BALLISTOL
MATERIAL SAFETY DATA SHEET

Manufacturer: Washington Trading Company, Inc.
Ballistol USA
One Cypress Knee Trail
Kitty Hawk, NC 27949
Tel.: 252-261-6181

Product: Ballistol is an alkaline, emulsifying oily cleaner, and lubricant, and corrosion inhibitor.

☐ **Hazardous Ingredients Information** Ballistol does not contain any components classified "hazardous" by OSHA. Ballistol contains only one ingredient with TLVs:

Ingredient	OSHA PEL	ACGHI TLV
Isobutyl Alcohol	100 ppm TWA	50 ppm TWA

☐ **Physical Characteristics**

Boiling Point		128 °C (262.4 °F)
Evaporation Rate		Moderate at 20 °C (68 °F)
Pour Point		-17 °C (1.4 °F)
Solubility in Water		Not easily. Emulsifies.
Specific Gravity at 20 °C (68 °F)	Oil:	0.865 g/cm³
	Spray:	0.775 g/cm³
Appearance		Yellowish oil.
Odor		licorice

☐ **Reactivity Data**

Stability	Stable.
Incompatibility	None known.
Hazardous polymerization	Not known to occur.
Hazardous decomposition	None known .

☐ **Fire and Explosion Information**

Flash point	52 °C (126 °F)
Flammable limits (LEL/UEL)	Not applicable.
Extinguishing media	Foam, carbon dioxide, water.
Special fire fighting procedures	Do not use dry powder as extinguishing medium. Wear protective gear and self-contained breathing apparatus as necessary under conditions.
Special fire / explosion hazards	Should be treated as flammable aerosol although product has not been tested as such to ASTM standards. Butane / propane (A-70) used as propellant.

☐ **Health Hazard Data**

Routes of Entry:

Inhalation	Aerosol Spray -Possible / Non-Aerosol Oil-Not Probable
Ingestion	Possible.
Absorption through skin	Insignificant if any.

Acute and Chronic Health Hazards:
No LD-50 oral could be determined for Ballistol with rats and rabbits. Manufacturer classifies product as non-poisonous. Ballistol does not contain Benzene or Kerosene.

Carcinogenicity:
No NTP publication. No IARC monograph. Ballistol is based on medicinal grade white mineral oil, (CAS # 8042-47-5) which has been classified "Class 3" by the IARC. This means that there is insufficient evidence for this substance to cause cancer in animals or humans. Ballistol does not contain any substance currently known to be a carcinogen.

Signs and Symptoms of Exposure	None known.
Medical Conditions Generally Aggravated by Exposure	None known.

Emergency and First Aid Procedures:
In the event of contact with eyes or skin, flush with large quantities of water. If ingested, DO NOT INDUCE VOMITING, ASPIRATION COULD OCCUR. Consult with physician immediately.

☐ **Control and Protection Information**

Respiratory Protection Information	Not required.	Eye Protection	Not normally required.
Ventilation	Locally as needed.	Protective gloves	Not required.
Mechanical	As needed.	Other Protective Clothing	Not normally required.

Work & Hygienic Practices:
Avoid contact with eyes. Use in ventilated area. Do not use around flame or hot surface. Do not spray into open flame. Do not puncture aerosol container.

☐ **Safe Handling and Disposal Information**

Steps to Take in Case of Spill:
Wipe up with absorbent rags. Use oil absorbent material. Sweep up and place in container. Wash area with warm water and detergent to eliminate slipperiness.

Waste Disposal Method:
Follow applicable Federal and local regulations.

Handling and Storage:
Store in cool dry place out of sunlight. Do not store in areas exposed to temperatures above 49 °C (120 °F). Store and use in ventilated room. Keep away from hot surfaces. Keep out of reach of children.

☐ **Transportation Data**

	Aerosol	Non-Aerosol
Description:	Aerosols, flammable	Petroleum Distillate n.o.s.
ID Number:	UN1950	UN1268
Hazard Class:	2.1	3
Packaging Group:	NONE	II
Domestic Surface:	Consumer Commodity, ORM-D	Consumer Commodity,ORM-D, for inner containers no more than one gallon.
Air:	Check with Dangerous Goods desk, or call WTC, Inc.	

Disclaimer
The information and statements contained in this document have been obtained from the manufacturer and from recognized reference sources as provided to or obtained by the Washington Trading Company. Inc. (WTC). WTC believes the information in this document to be true and reliable but expressly disclaims any liability for providing such information and toxicological data.

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Acronyms:

LEL	=	Lower Exposure Limit
UEL	=	Upper Exposure Limit
LD 50	=	Median Lethal Dose. It is the dose at which 50% of a given population will experience fatalities due to a chemical substance.
NTP	=	National Toxicological Program.
IARC	=	International Agency for Research on Cancer.
PEL	=	Permissible Exposure Limit (as set by OSHA).
CAS	=	Chemical Abstract Service
TLV	=	Threshold Limit Value

BALLISTOL
MATERIAL SAFETY DATA SHEET (cont.)

TECHNICAL DATA SHEETS FOR BALLISTOL

Contents

Ballistol contains medicinal grade mineral oil, alkaline salts of oleic acid, several alcohols, Benzyl Acetate and an oil from vegetal seeds. The mineral oil is unchlorinated and conforms to the specifications of US Pharmacopeia XX.

Volatile Organic Components (VOCs)

As an aerosol Ballistol contains 33.8% VOCs. As a non-aerosol it contains 5.3% VOCs.

Propellants

Ballistol aerosols contain A-70 (a Butane, Propane blend) as propellants. The pressure inside the full can is 7-7.5 bars. Ballistol aerosols contain 14% Isohexane as a thinner.

Risk of Explosion

Theoretically a risk of explosion exists with the use of Butane and Propane as propellants for Ballistol aerosols. However, the actual risk is quite negligible, as the following information illustrates:

Explosion Limit / Propellant	Butane	Propane
Lower Explosion Limit (LEL)	1.5 vol.% (37 gr. / cm^3)	2.1 vol.% (39 gr. / cm^3)
Upper Explosion Limit (UEL)	8.5 vol.% (210 gr. / cm^3)	9.5 vol.% (180 gr. / cm^3)

In order to produce an explosive mix of Propane or Butane with air an entire 11 oz. aerosol can of Ballistol would have to be emptied into one cubic meter of air and retained in this space. If any leakage occurred, the LEL would not be reached. It is obvious that for practical purposes the risk of explosion using Ballistol aerosols is fairly insubstantial.

Electrical Properties of Ballistol

Ballistol has a comparatively high dielectric strength. Its electric conductivity is 0.005 Micro-Siemens / cm. This is 1/60 of the electric conductivity of water (0.3 Micro-Siemens / cm). Undiluted and unemulsified Ballistol has an Ohmic resistance of approx. 800 Kilo-Ohms. For most practical purposes Ballistol can be considered a non-conductor. However, Ballistol does have the characteristic of a weak electrolyte due to the free ions contained in it. This characteristic diminishes with age and with extended exposure to an acidic environment. It increases, when Ballistol is emulsified with water.

Therefore, Ballistol, in its non-emulsified form, will not interfere with the flow of electric current in electrical networks or devices. It will not normally build electrical bridges or cause creeping currents or short circuits to occur, even if applied directly on electrical equipment while energized. Ballistol should not be applied to electrical or electronic equipment while water or a high degree of moisture are present in the equipment.

Ballistol has been tested by GTE Testmark Laboratories (now Inchcape Laboratory) in 1994 for its compatibility with Alcatel and Siecor telecommunication cable insulation. It was found to slightly decrease the tensile strength and to significantly increase the elongation of HDPE insulation material. It was also found to improve the DC insulation capability of the HDPE material by factor 5 at 3,000 and 10,000 Volts DC. (See attached).

Warning: Ballistol should not be applied on electrical installations while they are wet from rain or condensation water or similar, since this may cause a short circuit. When electrical installations, which have been treated with Ballistol, are exposed to direct contact with a significant amount of water, a short circuit may result, since Ballistol is a lubricant, not a water blocker.

Compatibility of Ballistol with Other Materials

Ballistol is fully compatible with all metals including aluminum. However, Ballistol dissolves traces of copper, zinc, lead and tombac and can, therefore, be used to clean brass, bronze and silver.

BallistoL is compatible with all types of unfinished woods. Ballistol is compatible with paints and varnishes which are chemically resistant to petroleum. Caution is recommended when using Ballistol on antique furniture or antique musical instruments. Paints and varnishes from past centuries may not be resistant to Ballistol.

Ballistol can be used on all smooth leathers. Its use on suede is not recommended, since it will spoil its looks. Ballistol can be emulsified with water and mixed with gasoline, diesel fuel or antifreeze. Ballistol will chemically interact with and partially or fully neutralize substances of an acidic nature such as, but not limited to, human sweat, battery fluid, residues from tannic acid in leather.

Ballistol - Alkalinity

Ballistol has a pH of between 8.5 and 9.5. This variance occurs, because the pH of Ballistol can only be measured, when Ballistol is emulsified with water and because the concentration of Hydronium ions varies with the concentration of Ballistol in the emulsion. With an emulsion of 50 gr. of Ballistol in 1000 gr. of water a pH of 9 should normally result.

Ballistol as a Corrosion Inhibitor

Most corrosion inhibiting lubricants can only protect against normal oxidation. They do so by covering up the surface, which they are supposed to protect, and prevent contact with water and air. Due to its alkalinity Ballistol can also protect against galvanic corrosion, acidic corrosion and salt water corrosion. Ballistol contains oxygen binders. They make the oxygen, contained in water or air, unavailable for oxidation. Due to its low surface tension, Ballistol is capable of creeping into the smallest openings even against gravity. Accordingly, Ballistol provides not only passive but also active protection against corrosion. However, Ballistol is not a permanent coating or paint. Its protective effect will be the stronger the more often it is re-applied.

Kinematic Viscosity

The following values have been established for the kinematic viscosity of Ballistol Liquid in Centistokes:

Temp. of Ballistol	Centistokes
10 °C	73.2
20 °C	41.8
30 °C	28.0
40 °C	19.5
50 °C	13.9

Due to anti-oxidants contained in it Ballistol will not easily harden or gum up. It retains its lubricity over extended periods of exposure. Due to its extreme purity the mineral oil contained in Ballistol survives autoclaving and leaves enough of a mineral oil film behind to provide a reasonable measure of lubrication and corrosion prevention even after autoclaving. As an emulsifying oil Ballistol does not lose its capability to lubricate in the presence of water.

Physical Indicators

Vapor Pressure:	Aerosol:	5 hP
	Non-aerosol:	6.5 mbar at 20 °C
		10.0 mbar at 50 °C
Flame Point:	51 °C	
Self Ignition Point:	400 °C (when oxygen present)	
Disintegration Point:	Approx. 500 °C (when no oxygen present)	
	Thermic disintegration beginning at approx. 400 °C	
Evaporation Rate:	At 20 °C:	14% in 40 hours
		28% in 480 hours
	At 107 °C:	15% in 0.5 hours
		30% in 12 hours

Non-Toxicity

In experiments with rats and rabbits the animals' entire intestinal tracti and stomachs were filled with Ballistol. The animals showed signs of uneasiness. After the Ballistol had been evacuated from their bodies as provided for by nature, the animals without exception appeared to be in excellent condition and showed no adverse prolonged side effects. It was not possible to establish an LD 50.

Ballistol does not contain ingredients considered hazardous by OSHA. It does not contain any ingredients, which normally may be considered harmful or fatal if swallowed, BUT DO NOT INDUCE VOMITING, ASPIRATION CAN OCCUR. CONSULT A PHYSICIAN IMMEDIATELY. It does not contain any ingredients which may be toxic for warm-blooded organisms, reptiles or aquatic organisms, **if used as directed**. However, Ballistol may kill small insects such as aphids, mites, chiggers, ants, termites, spiders or wasps etc. by mechanically clogging up their respiratory systems, as most oils will.

Ballistol does not contain any ingredients known to cause cancer such as 1,1,1 Trichloroethane, 1.1,2,2 Tetrachloroethylene, tar, Teflon (Polytetrafluorethylene) or Silicone. Ballistol does not contain chlorine or chlorinated substances. Ballistol aerosols do not contain CFCs. The Isohexane contained in Ballistol aerosols as a thinner containes less than 3% n-Hexane, which make it non-toxic. Ballistol meets the criteria of the Federal Trade Commission for the claim of biodegradability. It has been found to biodegrade and/or photodegrade within a period of approximately 24 months in aerobic decomposition as defined by OECD approved closed bottle tests.

Further Information

For further technical information about Ballistol contact Washington Trading Company, One Cypress Knee Trail, Kitty Hawk, NC 27949, phone: 252- 261-6181 fax: 252-261-0408 email doug@ballistol.com .

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BALLISTOL AND "BIODEGRADABILITY"

The Concept of Biodegradability

The concept of biodegradability must be considered under two entirely different aspects: the scientific aspect and the legal aspect.

Scientifically 'biodegradable' means that a susbstance disintegrates under the influence of the elements and/or of microbes (bacteria) or fungi into components, which are normal constituents of the environment and occur in nature, naturally, so to speak. One must distinguish between aerobic and anaerobic biodegradation, i.e. degradation in the presence of oxygen and in its absence. Since under normal circumstances all degradation of materials happens, more or less, in the presence of oxygen, biodegradation is normally aerobic biodegradation.

Biodegradation must be distinguished from photodegradation. Photodegradation is the decomposition of a substance under the impact of light, mostly ultraviolet light.

Legislators have come up with a multitude of definitions of biodegradability, which have often nothing to do with the scientific concept of biodegradability. Indeed, some legal definitions of biodegradability seem to ignore the most elementary facts about natural decomposition. Typically, legal concepts of biodegradability will bring the factor of time into the definition and rule that something cannot be called or labelled "biodegradable" if it takes it longer to biodegrade than the period of time allowed for in the law. Or they will define extremely narrowly, exactly into what substances a product is allowed to decompose. Some laws combine both criteria. A typical example for this kind of approach is the definition of biodegradability of the State of California. The California Statute defines: "*'Biodegradable' means that a material has the proven capability to decompose in the most common environment where the material is disposed within one year through natural biological processes into non toxic carbonaceous soil, water or carbon dioxide.*"

Obviously, some of nature's own products would not be biodegradable under this definition such as leaves, lawn clippings, feathers, bones, wood or the exoskeletons of insects.

The California definition of biodegradability is the most restrictive one so far. However, it applies only to **unspecific** claims of biodegradability. Most other State laws concerning biodegradability are either copies of the California Statute or are less restrictive or they do not apply to products but only to packaging material. The only federal regulation about biodegradability currently in effect is that of the Federal Trade Commission. The FTC rules that a substance can be called biodegradable or photodegradable, if it can be "*... substantiated by competent and reliable scientific evidence that the entire product or package will completely break down and return to nature, i.e. decompose[s] into elements found in nature within a reasonably short period of time after customary disposal.*"

The Components of Ballistol

While the FTC demands that the product must "break down and return to nature" it does apparently not consider the possibility that a product might consist of components **which are already natural substances** or their equivalents. Many of the substances, which are found in nature, are complex chemicals and they are broken down into other chemicals, when they decompose. For example: when an apple decomposes, alcohols form, which decompose into other chemicals or react with other chemicals to form tertiary compounds. It appears to be within the logic of the FTC's definition that there would be no need to prove the break down and

return to nature for any substance, which is already a natural substance or its equivalent.

Ballistol contains the following ingredients:

Mineral Oil
Potassium Oleate
Ammonium Oleate
Oleic Acid
Benzyl Alcohol
Amyl Alcohol
Isobutyl Alcohol
Benzyl Acetate
Anethole
Isohexane (aerosol only)

These substances are either natural substances or they are the chemical equivalents of natural substances. For example: an alcohol is a natural substance regardless of whether is was produced in a laboratory, in a destillery or in a rotting apple under an apple tree.

The Decomposition of the Components of Ballistol

While there can hardly be any reasonable doubt that a natural substance can "return to nature", there is only very scarce literature about the biodegradation of natural substances. The reason is obvious: why would anybody bother to prove that natural substances are part of the process of nature? To write a scientific publication proving that apples can rot, would appear like a hoax. The components contained in Ballistol decompose in the following fashion:

Mineral Oil (Liquid Paraffin)

Most paraffin-based lubricants contain a dirty or even chlorinated paraffin, which is toxic and has a tendency to gum up and harden. If it decomposes, it releases chlorine into nature. By contrast, the paraffin used in Ballistol is highly purified and not chlorinated. Indeed, it is so clean that it conforms to the specifications of the United States Pharmacopeia section XX-NP-XV for medicinal grade paraffin, as is used for the production of medicinal ointments and creams or cosmetics. Paraffin of this degree of purity is not considered hazardous for water. It is, in fact, the equivalent of natural vegetal (plant) wax, as it is produced by many plants and found on the leaves of most leaf bearing plants. The biodegradability of this type of paraffin is self-evident, however, it may take up to 24 months for it to completely biodegrade.

Potassium Oleate and Ammonium Oleate

Potassium Oleate is the Potassium salt of Oleic Acid. Ammonium Oleate is its Ammonium salt. When exposed to water for an extended period of time both compounds split into Potassium ions, respectively Ammonium ions, and Oleic Acid. This is what happens, when Ballistol emulsifies with water. Potassium ions are naturally found in ocean water and clear water, whereas Ammonium ions result from the natural (bacterial) decomposition of urine and feces in combination with water. They are naturally transformed into nitrates, which are also known as fertilizers for plants. The process is the equivalent to what happens, when a farmer fertilizes a field with cow dung.

Oleic Acid

Oleic Acid is a fatty acid and a natural component of all oils and fats, e.g. olive oil or butter. In the natural cycle of decomposition these oils and fats are split into fatty acids and glycerine, which are both either transformed by baterial action into CO_2 and water or absorbed by the bacteria to support their own growth and reproduction. In fact, this is the basic process of natural fermentation of all organic tissue. The biodegradability of Oleic Acid is self-evident.

Benzyl Alcohol, Amyl Alcohol and Isobutyl Alcohol

Alcohols are products of natural fermentation on the basis of protein, starch or sugar. Benzyl Alcohol develops, when Benzyl Acetate breaks down into Benzyl Alcohol and Acetic Acid. Amyl Alcohol and Isobutyl Alcohol are the products of natural fermentation of fruit. They occur in all distilled alcoholic beverages, e.g. brandies. Their biodegradability is self-evident.

Benzyl Acetate

Benzyl Acetate occurs in nature in a number of fragrant substances, especially in Jasmine. It decomposes into Benzyl Alcohol and Acetic Acid, both natural substances. Its biodegradability is self-evident.

Anethole

Anethole is the essential oil from the seeds of Pimpinella anisum L., a shrub which grows around the Mediterranean and in South and Central America. Anethole is a medicinal oil. Its many medicinal uses have been described by the ancient Persian and Greek physicians. As a plant oil of natural origin its biodegradability is self-evident.

Isohexane

Isohexane, a pure hydrocarbon, is used in Ballistol-Lube aerosols to improve the sprayability of the highly viscose Ballistol. Isohexane as used in Ballistol aerosol cans contains less than 3% n-Hexane. It is, therefore, non-toxic for warm-blooded organisms. Isohexane photodegrades in the atmosphere within approximately 20-25 days into water and CO2.

Biodegradability Tests

Some competing products (e.g. CRC 5-56) claim that they are biodegradable as specified by the "Bartha-Pramer Test of Biodegradability". This test is a California special. It is not a closed-bottle test and it does not conform with internationally recognized OECD standards. It is not generally recognized by US regulating agencies.

Ballistol has been tested in OECD approved closed-bottle tests and was found to biodegrade resp. photodegrade within approximately 24 months in aerobic decomposition and at ambient temperatures of 18 °C.

For more information call 252-261-6181 or write to Washington Trading Company,One Cypress Knee Trail, Kitty Hawk, NC 27949
(wtc/092294/fd/biodegra)