Schering-Plough Animal Health Corporation
556 Morris Avenue
Summit, NJ 07901

MATERIAL SAFETY DATA SHEET

Schering-Plough urges each user or recipient of this MSDS to read the entire data sheet to become aware of the hazards associated with this material.

SECTION 1. IDENTIFICATION OF SUBSTANCE AND CONTACT INFORMATION

MSDS NAME: **Beuthanasia-D Solution**

SYNONYM(S): Beuthanasia-D Special
Beuthanasia-D Injection

MSDS NUMBER: SP000354

EMERGENCY NUMBER(S): Schering-Plough Security Control Center (908) 820-6921 (24 hours)

Transportation Emergencies - CHEMTREC:
(800) 424-9300 (Inside Continental USA)
(703) 527-3887 (Outside Continental USA)

Rocky Mountain Poison Center (For Human Exposure):
(303) 595-4869

Animal Health Technical Services:
For Animal Adverse Events: Small Animals and Horses: (800) 224-5318
For Animal Adverse Events: Livestock: (800) 211-3573
For Animal Adverse Events: Poultry: (800) 219-9286

INFORMATION: Animal Health Technical Services:
For Small Animals and Horses: (800) 224-5318
For Livestock: (800) 211-3573
For Poultry: (800) 219-9286

SCHERING-PLOUGH MSDS HELPLINE: (800) 770-8878 (US and Canada)
(908) 629-3657 (Worldwide)
Monday to Friday, 9am to 5pm (US Eastern Time)

SECTION 2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Clear, Pink
Solution
Odor unknown

Toxic if swallowed.
May be toxic by inhalation.
May cause allergic reactions in susceptible individuals.
Prolonged exposure may cause serious health effects.

Causes effects to:
- central nervous system
- respiratory system
- brain
- cardiovascular system

Causes birth defects.

May cause effects to:
- gastrointestinal tract
- blood
- immune system
- liver
- kidney

Harmful to fish and aquatic organisms.

POTENTIAL HEALTH EFFECTS:

The following summary is based upon available information about the individual ingredients of the mixture, or of the expected properties of the mixture. Only information about the ingredients that are expected to contribute significantly to the potential health hazard profile of the formulation(s) is presented.

This product is intended to cause euthanasia in dogs upon administration intravenously. Euthanasia is due to cerebral death in conjunction with respiratory arrest and circulatory collapse. Central nervous system depression and hypotension may also occur.

Pentobarbital sodium is a short-acting barbiturate used as a sedative, preanesthetic, and sleeping aid. Barbiturates may be habit-forming, and tolerance, psychological, or physical dependence may occur especially following prolonged use of high concentrations. Barbiturates are central nervous system and respiratory depressants. Effects that may be seen following acute exposure include slurred speech, confusion, poor judgement, irritability, insomnia, or incoordination. Effects that may be seen following exposure to high concentrations include severe confusion, decrease or loss of reflexes, severe drowsiness, fever, hypothermia, shortness of breath or troubled breathing, slow heartbeat, severe weakness, respiratory depression, pneumonia, congestive heart failure, renal failure, coma, respiratory arrest, or death.

Barbiturates readily cross the placenta following oral administration. Barbiturates have been associated with an increased risk of congenital heart disease, facial abnormalities, and other birth defects; however, no effects have been observed in women exposed to pentobarbital. In addition, newborns that were chronically exposed to bariturates in utero may exhibit withdrawl symptoms such as hyperactivity and tremors.

Phenytoin, often administered as phenytoin sodium, is an anticonvulsant and antiarrhythmic agent. Phenytoin is a central nervous system depressant. Acute effects from exposure may include nausea, vomiting, gastrointestinal pain, loss of appetite, dizziness, staggering, blurred vision, nystagmus (involuntary movement of the eye), drowsiness, pupil dilation, hyperactive tendon reflexes, tremor, increased or decreased activity, hallucinations, confusion, respiratory depression, breathing difficulties, or coma. Hypersensitivity reactions, sometimes fatal, have been reported after chronic therapy. General symptoms of potential reactions include fever, general discomfort, rash, facial swelling, skin redness, lymph node effects, hepatitis, anemia, pharyngitis, diarrhea, anorexia, kidney inflammation, and acute inflammation of the lungs. Phenytoin may also invoke autoimmune dysfunction, swelling of the gums, psychological disorders, or effects on the liver or blood.

Phenytoin freely pases through the placenta. Human teratogenicity (birth defects) has been reported in women who received phenytoin treatment, and phenytoin has been linked to Fetal Hydantoin Syndrome (FHS). Phenytoin is a teratogen in animals.

Propylene glycol is considered to be relatively non-toxic. It is a mild irritant to the eyes and has been reported to irritate the skin. It may cause skin sensitization resulting in allergic contact dermatitis in susceptible individuals. Inhalation exposure to saturated and supersaturated atmospheres of propylene glycol for prolonged periods of time produced no adverse effects. Propylene glycol may cause nervous system depression, acidosis, stupor, and seizures after chronic ingestion.

LISTED CARCINOGENS

CHEMICAL NAME	CAS NUMBER	OSHA	IARC	NTP	ACGIH
Ethyl Alcohol	64-17-5		Listed.		Group A4 Not classifiable as a human carcinogen.

Phenytoin: IARC has classified phenytoin as a Group 2B (possibly carcinogenic to humans).

Ethanol (ethyl alcohol): IARC (International Agency for Research on Cancer) has classified Alcoholic Beverages as Group 1 (indicating in their evaluation that the agent is carcinogenic to humans). However, occupational handling or manufacturer's specified use of this product is not expected to result in relevant exposures.

SECTION 3. COMPOSITION AND INFORMATION ON INGREDIENTS

PRODUCT USE: Veterinary product

CHEMICAL FORMULA: Mixture.

The formulation for this product is proprietary information. Only hazardous ingredients in concentrations of 1% or greater and/or carcinogenic ingredients in concentrations of 0.1% or greater are listed in the Chemical Composition table. Active ingredients in any concentration are listed. For additional information about carcinogenic ingredients see Section 3.

CHEMICAL COMPOSITION

CHEMICAL NAME	CAS NUMBER	PERCENT
Pentobarbital Sodium	57-33-0	39
Phenytoin Sodium	630-93-3	5
Propylene Glycol	57-55-6	10-20
Ethyl Alcohol	64-17-5	<10
Benzyl Alcohol	100-51-6	<10

ADDITIONAL INFORMATION: This MSDS is written to provide health and safety information for individuals who will be handling the final product formulation during research, manufacturing, and distribution. For health and safety information for individual ingredients used during manufacturing, refer to the appropriate MSDS for each ingredient. Refer to the package insert or product label for handling guidance for the consumer.

SECTION 4. FIRST AID MEASURES

INHALATION: Remove to fresh air. If any trouble breathing, get immediate medical attention. Administer artificial respiration if breathing has ceased. If irritation or symptoms occur or persist, consult a physician.

SKIN CONTACT: In case of skin contact, while wearing protective gloves, carefully remove any contaminated clothing, including shoes, and wash skin thoroughly with soap and water. If irritation or symptoms occur or persist, consult a physician.

EYE CONTACT: In case of eye contact, immediately rinse eyes thoroughly with plenty of water. If wearing contact lenses, remove only after initial rinse, and continue rinsing eyes for at least 15 minutes. If irritation occurs or persists, consult a physician.

INGESTION: DO NOT induce vomiting. Do not attempt to give anything by mouth to a seizing, drowsy or unconscious person. If alert, rinse mouth, drink a glass of water and IMMEDIATELY consult a physician.

SECTION 5. FIRE FIGHTING MEASURES

FLAMMABILITY DATA:

Flash Point: Not determined (liquids) or not applicable (solids).

SPECIAL FIRE FIGHTING PROCEDURES:
Wear full protective clothing and self-contained breathing apparatus (SCBA).

SUITABLE EXTINGUISHING MEDIA:
Carbon dioxide (CO_2), extinguishing powder or water spray.

See Section 9 for Physical and Chemical Properties.

SECTION 6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:
Wear appropriate personal protective equipment as specified in Section 8. Keep personnel away from the clean-up area.

SPILL RESPONSE / CLEANUP:
All spills should be handled according to site requirements and based on precautions cited in the MSDS. In the case of liquids, use proper absorbent materials. For laboratories and small-scale operations, incidental spills within a hood or enclosure should be cleaned by using a HEPA filtered vacuum or wet cleaning methods as appropriate. For large dry or liquid spills or those spills outside enclosure or hood, appropriate emergency response personnel should be notified. In manufacturing and large-scale operations, HEPA vacuuming prior to wet mopping or cleaning is required.

See Sections 9 and 10 for additional physical, chemical, and hazard information.

SECTION 7. HANDLING AND STORAGE

HANDLING:
Keep containers adequately sealed during material transfer, transport, or when not in use.

Appropriate handling of this material is dependent on many factors, including physical form, duration and frequency of process or task, and effectiveness of engineering controls. Site-specific risk assessments should be conducted to determine the feasibility and the appropriateness of all exposure control measures. See Section 8 (Exposure Controls) for additional guidance.

STORAGE:
Store in a cool, dry, well ventilated area.

See Section 8 for exposure controls and additional safe handling information.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

EXPOSURE CONTROLS:
The health hazard risks of handling this material are dependent on many factors, including physical form, duration and frequency of process or task, and effectiveness of engineering controls. Site-specific risk assessments should be conducted to determine the feasibility and the appropriateness of all exposure control measures. Exposure controls for normal operating or routine procedures follow a tiered strategy. Engineering controls are the preferred means of long-term or permanent exposure control. If engineering controls are not feasible, appropriate use of personal protective equipment (PPE) may be considered as alternative control measures. However, PPE should not be used as a method of permanent or long-term exposure control. Exposure controls for non-routine operations must be evaluated and addressed as part of the site-specific risk assessment.

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

Respiratory Protection:	Respiratory protective equipment (RPE) may be required for certain laboratory and large-scale manufacturing tasks if potential airborne breathing zone concentrations of substances exceed the relevant exposure limit(s). Workplace risk assessment should be completed before specifying and implementing RPE usage. Potential exposure points and pathways, task duration and frequency, potential employee contact with the substance, and the ability of the substance to be rendered airborne during specific tasks should be evaluated. Initial and ongoing strategies of quantitative exposure measurement should be obtained as required by the workplace risk assessment. All RPE must conform to local and regional specifications for efficacy and performance. Consult your site or corporate health and safety professional for additional guidance.
Skin Protection:	Gloves that provide an appropriate barrier to the skin are recommended if there is potential for contact with this material. Consult your site safety staff for guidance.
Eye Protection:	Safety glasses with side shields. Use of goggles or full face protection may be required based on hazard, potential for contact, or level of exposure. Consult your site safety staff for guidance.
Body Protection:	In small-scale or laboratory operations, lab coats or equivalent protection is required. Disposable Tyvek or other dust impermeable suit should be considered based on procedure or level of exposure. Use of additional PPE such as shoe coverings, gauntlets, hood, or head covering may be necessary. Consult your site safety staff for guidance. In large-scale or manufacturing operations, disposable Tyvek or other dust impermeable suit is recommended and based on level of exposure. Use of additional PPE such as shoe coverings, gauntlets, hood, or head covering may be necessary. Consult your site safety staff for guidance.

EXPOSURE LIMIT VALUES

CHEMICAL NAME	CAS NUMBER	ACGIH TLV (TWA)	OSHA PEL (TWA)
Ethyl Alcohol	64-17-5	1000 ppm	1900 mg/m^3 1000 ppm

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

FORM:	Solution
COLOR:	Clear, Pink
ODOR:	Odor unknown
SOLUBILITY:	
Water:	Not determined

See Section 5 for flammability/explosivity information.

SECTION 10. STABILITY AND REACTIVITY

STABILITY/ REACTIVITY:
Stable under normal conditions.

INCOMPATIBLE MATERIALS / CONDITIONS TO AVOID:
Open flames and high temperatures.

HAZARDOUS DECOMPOSITION PRODUCTS / REACTIONS:
Carbon oxides (COx).

SECTION 11. TOXICOLOGICAL INFORMATION

The toxicological properties of the mixture(s) have not been fully characterized in humans or animals. The information presented below pertains to the following individual ingredients in this formulation, unless indicated otherwise.

ACUTE TOXICITY DATA

INHALATION:
Propylene glycol caused no adverse effects in monkeys or rats following exposure to saturated atmospheres for prolonged periods of time.

SKIN:
Propylene glycol: Dermal LD50: 20.8 g/kg (rabbit)
Propylene glycol was irritating in a human patch test. Propylene glycol was not irritating to the skin of rabbits, guinea pigs and swine.

EYE:
Propylene glycol was slightly irritating to the eyes of rabbits.

ORAL:
Pentobarbital Sodium: Oral LD50: 118 mg/kg (rat); 65 mg/kg (dog)

Phenytoin Sodium: Oral LD50: 1530 mg/kg (rat); 165-490 mg/kg (mouse)
Toxic doses of phenytoin sodium in animals produce mydriasis, nystagmus, salivation, incoordination, and ataxia. Muscular spasticity, rigidity, tremors, convulsive movements, and opisthotonos has preceded death from respiratory failure.

Propylene glycol: Oral LD50: 21 to 33.7 g/kg (rat), 10 to 20 g/kg (dog)
Propylene glycol caused dyspnea, cramps, loss of equilibrium, depression, analgesia, and death after prolonged moribund state in mice at doses ranging from 23.9 to 31.8 g/kg. In rabbits, 1 to 1.5 g/kg propylene glycol reduced intraocular pressure by raising the osmotic pressure of blood.

SENSITIZATION:
Propylene glycol did not cause sensitization in a human patch test.

ADDITIONAL INFORMATION:
This product is intended for euthansia in dogs upon intravenous administration. Cerebral death in conjunction with respiratory arrest and circulatory collapse is expected.

REPEAT DOSE TOXICITY DATA

SUBCHRONIC / CHRONIC TOXICITY:
Phenytoin effected the peripheral nervous system when given to female rats orally at doses of 300 mg/jg/day for 180 days. Increased thickness of craniofacial bones measured by increases of histomorphometric (osteoblast number, bone mineral apposition rate) and biochemical (skeletal alkaline phosphatase activity, osteocalcin concentrations) parameters of bone formation were observed in rats given phenytoin at doses of 5 mg/kg/day for 36 days by intraperitoneal injection.

Propylene glycol caused no adverse effects in monkeys or rats exposed to saturated vapor concentrations for 12 to 18 months. Rats exposed to 25 or 50% (7.7 and 13.2 g/kg/day) propylene glycol in water died within 69 days in a 140 day study. In a separate study, a diet of 30% propylene glycol was not well tolerated in young rats, and dams could not bring their young to weaning; diets containing 40, 50, or 60% propylene glycol were lethal after a few days.

REPRODUCTIVE / DEVELOPMENTAL TOXICITY:
Pentobarbital (base) induced a number of anomalies in mice; however, it was not shown to be teratogenic in rats, rabbits, or guinea pigs.

Phenytoin is a teratogen and fetotoxin in rats. It is a teratogen in mice and rabbits, and fetotoxic in monkeys at doses that were also maternally toxic. Phenytoin is not teratogenic in dogs or cats.

Rabbits were administered phenytoin sodium by oral gavage at doses of 150 mg/kg on gestation day 14-16 or 300 mg/kg on gestation days 15-16. Fetuses were examined shortly after the last dose on Day 16. The following effects were observed in the fetuses: digital areas of the limb plates showed edema and dilated blood vessels, vascular disruption occurred with hemorrhages, mesenchymal necrosis, amputation of digits, superficial hemorrhage in the frontal and nasal region, and intracranial and superficial hemorrhage in the central nevous system. Rats were administered phenytoin sodium through intraperitoneal injections at doses of 10, 50, or 100 mg/kg on Day 17 of gestation. There were no adverse effects on pregnancy or neonatal survival in the 10 and 50 mg/kg group. In the 100 mg/kg group, total fetal loss was observed in 50% of the dams, and in the remaining dams, delivery was delayed. In monkeys, oral administration of 60 to 600 mg/kg of phenytoin during gestational days 21 to 50 resulted in dose dependent maternal toxicity, and an increase in embryonic loss. In mice, phenytoin induced cleft palated when administered subcutaneously at doses up to 50 mg/kg from days 9 to 15 of gestation.

Propylene glycol caused decreased food consumption, retarded growth, smaller litters, changes in breeding patterns, and inhibited weaning in rats that were fed 30% propylene glycol through six generations; however, this may have been due to nutritional insufficiency. Propylene glycol was not teratogenic in rabbits, monkeys or chickens.

MUTAGENICITY / GENOTOXICITY:
Pentobarbital (base) was positive in the mouse micronucleus assay, mouse cell DNA inhibition test, hamster cytogenetic assay, and in the hamster dominant lethal test.

Studies with phenytoin showed no induction of micronuclei, chromosomal aberrations, or aneuploidy in human lymphocytes in vivo. There was an increase of polyploidy in one study, and sister chromatid exchange in three of seven studies. Neither chromosomal aberrations nor aneuploidy were induced in human bone marrow. Phenytoin induced mutations in Salmonella typhimurium in the presence of a metabolic activation system in one study, but was negative in Drosophila or mammalian cells in vitro assays in the absence of a metabolic system. Aneuploidy was induced in one study in primary mouse embryonic fibroblasts in vitro. Cell transformation was induced in Syrian hamster embryo. Phenytoin inhibited gap-junctional intercellular communication.

Propylene glycol was negative in a bacterial mutagenicity study (Ames).

CARCINOGENICITY:
This material or product has not been evaluated for carcinogenicity.

IARC has classified phenytoin as a Group 2B (agent is a possible human carcinogen) based on sufficient evidence in animals.

Phenytoin sodium was tested in three strains of mice at oral doses of 60 mg/kg/day for 168 days. There was an increase of thymic lymphomas in two strains of mice, and in the other strain, there was an increase of generatlized lymphomas. In another study, mice administered intraperitoneal injections of 0.6 mg/mouse over 66 days showed an increase in tumors: thymic, mesenteric, and leukemia.

Propylene glycol was not carcinogenic when applied to the skin, or when given orally in mice and rats.

SECTION 12. ECOLOGICAL INFORMATION

There are no data for the final product or its formulation(s). The information presented below pertains to the following ingredient(s).

ECOTOXICITY DATA

INGREDIENT ECOTOXICITY

Pentobarbital Sodium: 96-hr LC50 (fathead minnow): 49.5 mg/L

Propylene glycol: 96-hr LC50 (sheepshead minnow): 23,800 mg/L
Propylene glycol: 48-hr EC50 (daphnid): >43,500 mg/L
Propylene glycol: 72-hr EC50 (green algae): >19,000 mg/L

ENVIRONMENTAL DATA

OTHER INGREDIENT ENVIRONMENTAL DATA:

Propylene glycol is expected to be readily biodegradable.

SECTION 13. DISPOSAL CONSIDERATIONS

MATERIAL WASTE:
Disposal must be in accordance with applicable federal, state/provincial, and/or local regulations. Incineration is the preferred method of disposal, when appropriate. Operations that involve the crushing or shredding of waste materials or returned goods must be handled to meet the recommended exposure limit(s).

PACKAGING AND CONTAINERS:
Disposal must be in accordance with applicable federal, state/provincial, and/or local regulations.

SECTION 14. TRANSPORT INFORMATION

Refer to site-specific procedures and requirements for additional guidance.

DOT CLASSIFICATION:

Proper Shipping Name:	Shipment for packages over 5 liters: Toxic liquids, organic, n.o.s. (pentobarbital sodium) Shipment for packages under 5 liters: Medicine liquid, toxic, n.o.s.
Hazard Class:	6.1
UN Number:	Shipment for packages over 5 liters: UN 2810 Shipment for packages under 5 liters: UN 1851
Packing Group:	III

IATA CLASSIFICATION:

Proper Shipping Name:	Shipment for packages over 5 liters: Toxic liquids, organic, n.o.s. (pentobarbital sodium) Shipment for packages under 5 liters: Medicine liquid, toxic, n.o.s.
Hazard Class:	6.1
UN Number:	Shipment for packages over 5 liters: UN 2810 Shipment for packages under 5 liters: UN 1851
Packing Group:	III

ADR CLASSIFICATION:

Proper Shipping Name:	Shipment for packages over 5 liters: Toxic liquid, organic, n.o.s. (pentobarbital sodium) Shipment for packages under 5 liters: Medicine liquid, toxic, n.o.s.
Hazard Class:	6.1
UN Number:	Shipment for packages over 5 liters: UN 2810 Shipment for packages under 5 liters: UN 1851
Packing Group:	III

IMDG CLASSIFICATION:

Proper Shipping Name:	Shipment for packages over 5 liters: Toxic liquid, organic, n.o.s. (pentobarbital sodium) Shipment for packages under 5 liters: Medicine liquid, toxic, n.o.s.
Hazard Class:	6.1
UN Number:	Shipment for packages over 5 liters: UN 2810 Shipment for packages under 5 liters: UN 1851
Packing Group:	III

SECTION 15. REGULATORY INFORMATION

TSCA LISTING

CHEMICAL NAME	TSCA
Phenytoin Sodium	Listed
Propylene Glycol	Listed
Ethyl Alcohol	Listed
Benzyl Alcohol	Listed

U.S. STATE REGULATIONS

CHEMICAL NAME	California Proposition 65	CARTK	NJRTK	CTRTK	MARTK
Pentobarbital Sodium	Listed.		Substance no. 3726 Listed.		
Phenytoin Sodium	Listed.	Listed.			
Ethyl Alcohol		Listed.	Substance no. 0844 Listed.	Listed.	Listed.
Benzyl Alcohol					Listed.

CHEMICAL NAME	PARTK	MNRTK	MIRTK	ILRTK	LARTK	RIRTK
Phenytoin Sodium		Listed.				
Propylene Glycol	Listed.	Listed.				Listed.
Ethyl Alcohol	Listed.	Listed.		Listed.		Listed.
Benzyl Alcohol	Listed.	Listed.				

SECTION 16. OTHER INFORMATION

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained therein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequence of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

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