar to the 1996–2002 average (P=0.266). Individual species estimates were similar to those from 2002 and to their 1996–2002 averages, with the exception of mergansers (0.6 ± 0.1 million), which decreased 30 percent from the 2002 estimate (P=0.035).

Habitats

The total number of May ponds in Prairie Canada and the north-central United States, at 5.2 ± 0.2 million, was 91 percent higher than in 2002 (P<0.001) and 7 percent above the long-term average (P=0.034). Canadian and U.S. ponds were 3.5 ± 0.2 and 1.7 ± 0.1 million, respectively, and both above 2002 (+145% and +30%, P<0.001). The number of ponds in Canada was similar to the 1961–2002 average (P=0.297), while U.S. ponds were 10 percent above their 1974–2002 average (P=0.037).

Waterfowl hunting occurs in habitats used by many taxa of migratory birds, as well as by aquatic invertebrates, amphibians, and some mammals. Fish also may be found in many hunting locations.

Estimated Environmental Concentrations

Terrestrial Settings

Calculation of the estimated environmental concentration (EEC) of a candidate shot in a terrestrial ecosystem is based on 69,000 #4 shot per hectare (2.47 acres) (50 CFR 20.134).

TBI Shot

For TBI shot, if the shots are completely dissolved, the EEC for tungsten in soil is 12.92 g/m³. In dry, porous soil, the EECs for copper, tin, and iron are 11.22, 0.99, and 0.15 g/m³, respectively. The EEC for tungsten from TBI shot is below that for tungsten-matrix shot.

Tungsten is very rare, and is never found free in nature. The tungsten concentration in the earth's crust is estimated to be 1.5 parts per million (ppm). In conterminous U.S. soils, copper and tin are found at approximately 17 and 0.9 ppm, respectively (Shacklette and Boerngen 1984). The terrestrial EEC for copper is considerably below the U.S. Environmental Protection Agency (EPA) maximum for sludge to be applied in terrestrial settings. The EEC for tin is comparable to the concentration found in U.S. soils. Iron is widespread in such settings, comprising approximately 2 percent of the composition of soils and sediments in the United States. The EEC for iron from all three shot types is much lower than that level.

TI Shot

For TI shot, if the shot are completely dissolved, the EEC for tungsten in soil is 14.08 mg/kg. The EEC for iron is less than 0.01% of the typical background concentration, and the iron is in an insoluble form.

TTB Shot

Assuming complete dissolution of the shot, the EEC for tungsten in soil is 10.1 mg/kg to 18.5 mg/kg, depending on the shot formulation. The EEC for tin in soil is 6.77 mg/kg to 10.5 mg/kg depending on the shot formulation. This is considerably smaller than the 50 mg/kg suggested maximum concentration in surface soil tolerated by plants (Kabata-Pendias and Pendias 2001). The EEC for tin also is comparable to the concentration found in U.S. soils. The EEC for bismuth in soil is 0.130 mg/kg to 1.28 mg/kg, depending on the shot formulation.

Aquatic Settings

TBI Shot

The EEC for water assumes that 69,000 #4 shot are completely dissolved in 1 hectare of water 1 foot (30.48 cm) deep (50 CFR 20.134). For TBI shot, the EEC for tungsten is 2.119 mg/Liter (L). The EEC value for copper in water is 1.842 mg/L. This EEC is approximately 153 times the EPA (2002) 12-microgram (mcg)/L 4-day average continuous concentration criterion for copper. It is about 635 times the 2.9 mcg/L criterion for salt water.

The EEC value for tin in an aquatic setting is 0.162 mg/L. We found no EPA aquatic criterion for elemental tin.

The aquatic EEC for iron in water is 0.025 mg/L. The EPA water quality criterion for iron in fresh water is 1,000 mcg/L. We are not aware of an EPA criterion for salt water.

TI Shot

The EECs for the elements in TI shot in water are 846.7 mcg/L for tungsten and 3,001.6 mcg/L for iron. Earlier, we concluded that a tungsten concentration of 10,500 mcg/L posed no threat to aquatic life (62 FR 4877, January 31, 1997).

The EEC for iron is below the chronic criterion for protection of aquatic life. Previous assessments of tungsten demonstrated dissolution at a rate of 10.5 mg/L (equal to 10,500 mcg/L) and concluded no risk to aquatic life (62 FR 4877). The EEC of tungsten from TI is 846.7 mcg/L. This level is less than one-tenth of the 10,500 mcg/L level previously mentioned.

TTB Shot

The EEC for tungsten in water is 2,150 mcg/L to 3,940 mcg/L, depending on the shot formulation. The EEC for tin in water is 1,444 mcg/L to 2,240 mcg/L, depending on the shot formulation. The EEC for bismuth in water is 27.7 mcg/L to 274 mcg/L, depending on the shot formulation.

Previous assessments of tungsten demonstrated dissolution at a rate of 10.5 mg/L (equal to 10,500 mcg/L) and concluded no risk to aquatic life (62 FR 4877). The EEC of tungsten from TTB shot is no more than 3,940 mcg/L. This level is approximately one-third of the 10,500 mcg/L level previously mentioned.

Tin occurs naturally in soils at 2 to 200 mg/g with areas of enrichment at much higher concentrations (up to 1,000 mg/g) (WHO 1980). However, in the United States, soil concentrations are between 1 and 5 ppm (Kabata-Pendias and Pendias 2001).

The EEC for bismuth in water is 27.7 mcg/L to 274 mcg/L, depending on the shot formulation. Bismuth is a relatively rare metal. It is considered nontoxic [U.S. Geological Survey (USGS) 2003].

Environmental Fate of the Components

Elemental tungsten and iron are virtually insoluble in water, and therefore do not weather and degrade in the environment. Tungsten is stable in acids and does not easily form compounds with other substances. Preferential uptake by plants in acidic soil suggests uptake of tungsten when it has formed compounds with other substances rather than when it is in its elemental form (Kabata-Pendias and Pendias 1984). Elemental copper can be oxidized by organic and mineral acids that contain an oxidizing agent. Elemental copper is not oxidized in water (Aaseth and Norseth 1986). In water, tin is stable under ambient conditions.

Toxicological Effects

Tungsten may be substituted for molybdenum in enzymes in mammals. Ingested tungsten salts reduce growth, and can cause diarrhea, coma, and death in mammals (*e.g.* Bursian *et al.* 1996, Cohen *et al.* 1973, Karantassis 1924, Kinard and Van de Erve 1941, National Research Council 1980, Pham-Huu-Chanh 1965), but elemental tungsten is virtually insoluble and therefore essentially nontoxic. Tungsten powder added to the food of young rats at 2, 5, and 10 percent by mass for 70 days did not affect health or growth (Sax and Lewis 1989). A dietary concentration of 94 ppm did not reduce weight gain in growing rats (Wei *et al.* 1987). Exposure to pure tungsten through oral, inhalation, or dermal pathways is not reported to cause any health effects (Sittig 1991).

Tungsten salts are toxic to mammals. Lifetime exposure to 5 ppm tungsten as sodium tungstate in drinking water produced no discernible adverse effects in rats (Schroeder and Mitchener 1975). At 100 ppm tungsten as sodium tungstate in drinking water, rats had decreased enzyme activity after 21 days (Cohen *et al.* 1973).

Kraabel *et al.* (1996) surgically embedded tungsten-tin-bismuth shot in the pectoralis muscles of ducks to simulate wounding by gunfire and to test for toxic effects of the shot. The authors found that the shot neither produced toxic effects nor induced adverse systemic effects in the ducks during the 8-week period of their study.

Chickens given a complete diet showed no adverse effects of 250 ppm sodium tungstate administered for 10 days in the diet. However, 500 ppm in the diet reduced xanthine oxidase activity and reduced growth of day-old chicks (Teekell and Watts 1959). Adult hens had reduced egg production and egg weight on a diet containing 1,000 ppm tungsten (Nell *et al.* 1981). Ecological Planning and Toxicology (1999) concluded that the No Observed Adverse Effect Level for tungsten for chickens should be 250 ppm in the diet; the Lowest Observed Adverse Effect Level should be 500 ppm. Kelly *et al.* (1998) demonstrated no adverse effects on mallards dosed with tungsten-iron or tungsten-polymer shot according to nontoxic shot test protocols.

Most toxicity tests reviewed were based on soluble tungsten compounds rather than elemental tungsten. As we found in our reviews of other tungsten shot types, we have no basis for concern about the toxicity of the tungsten in TI or TTB shot to fish, mammals, or birds.

Copper is a dietary essential for all living organisms. In most mammals, ingestion of one TBI shot pellet would result in release of 8 to 25 milligrams (mg) of copper, not all of which would be absorbed. In humans, ingestion of a TBI shot pellet could mobilize approximately 8 mg of copper, though again not all would be absorbed. These low levels of copper would not pose any risk to mammals. Copper poisoning due to ingestion of TBI shot is highly unlikely in most mammals.

Copper requirements in birds may vary depending on intake and storage of other minerals (Underwood 1971). The maximum tolerable level of dietary copper during the long-term growth of chickens and turkeys is 300 ppm (Committee on Mineral Toxicity in Animals 1980). Eight-day-old ducklings were fed a diet supplemented with 100 ppm copper as copper sulfate for 8 weeks. They showed greater growth than controls, but some thinning of the caecal walls (King 1975). Studying day-old chicks, Poupoulis and Jensen (1976) reported that no gizzard lining erosion could be detected in chicks fed 125 ppm of copper for 4 weeks, but they detected slight gizzard erosion in chicks fed 250 ppm copper. The authors found that it required 500 to 1,000 ppm of copper to depress growth and weight gain of chicks. Jensen *et al.* (1991) found that 169 ppm copper in the diet produced maximal weight gain in chickens.

The influence of dietary copper addition on the body mass and reproduction of mature domestic chickens was analyzed by Stevenson and Jackson (1980). Hens fed on a diet containing 250 ppm copper for 48 days showed a similar daily rate of food intake as control hens (no copper in the diet). The mean number of eggs laid daily also did not differ between hens fed 250 ppm copper and controls. Negative effects on the daily food intake, body mass loss, and egg laying rates were observed only at dietary copper levels in excess of 500 ppm, and after 4 months of being fed such diets.

Similar performance tests on growing domestic turkeys showed that 300 ppm copper in the daily diet produced no long-term effect on 1-week-old turkey poults, but 800 ppm of copper in the diet for 3 weeks inhibited growth (Supplee 1964). Vohra and Kratzer

(1968) reported no effect of feeding 400 ppm of copper as copper sulfate to turkey poults in the daily diet for 21 weeks, and concluded that poults could tolerate 676 ppm of copper without exhibiting deleterious effects. However, these authors reported reduced growth of poults fed 800 ppm and 910 ppm of copper over the same time, and death at 3,240 ppm in the diet. This conclusion was supported by Christmas and Harms (1979), who found that copper in the diet of domestic turkeys had to rise to the 500–750 ppm level before signs of slight toxicity appeared, assuming that adequate methionine were also present.

Henderson and Winterfield (1975) reported acute copper toxicity in 3-week-old Canada geese (*Branta canadensis*) that had ingested water contaminated with copper sulfate. The authors calculated the copper intake to be about 600 mg copper sulfate/kg body weight, or 239 mg Cu/kg. The amount of copper released from eight #4 shot would be 42.26 mg, which is much less than the 239 mg/kg toxic level.

Ingested copper shot does not increase mortality among mallards. Ducks dosed with eight #6 copper shot showed no toxic effects due to copper (Irby *et al.* 1967).

Inorganic tin compounds are comparatively harmless. Inorganic tin and its salts are poorly absorbed, their oxides are relatively insoluble, and they are rapidly lost from tissues (*see* Eisler 1989 for reviews). Reviews indicate that elemental tin is not toxic to birds (Cooney 1988, Eisler 1989). Tin shot designed for waterfowl hunting is used in several European countries. We are aware of no reports that suggest that tin shot causes toxicity problems for wildlife.

On mallard ducks, Grandy *et al.* (1968) and the Huntingdon Research Centre (1987) conducted acute toxicity tests lasting 30 and 28 days, respectively, by placing tin pellets inside the ducks' digestive tracts or tissues. They reported that all treated ducks survived without deleterious effects.

Elemental and inorganic tins have low toxicity, due largely to low absorption rate, low tissue accumulation, and rapid excretion rates. Inorganic tin is only slightly to moderately toxic to mammals. The oral LD_{50} values for tin (II) chloride for mice and rats are 250 and 700 mg/kg of body weight, respectively (WHO 1980).

A 150-day chronic toxicity/reproductive study conducted for tin shot revealed no adverse effects in mallards dosed with eight #4 shot. There were no significant changes in egg production, fertility, or hatchability of birds dosed with tin when compared to steel-dosed birds (Gallagher *et al.* 2000).

Bismuth is the only nontoxic heavy metal (USGS 2003). Ringelman *et al.* (1993) conducted a 32-day acute toxicity study which involved dosing game-farm mallards with a shot alloy of 39 percent tungsten, 44.5 percent bismuth, and 16.5 percent tin (TBT shot) by weight, respectively. All the test birds survived and showed normal behavior. Examination of tissues post-euthanization revealed no toxicity or damage related to shot exposure. Blood calcium differences between dosed and undosed birds were judged to be unrelated to shot exposure. Although bismuth concentrations in kidney and liver were near detectable limits, they did not differ between dosed and undosed birds. This study concluded that ''TBT shot presents virtually no potential for acute intoxication in mallards under the conditions of this study.''

As noted for tungsten, Kraabel *et al.* (1996) imbedded TBT shot in muscles of ducks for an 8-week study. They determined that the shot neither produced toxic effects nor induced any adverse systemic effects on the health of the ducks.

The 2 percent tin in bismuth-tin (BT) shot produced no toxicological effects in ducks during reproduction. It did not affect the health of ducks, the reproduction by male and female birds, or the survival of ducklings over the long term (Sanderson *et al.* 1997).

In a 30-day dosing study with game-farm mallards dosed with eight #4 tin shot, there were no overt signs of toxicity or treatment-related effects on body weight. Tin was not detected in any tissues (Gallagher *et al.* 1999).

Based on the toxicological report and the toxicity tests for tin shot, we concluded that tin shot, which was approximately 99.9 percent tin by weight, posed no significant danger to migratory birds or other wildlife and their habitats (65 FR 76885, December 7, 2000). We believe the small amount of tin in TBI shot is not likely to harm waterfowl.

TBI shot will rapidly be broken up and dissolved in the gizzard if ingested by waterfowl. TBI shot disintegrated completely in less than 14 days under chemical action alone, according to data submitted by International Nontoxic Composites (INC). The INC submission also asserted that ''action of the gizzard assisted by grit would cause complete fragmentation in a much shorter time, probably less than 1 week. Moreover, the fine pieces of shot that are released in a gizzard would quickly leave the gizzard, so lowering the overall dissolution of copper.''

Ingestion of TBI shot by waterfowl would subject the shot to low pH and grinding in the gizzard. Based on an *in vitro* simulation, INC concluded that ingestion of eight #4 TBI shot (1.39 g) would release a maximum of 42.26 mg of copper each day for 1 week or less. In a diet of 150 g of dry food, that release is equivalent to 281.7 ppm copper. In young chickens, 500 ppm or more reduced body growth when ingested for 1 month (Poupoulis and Jensen 1976). Stevenson and Jackson (1980) determined that adult chickens suffered negative effects of copper ingestion only at dietary levels in excess of 500 ppm for 4 months. Copper toxicosis in young Canada geese was triggered by ingestion of water that contained approximately 239 mg/kg of body weight (Henderson and Winterfield 1975).

INC also suggested that ''The Tungsten-Bronze-Iron shot will also liberate iron ions at the same time that copper is being dissolved in the gizzard. The iron in solution could moderate the uptake of copper from the small intestine of the bird (see Davis and Mertz 1987).''

Iron is an essential nutrient. Iron toxicosis in mammals is primarily a phenomenon of overdosing of livestock. Maximum recommended dietary levels of iron range from 500 ppm for sheep to 3,000 ppm for pigs (National Research Council [NRC] 1980). The amounts of iron in TBI and TI shots would not pose a hazard to mammals.

Chickens require at least 55 ppm iron in the diet (Morck and Austic 1981). There were no ill effects on chickens fed 1,600 ppm iron in an adequate diet (McGhee *et al.* 1965). Turkey poults fed 440 ppm in the diet suffered no adverse effects. Tests in which eight #4 tungsten-iron shot were administered to each mallard in a toxicity study indicated that the 45 percent iron content of the shot had no adverse effects on the test animals (Kelly *et al.* 1998).

Environmental Concentrations

We have previously approved as nontoxic other shot types that contain tungsten, iron, and tin. Previous assessments of tungsten-iron, tungsten-polymer, tungsten-matrix, and tungsten-nickel-iron shot indicated that neither the tungsten nor the iron in TBI shot should be of concern in aquatic systems. Similarly, release of tin and iron from TBI shot should not harm aquatic or terrestrial systems. It is generally agreed that inorganic tin and tin compounds are comparatively harmless (Eisler

1989). The release of iron from the shot would be insignificant in natural settings. Reviews of past studies for approvals of other tungsten-based and iron-based nontoxic shot types also support the idea that ingestion of TBI or TI shot will not cause harm to birds or mammals. We have no concerns about approving an additional shot that contains these metals.

However, the 1.842 mg/L EEC for copper from TBI shot calculated for Tier 1 review is considerably greater than the EPA criteria for both fresh water and salt water. Though the Tier 1 EEC is a ''worst-case'' preliminary evaluation of possible effects of the components of a proposed nontoxic shot type, the determination of the aquatic EEC suggested that evaluation of the release of copper from TBI shot and the resultant effects on aquatic biota is warranted.

To determine the actual release of copper from TBI shot, Tin Technology, Ltd. and ITRI Ltd. of the United Kingdom conducted 28-day *in vitro* tests of the shot in synthetic buffered waters with pHs of 5.6, 6.6, and 7.8 at 15 °C. Under normal pH conditions, TBI shot is very sparingly soluble, and the tests demonstrated that copper release from TBI shot is minimal. INC reported that ''5 shot would be required in 1 liter quantities of moderately hard water to generate sufficient concentrations of dissolved copper to be detectable in the leaching tests.'' The concentrations in water for a single shot calculated at the end of 28-day leaching tests were 0.4136 mcg/L at pH 5.6, 0.1261 mcg/L at pH 6.6, and 0.0233 mcg/L at pH 7.8. These concentrations are the equivalent of background values.

From the copper concentrations under the three pH conditions, the risk to aquatic organisms due to use of TBI shot can be evaluated (50 CFR 20.134 (b)(2)(i)(D)(*2*)). The risk of the submitted shot material is determined by comparing the EEC to an appropriate toxicological level of concern—in this case, EPA LC50 values for the most sensitive aquatic organisms. *Ceriodaphnia reticulata* have the lowest average LC50 listed, 9.92 mcg/L. The ratio of the EEC to the LC50 for this species (using the EEC for pH 5.6) is (0.4136/9.92), or 0.042. Under the guidelines in (50 CFR 20.134 (b)(2)(i)(D)(*2*), a risk ratio quotient less than 0.1 indicates that detrimental effects on aquatic organisms are not likely. For TBI shot, even under acidic conditions, the risk ratio is only about 4 percent of the effect level. Thus, we conclude that negative effects from approval of TBI shot are very unlikely.

Impacts of Approval of TBI, TI, and TTB Shot Types as Nontoxic

The status quo would be maintained by not authorizing use of the three shot types for hunting waterfowl and coots. By regulation, steel, bismuth-tin, tungsten-iron, tungsten-polymer, tungsten-matrix, tungsten-nickel-iron, and tungsten-tin-iron-nickel are nontoxic shot types authorized for use by waterfowl and coot hunters. Because these shot types have been shown to be nontoxic to migratory birds, using only those shot types would have no adverse impact on waterfowl and their habitats.

Data provided to us and analyses of the likely effects of the three shot types on migratory birds indicate that these three shot types are nontoxic. We are concerned, however, because some nontoxic shot types are not widely used, and steel is unacceptable to a percentage of waterfowl hunters. Without alternative nontoxic shot types, hunters might not comply with the requirement for use of nontoxic shot when hunting waterfowl. The hunters who still consider steel an unacceptable alternative might continue to use lead, resulting in a small negative impact to the migratory bird resource. Use of lead shot would also negatively impact wetland habitats because of shot erosion and the ingestion of shot by aquatic animals.

Approving additional nontoxic shot types will likely result in a minor positive long-term impact on waterfowl and wetland habitats. Approval of TBI, TI, and TTB shot types as nontoxic would have a positive impact on the waterfowl resource.

The impact on endangered and threatened species of approval of the three shot types will be small but positive. We obtain a biological opinion pursuant to Section 7 of the Endangered Species Act prior to establishing the seasonal hunting regulations. The hunting regulations promulgated as a result of this consultation remove and alleviate chances of conflict between migratory bird hunting and endangered and threatened species. We also will consult on effects on threatened and endangered species concurrent with the approval of the three shot types.

Our consultations do not address take resulting from noncompliance. Indeed, a factor considered when we developed the regulations banning the use of lead for migratory waterfowl hunting was the impact of lead on endangered and threatened species. Hunter failures to comply with the existing ban on lead are of concern to us. If additional alternatives to lead shot are not available, small amounts of lead shot may be added to the environment, causing a negative impact on endangered and threatened species. We believe noncompliance is of concern, but failure to approve the three shot types as nontoxic would have only a small negative impact on the resource.

The impact of approval of the three shot types on endangered and threatened species is similar to that described for waterfowl. In the short and long term, approval would provide a positive impact on endangered and threatened species by assuring that the three shot types have been found nontoxic. Also, as alternative shot types, they will further discourage the use of lead during waterfowl hunting and perhaps extend to upland game.

Approval of the three shot types as nontoxic would have a short-term positive impact on ecosystems. Some hunters still shooting lead shot may switch to one of the three shot types. Approval of them as nontoxic will result in positive long-term impact on ecosystems.

In the short and long term, a minor positive impact will result by approving the three shot types as an alternative to other approved nontoxic shot types. People who may have stopped hunting might be encouraged to participate again, and businesses could experience increased activity. Funding support for public programs will increase and product manufacturers will be able to target potential markets.

Cumulative Impacts

We foresee no negative cumulative impacts of approval of the three shot types for waterfowl hunting. Approval of an additional nontoxic shot type should help to further reduce the negative impacts of the use of lead shot for hunting waterfowl and coots. We believe the impacts of approval of the three shot types for waterfowl hunting should be positive both in the United States and elsewhere. Approval of additional nontoxic shot types should help to further reduce lead poisoning of waterfowl that migrate south of the United States for the winter and of animals that prey on them or consume their carcasses.

Nontoxic Shot Approval Process

The first condition for nontoxic shot approval is toxicity testing. Based on the data provided to us, we preliminarily conclude that none of the three shot types poses a significant danger to migratory birds, other wildlife, or their habitats. Based on the results of past toxicity tests, we conclude that the shots do not pose significant dangers to migratory birds, other wildlife, or their habitats.

The second condition for approval is testing for residual lead levels. Any shot with a lead level of 1 percent or more will be illegal. We determined that the maximum environmentally-acceptable level of lead in shot is 1 percent, and incorporated this requirement in the nontoxic shot approval process we published in the **Federal Register** on December 1, 1997 (62 FR 63608). International Nontoxic Composites, Inc. has documented that TBI shot meets this requirement, ENVIRON-Metal, Inc. has documented that TI shot meets this requirement, and Victor Oltrogge has documented that TTB shot meets this requirement.

The third condition for approval involves enforcement. In 1995 (60 FR 43314), we stated that approval of any nontoxic shot would be contingent upon the development and availability of a noninvasive field testing device. This requirement was incorporated in the nontoxic shot approval process. TBI and TI shotshells can be drawn to a magnet as a simple field detection method. TTB shotshells can be detected in the field by testers already in use for bismuth-tin, tungsten-matrix, and tungsten-polymer shot types.

For these reasons, and in accordance with 50 CFR 20.134, we intend to approve TBI, TI, and TTB shots as nontoxic for migratory bird hunting, and propose to amend 50 CFR 20.21(j) accordingly. This decision is based on data about the components of these shots, assessment of concentrations in aquatic settings, and assessment of the environmental effects of the shot. Those results indicate no likely deleterious effects of TBI, TI, or TTB shot to ecosystems or when ingested by waterfowl. Earlier testing of shot types containing tungsten and/or tin and/or iron indicated no environmental problems due to those metals in nontoxic shot. We do not believe the copper in TBI shot will pose any environmental hazard, and we propose to approve TBI shot with no further testing.

This proposed rule will amend 50 CFR 20.21(j) by approving TBI, TI, and TTB shot as nontoxic for migratory bird hunting. It is based on the toxicological reports, acute toxicity studies, and assessment of the environmental effects of the shot. Those results indicate no deleterious effects of any of the shot types to ecosystems or when ingested by animals.

Public Participation

Past proposed rules on approval of nontoxic shot have generated fewer than five comments. Furthermore, tungsten, iron, bismuth, and tin already have been reviewed extensively for use in nontoxic shot. Therefore, we will accept comments on this proposal until the closing date in the **DATES** section.

Please submit electronic comments as text files; do not use file compression or any special formatting. Comments will become part of the administrative record for the review of the application.

All comments on the proposed rule will be available for public inspection during normal business hours at Room 4091 at the Fish and Wildlife Service, Division of Migratory Bird Management, 4501 North Fairfax Drive, Arlington, Virginia 22203–1610. The complete file for this proposed rule is available, by appointment, during normal business hours at the same address. You may call (703) 358–1825 to make an appointment to view the files.

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NEPA Consideration

In compliance with the requirements of section 102(2)(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(C)), and the Council on Environmental Quality's regulation for implementing NEPA (40 CFR 1500–1508), we have complied with NEPA in the following manner for the three shot applications:

For	NEPA compliance
TBI shot	a Draft Environmental Assessment (EA).
TI shot	a Draft Environmental Assessment (EA).
TTB shot	a Draft Environmental Assessment (EA).

These documents are available to the public at the location indicated in the ADDRESSES section.

Endangered Species Act Considerations

Section 7 of the Endangered Species Act (ESA) of 1972, as amended (16 U.S.C. 1531 *et seq.*), provides that Federal agencies shall ''insure that any action authorized, funded or carried out * * * is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of (critical) habitat.'' We are completing a Section 7 consultation under the ESA for this proposed rule. The result of our consultation under Section 7 of the ESA will be available to the public at the location indicated in the ADDRESSES section.

Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601 *et seq.*) requires the preparation of flexibility analyses for rules that will have a significant effect on a substantial number of small entities, which includes small businesses, organizations, or governmental jurisdictions. This rule proposes to approve additional types of nontoxic shot that may be sold and used to hunt migratory birds; this proposed rule would provide shot types in addition to the types that are approved. We have determined, however, that this proposed rule will have no effect on small entities since the approved shots merely will supplement nontoxic shot types already in commerce and available throughout the retail and wholesale distribution systems. We anticipate no dislocation or other local effects, with regard to hunters and others. This rule was not subject to Office of Management and Budget (OMB) review under Executive Order 12866.

Small Business Regulatory Enforcement Fairness Act

Similarly, this policy is not a major rule under 5 U.S.C. 804(2), the Small Business Regulatory Enforcement Fairness Act. This policy does not impose an unfunded mandate of more than $100 million per year or have a significant or unique effect on State, local, or tribal governments or the private sector because it is the Service's responsibility to regulate the take of migratory birds in the United States.

Executive Order 12866

In accordance with the criteria in Executive Order 12866, this proposed rule is not a significant regulatory action subject to Office of Management and Budget (OMB) review under Executive Order 12866. OMB makes the final determination under E.O. 12866. This rule will not have an annual economic effect of $100 million or adversely affect any economic sector, productivity, competition, jobs, the environment, or other units of government. Therefore, a cost-benefit economic analysis is not required. This proposed action will not create inconsistencies with other agencies' actions or otherwise interfere with an action taken or planned by another agency. The action proposed is consistent with the policies and guidelines of other Department of the Interior bureaus. This proposed action will not materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients because it has no mechanism to affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients. This proposed action will not raise novel legal or policy issues because the Service has already approved several other nontoxic shot types.

Executive Order 12866 requires each agency to write regulations that are easy to understand. We invite comments on how to make this rule easier to understand, including answers to questions such as the following: (1) Are the requirements in the rule clearly stated? (2) Does the rule contain technical language or jargon that interferes with its clarity? (3) Does the format of the rule (grouping and order of sections, use of headings, paragraphing, etc.) aid or reduce its clarity? (4) Would the rule be easier to understand if it were divided into more (but shorter) sections? (5) Is the description of the rule in the SUPPLEMENTARY INFORMATION section of the preamble helpful in understanding the rule? What else could we do to make the rule easier to understand? Send a copy of any comments on how we could make this proposed rule easier to understand to: Office of Regulatory Affairs, Department of the Interior, Room 7229, 1849 C Street, NW., Washington, DC 20240. You may e-mail your comments to this address: *Exsec@ios.doi.gov.*

Paperwork Reduction Act

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The information collection associated with this proposed rule (see 50 CFR 20.134) is already approved under OMB control number 1018–0067, which expires December 31, 2003. On October 22, 2003, we published in the **Federal Register** (68 FR 60409) a notice that we have submitted a request to OMB to renew the information collection associated with 50 CFR 20.134 for 3 years. OMB has not yet responded to our request.

Unfunded Mandates Reform

We have determined and certify pursuant to the Unfunded Mandates Reform Act, 2 U.S.C. 1502, *et seq.*, that this proposed rulemaking will not impose a cost of $100 million or more in any given year on local or State government or private entities.

Civil Justice Reform—Executive Order 12988

We have determined that these regulations meet the applicable standards provided in Sections 3(a) and 3(b)(2) of Executive Order 12988.

Takings Implication Assessment

In accordance with Executive Order 12630, this proposed rule, authorized by the Migratory Bird Treaty Act, does not have significant takings implications and does not affect any constitutionally-protected property rights. This proposed rule will not result in the physical occupancy of property, the physical invasion of property, or the regulatory taking of any property. In fact, this proposed rule will allow hunters to exercise privileges that would be otherwise unavailable; and, therefore, reduces restrictions on the use of private and public property.

Federalism Effects

Due to the migratory nature of certain species of birds, the Federal Government has been given responsibility over these species by the Migratory Bird Treaty Act. This proposed rule does not have a substantial direct effect on fiscal capacity, change the roles or responsibilities of Federal or State governments, or intrude on State policy or administration. Therefore, in accordance with Executive Order 13132, this proposed regulation does not have significant federalism effects and does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951) and 512 DM 2, we have determined that this proposed rule has no effects on Federally recognized Indian tribes.

Energy Effects

In accordance with Executive Order 13211, this proposed rule, authorized by the Migratory Bird Treaty Act, does not significantly affect energy supply, distribution, and use. This proposed rule is not a significant energy action and no Statement of Energy Effects is required.

List of Subjects in 50 CFR Part 20

Exports, Hunting, Imports, Reporting and recordkeeping requirements, Transportation, Wildlife.

For the reasons discussed in the preamble, we propose to amend part 20, subchapter B, chapter 1 of Title 50 of the Code of Federal Regulations as follows:

PART 20—[AMENDED]

1. The authority citation for part 20 continues to read as follows:

Authority: Migratory Bird Treaty Act, 40 Stat. 755, 16 U.S.C. 703–712; Fish and Wildlife Act of 1956, 16 U.S.C. 742a–j; Pub. L. 106–108, 113 Stat. 1491, Note Following 16 U.S.C. 703.

2. Section 20.21 is amended by revising paragraph (j) to read as follows:

§ 20.21 What hunting methods are illegal?

* * * * *

(j)(1) While possessing loose shot for muzzleloading or shotshells containing other than the following approved shot types:

Approved shot type	Composition by weight (in percentages)
bismuth-tin	97 bismuth, 3 tin
steel	iron and carbon
tungsten-bronze-iron	51.1 tungsten, 44.4 copper, 3.9 tin, 0.6 iron
tungsten-iron (2 types)	40 tungsten, 60 iron 22, tungsten, 78 iron
tungsten-matrix	95.9 tungsten, 4.1 polymer
tungsten-nickel-iron	50 tungsten, 35 nickel, 15 iron
tungsten-polymer	95.5 tungsten, 4.5 Nylon 6 or 11
tungsten-tin-bismuth	49–71 tungsten, 29–51 tin; 0.5–6.5 bismuth
tungsten-tin-iron-nickel	65 tungsten, 21.8 tin, 10.4 iron, 2.8 nickel

(2) Each approved shot type must contain less than 1 percent residual lead (see § 20.134). This lead restriction applies to the taking of ducks, geese (including brant), swans, coots *(Fulica americana)*, and any other species that make up aggregate bag limits with them during concurrent seasons in areas described in § 20.108 as nontoxic shot zones.

Dated: March 8, 2004.

Craig Manson,

Assistant Secretary for Fish and Wildlife and Parks.

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