

Safety Data Sheet



Rev. A – December 6, 2016

Section 1 - Identification

Product Identifier and Trade Names: TURBOprop™ Activator
Product Type: Activator for TURBOprop™ Sand Proppant
Application: Hydraulic Fracturing
Restriction on Use: For Industrial Use Only
Manufacturer: Badger Mining Corporation
409 South Church Street, Berlin, Wisconsin 54923 USA
24-Hour Telephone: (715) 662-2400
www.badgerminingcorp.com

Distributor: BMC Northern Resources Inc.
#45 61027 Hwy 672, Emerson Trail Industrial Park, Sexsmith, AB,
T0H 3C0
Telephone: (780) 568-2096

Section 2 - Hazards Identification

GHS Classification:

Health Hazards:

Category 2 Causes Skin Irritation
Category 2 Causes Eye Irritation
Category 3 May Cause Respiratory Irritation
Category 3 May Cause Drowsiness or Dizziness

Signal Word: WARNING



Hazard Statements:

Causes serious eye irritation. May cause skin corrosion/irritation. May cause respiratory irritation. May cause drowsiness or dizziness.

Precautionary Statements:

Wash skin thoroughly with soap and water after handling. Wear protective gloves/eye protection/face protection. If product gets in eyes: rinse continuously with water for 15 minutes, and if able to, remove contact lenses, continue rinsing. If eye irritation persists, get medical attention. If inhaled remove victim to fresh air & keep at rest in a position comfortable for breathing.

Section 2 - Hazards Identification, continued

Use with adequate ventilation to keep exposure below recommended exposure limits. Wear eye protection and respiratory protection following this SDS, NIOSH guidelines and other applicable regulations.

Dispose of contents/container in accordance with local, regional, national or international regulations.

Please refer to Section 11 for details of specific health effects of hazardous ingredients.

Section 3 - Composition/Information on Ingredients

Hazardous Ingredients:

	<u>CAS #</u>	<u>Percent</u>
2-(2-butoxyethoxy)ethanol	112-34-5	95-100%

Chemical synonyms: diethylene glycol monobutyl ether; diethylene glycol mono-n-butyl ether; glycol ether DB; butyldiglycol; butyl carbitol.

TRACE COMPONENTS: Trace ingredients (if any) are present in < 1% concentration, (< 0.1% for potential carcinogens, reproductive toxins, respiratory tract mutagens, and sensitizers). The trace ingredients will not contribute significant additional hazards at the concentrations that may be present in this product. All pertinent hazard information has been provided in this document, per the requirements of the Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalents, and Canadian Hazardous Materials Identification System Standard (CPR 4).

Section 4 - First Aid Measures

Inhalation - If excessive inhalation of product occurs, remove the person to fresh air. Trained personnel should perform artificial respiration and/or cardiopulmonary resuscitation as needed. Contact a physician if irritation persists or develops later. Refer for medical attention.

Eyes - Immediately wash the eye with plenty of water for at least 15 minutes, while holding eyelid(s) open. Occasionally lift the eyelid(s) to ensure thorough rinsing. Remove contact lenses, if present and easy to do, and continue rinsing. Contact a physician if irritation persists or develops later.

Skin - In case of contact with skin immediately remove contaminated clothing. Wash thoroughly with soap & water. Seek medical attention if irritation persists or develops later. Wash contaminated clothing before reuse.

Ingestion - Do NOT induce vomiting, rinse mouth with water. Refer for medical attention.

Signs and Symptoms of Exposure – Direct exposure to eyes causes serious irritation. Human patch (skin) testing with undiluted 2-(2-butoxyethoxy)ethanol revealed a limited number of the study volunteers who developed reddening of the skin. May cause nausea, vomiting and diarrhea when ingested. If significant ingestion occurs individual may exhibit tachypnea, cyanosis, uremia and impaired kidney function. Large and intentional exposures to other diglycol ethers have resulted in reports of CNS depression, metabolic acidosis, renal injury and acute lung injury.

Section 5 - Fire Fighting Measures

Extinguishing Media: Carbon dioxide, dry chemical powder

Unusual Fire and Explosion Habits: In case of fire: keep drums, etc., cool by spraying with water. Isolate from oxidizers, heat and open flames.

Section 5 - Fire Fighting Measures, continued

Special Fire Fighting Procedures:	Fire fighters should wear self-contained breathing apparatus. Water spray may be ineffective on fire but can protect fire-fighters & cool closed containers. Use fog nozzles if water is used. Do not enter confined fire-space without full bunker gear. (Helmet with face shield, bunker coats, gloves & rubber boots).
Hazardous Combustion Products:	Oxides of carbon, peroxides, acrid smoke and particulates

Section 6 – Accidental Release Measures

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Persons involved in cleaning should first follow the precautions defined in Section 7 of the SDS. Keep from entering storm sewers and ditches which lead to waterways. Stop spill at source. Dike and contain. Collect leaking & spilled liquid in sealable containers as far as possible. For small releases transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. For larger releases transfer by mechanical means such as a vacuum truck. Remove contaminated soil and dispose of safely.

Wear appropriate personal protective equipment as specified in Section 8. Ensure appropriate respirators are worn during and following cleanup, to ensure worker exposures remain below occupational exposure limits (OELs) refer to Section 8. Follow respiratory protection selection guidelines as described in Section 8 of this document.

This product is subject to the reporting requirements of SARA Title III Section 313, and 40 CFR 372.

Section 7 - Handling and Storage

Follow protective controls set forth in Section 8 of this SDS when handling this product. Avoid breathing vapors or contact with material. Use only in well ventilated areas. Wash skin thoroughly after handling.

Store in a cool dry place. Do not cut, grind, weld, or drill on or near this product. Do not smoke. Remove ignition sources and open flames. Avoid sparks. Avoid inhaling vapor and or mists, when using do not eat or drink. Bond and ground all equipment utilizing this product. See Section 5. Fire Fighting Measures as it relates to handling and storage of this material.

Non-Bulk Containers: Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Empty containers should be handled with care. Never store food, feed, or drinking water in containers which held this product.

Bulk Containers: All tanks and pipelines which contain this material must be labeled. Perform routine maintenance on tanks or pipelines which contain this product. Report all leaks immediately to the proper personnel.

Tank Car Shipments: Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendations and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Engineering Controls and Personal Protective Equipment.) All loading and unloading equipment must be inspected, prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level, brakes must be set or wheels must be locked or blocked prior to loading or unloading. Tank cars (for loading) or storage tanks (for unloading) must be verified to be correct for receiving this product and be properly prepared prior to starting the transfer operations. Hoses must be verified to be in the correct positions before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operations. All lines must be blown-down and purged before disconnecting them from the tank car or vessel.

Section 7 - Handling and Storage, continued

Protective Practices During Maintenance of Contaminated Equipment: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Collect all rinsates and dispose of according to applicable Federal, State, Provincial, or local procedures.

Empty Container Warning: Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through a suitably qualified or licensed contractor and in accordance with governmental regulations. **DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY BURST RESULTING IN INJURY OR DEATH.**

In accordance with OSHA's Hazard Communication Standards (29 CFR 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59, 1928.21), state and/or local right to know laws and regulations, familiarize your employees with this SDS and the information herein. Warn employees, your customers and other third parties (in the case of resale or distribution to others) of the potential health risks associated with the use of this product and train them in the appropriate use of PPE and engineering controls which will reduce their risks of exposure. It is a requirement of law that training, testing and appropriate handling is used.

Section 8 - Exposure Controls/Personal Protection

OELs for 2-(2-butoxyethoxy)ethanol

Standard	Exposure Limits
OSHA PEL (8-Hour Time-Weighted Average)	Not established
ACGIH TLV (8-Hour Time-Weighted Average)	10 ppm or 67.5 mg/m ³ (IFV)*
NIOSH REL (10-Hour Time-Weighted Average, 40-hour work week)	Not established
European Union (8-Hour Time-Weighted Average)	10 ppm or 67.5 mg/m ³
European Union (Short-Term Limit Value, 15 minutes)	101.2 mg/m ³
Germany – MAK (8-Hour Time-Weighted Average)	10 ppm** or 67.5 mg/m ³ **

*IFV – Measured as inhalable fraction and vapor.

**Sum of the concentration of 2-(2-butoxyethoxy)ethanol and its acetate in air.

Engineering Controls: Ventilation: Use local exhaust, general ventilation or natural ventilation adequate to maintain exposures below appropriate exposure limits.

Respiratory Protection: Consult with OSHA regulations, Canadian CCOHS, NIOSH recommendations and other applicable regulatory agencies to determine the appropriate respiratory protection to be worn during the use of this product, and use only such recommended respiratory protection equipment. Avoid breathing vapors produced during the use and handling of this product. If the workplace 2-(2-butoxyethoxy)ethanol concentration is unknown for a given task, conduct air monitoring to determine the appropriate level of respiratory protection to be worn. Consult with a Certified Industrial Hygienist (CIH), your insurance risk manager or the OSHA Consultative Services group for detailed information. Ensure appropriate respirators are worn during and following the task, including clean up or whenever airborne vapor is present, to ensure worker exposures remain below occupational exposure limits. Provisions should be made for a respiratory

Section 8 - Exposure Controls/Personal Protection, continued

protection training program (see 29 CFR 1910.134 – Respiratory Protection for minimum program requirements). See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection," 29 CFR 1910.134 and 1926.103, and 42 CFR 84.

Respirator Recommendations:

For airborne 2-(2-butoxyethoxy)ethanol levels that exceed, or are likely to exceed appropriate exposure limits, a NIOSH-approved organic vapor/P100 filter respirator must be worn.

Respirator use must comply with applicable standards, which include provisions for a user training program, respirator maintenance and cleaning, respirator fit testing, and other requirements. For additional information contact NIOSH at 1-800-35-NIOSH or visit website: <http://www.cdc.gov/niosh/npg>

Emergency or planned entry into unknown concentrations or IDLH conditions: A self-contained breathing apparatus that has a full-face piece and is operated in a pressure-demand or other positive-pressure mode or a supplied-air respirator that has a full-face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus must be worn.

Escape from unknown or IDLH conditions: An air-purifying, full-face piece respirator with a high-efficiency particulate filter or an appropriate escape-type, self-contained breathing apparatus must be worn.

Protective Clothing:	Long sleeved shirt, full length pants and safety shoes. Cover-all, rubber aprons, or chemical protective clothing made from impervious materials are generally acceptable, depending on the task.
Gloves:	Use gloves which are chemically resistant to this material. Suitability and durability of a glove is dependent on usage, frequency and duration of contact, chemical resistance of the glove material, glove thickness and dexterity. See advice from glove manufacturers for chemical compatibility.
Eye/Face:	Safety glasses with side shields or goggles should be worn as minimum protection.
General Hygiene Considerations:	There are no known hazards associated with this material when used as recommended. Following the guidelines in this SDS is recognized as good industrial hygiene practice. Avoid breathing vapors. Avoid skin and eye contact. Wash exposed skin with soap and water before eating, drinking, smoking and using toilet facilities.

Section 9 - Physical and Chemical Properties

Appearance:	Clear to colorless liquid
Odor:	Mild pleasant odor to faint butyl odor
Odor threshold:	Data not available
pH:	approximately 7
Boiling Point:	230.4 °C
Melting point/freezing point:	-76 °C
Flash Point:	114°C (closed cup)

Section 9 - Physical and Chemical Properties, continued

Flammability Classification:	Class III-B
Upper/Lower Explosive Limit:	0.9 to 6.2% by volume
Vapor Pressure:	0.027 mbar at 30°C
Vapor Density:	Not applicable (air = 1.0)
Evaporation rate (n-Butyl Acetate=1):	0.01
Specific Gravity:	0.948 at 20 °C
Solubility in Water:	Complete
Solubility:	Very soluble in ethanol, ethyl ether, acetone, benzene
Partition coefficient: n-octanol/water	not available
Auto ignition Temperature:	204 °C
Viscosity:	6.122 mm ² /s at 20 °C
Viscosity (ASTM D445):	4.74 mPa.s at 25 °C

Section 10 – Stability and Reactivity

Chemical Stability:	Stable when used as recommended. When the product is allowed to remain exposed to ambient air, it may oxidize to form unstable peroxides that may explode spontaneously.
Conditions to Avoid:	Avoid heat, sparks, open flames and other ignition sources.
Incompatibility:	Avoid contact with strong oxidizing agents and light metals (i.e. sodium, lithium).
Hazardous Decomposition Products:	Hazardous decomposition products are not expected during normal usage. When heated to decomposition it emits acrid smoke and irritating fumes.
Hazardous Polymerization:	Not expected to occur.

Section 11 - Toxicological Information

Potential Health Effects

Primary routes(s) of exposure: Inhalation Eyes Skin Ingestion

Inhalation: Inhalation for brief periods has no significant effect. Prolonged inhalation of vapors or mists may cause irritation to the respiratory system and an anesthetic/narcosis effect. Acute overexposure can cause serious nervous system depression. Vapor is harmful.

Eye Contact: Contact with liquid causes serious irritation of eyes and corneal injury. Redness, tearing and blurred vision may occur.

Skin Contact: Not generally recognized as a skin sensitizer, but may cause redness, defatting, dermatitis and pain.

Ingestion: Ingestion could result in nausea, diarrhea, and vomiting. If significant ingestion occurs individual may exhibit tachypnea, cyanosis, uremia and impaired kidney function. Large and intentional exposures to other diglycol ethers have resulted in reports of CNS depression, metabolic acidosis, renal injury and acute lung injury.

Product is generally recognized as having low oral, dermal and inhalational acute toxicity based on animal toxicological studies. The product is not considered a mutagenic hazard and is not classified as a carcinogen by IARC, NTP, NIOSH, OSHA or ACGIH.

Medical Conditions Generally Aggravated by Exposure: Respiratory conditions and respiratory sensitivity.

Section 11 - Toxicological Information, continued

The European Union and ACGIH have determined that adverse effects are not likely to occur in the workplace provided exposure levels do not exceed the appropriate OELs. Lower exposure limits may be appropriate for some individuals including persons with pre-existing medical conditions as described under medical conditions aggravated by exposure.

Lowest known lethal dose data:

Oral LD₅₀: 6,560 mg/kg (Rat)
Skin LD₅₀: 4,120 mg/kg (Rabbit)

Section 12 – Ecological Information

All work practices must be aimed at eliminating environmental contamination. When released into the soil, this material is not expected to evaporate significantly. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material is not expected to evaporate significantly. When released into water, this material may biodegrade to a moderate extent. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bio-accumulate. When released into the air, this material is expected to be readily degraded by reaction with photo-chemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.

This product may be harmful or fatal to plant and animal life if released into the environment. This product is not expected to be toxic to aquatic life.

Section 13 - Disposal Considerations

General: Dispose of according to local, state/provincial and federal requirements. Additional information concerning disposal can be obtained by contacting Badger Mining Corporation.

Recycling the material: SDS and disposal profile available on request.

Badger Mining Corporation will supply disposal company information and information related to the material and recycling.

Section 14 - Transportation Information

U.S. Department of Transportation: Not regulated
Drum Label: None/ATA/ ICAO: Not regulated
IMO / IMDG: Not regulated

Consult other applicable international, national, state, provincial or local laws, as needed.

Section 15 - Regulatory Information

As determined by review according to the requirements of OSHA Hazardous Communication Standard 29CFR1910.1200, this material presents possible health hazards. The OSHA Hazardous Communication Standard 29 CFR 1910.1200 and state and local worker or community "Right to Know" laws and regulations should be strictly followed. Provide training about the OSHA precautions. It is the user's responsibility to make available this SDS to employees and others who may handle or be exposed to this product. Instruct your employees to handle this product properly.

OTHER REGULATORY INFORMATION:

SARA Title III: Section 311 and 312 is not listed as a hazardous substance under regulations of the Superfund Amendments and Reauthorization Act (SARA) 40 CFR §311 and 312

TSCA: 2-(2-butoxyethoxy)ethanol appears on the EPA inventory.

RCRA: Not listed under 261.30, 31,32,33, 35 sub D

CERCLA: 2-(2-butoxyethoxy)ethanol is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 40 CFR §302.4

EPCRA: 2-(2-butoxyethoxy)ethanol is listed under regulations of the Emergency Planning and Community Right to Know Act, 40 CFR Part 355, Appendices A and B and is a toxic chemical subject to the requirements of Section 313.

Clean Air Act (CAA): Listed in CAA112(b) HON, CAA111

National Pollutant Release Inventory (NPRI), CEPA subsection 16(1): 2-(2-butoxyethoxy)ethanol is listed.

California Proposition 65: Not listed as of August 5, 2016.

Massachusetts Toxic Use Reduction Act: Not listed.

Pennsylvania Worker and Community Right to Know Act: Not listed.

Domestic Substances List: -2-(2-butoxyethoxy)ethanol is not specified on the public portion of the Canadian DSL.

Canadian Regulations: All information required by Controlled Products Regulation (CPR) is contained in the SDS. Product classified according to the hazard criteria of CPR.

WHMIS: D2B: Irritating to skin/ eyes.

Local, county, state/provincial or national emergency planning, right to know, or other laws, regulations or ordinances may apply. CONSULT APPLICABLE LAWS, REGULATIONS ORDINANCES.

Section 16 – Other Information

Definitions of Acronyms/Abbreviations:

ACGIH: American Conference of Governmental Industrial Hygienists

ANSI: American National Standards Institute

APF: Assigned Protection Factor

California REL: California Inhalation Reference Exposure Limit

CAS: Chemical Abstracts Service

CCOHS: Canadian Centre for Occupational Health and Safety

CEPA: Canadian Environmental Protection Agency

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act

CFR: US Code of Federal Regulations

CPR: Controlled Products Regulation

DHHS: Department of Health and Human Services

DSL: Domestic Substances List

EPA: Environmental Protection Agency

EPCRA: Emergency Planning and Community Right to Know Act

FDA: Food and Drug Administration

GHS: Globally Harmonized System

HEPA: High-Efficiency Particulate Air

Section 16 – Other Information, continued

HSG: Health & Safety Guidance

IARC: International Agency for Research on Cancer

IDLH: Immediately Dangerous to Life and Health

IFV: Measured as inhalable fraction and vapor

LEL: Lower Explosive Limit

LD₅₀: The amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals.

MSHA: Mine Safety and Health Administration

NFPA: National Fire Protection Association

NIOSH: National Institute for Occupational Safety and Health, US Department of Health and Human Services

NIOSH REL: NIOSH Recommended Exposure Limit

NPRI: National Pollutant Release Inventory

NTP: National Toxicology Program

OEL: Occupational Exposure Limit

OSHA: Occupational Safety and Health Administration, US Department of Labor

PEL: Permissible Exposure Limit

PMF: Progressive Massive Fibrosis

PPE: Personal Protective Equipment

RCRA: Resource Conservation and Recovery Act

SARA Title III: Title III of the Superfund Amendments and Reauthorization Act, 1986

SDS: Safety Data Sheet

STOT: Specific Target Organ Toxicity

TDG: Transportation of Dangerous Goods

TLV: Threshold Limit Value

TSCA: Toxic Substance Control Act

TWA: Time-Weighted Average

UK HSE: United Kingdom Health and Safety Executive

WHMIS: Workplace Hazardous Materials Information System

User's Responsibility: The OSHA Hazard Communication Standard 29 CFR 1910.1200 requires that this SDS be made available to your employees who handle or may be exposed to this product. Educate and train your employees regarding applicable precautions. Instruct your employees to handle this product properly.

Disclaimer: The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for one's own particular use. Since the actual use of the product described herein is beyond our control, Badger Mining Corporation, assumes no liability arising out of the use of the product by others. Appropriate warnings and safe handling procedures should be provided to handlers and users. An electronic version of this SDS is available at www.badgerminingcorp.com. More information on the effects of crystalline silica exposure may be obtained from OSHA (phone number: 1-800-321-OSHA; website: <http://www.osha.gov>) or from NIOSH (phone number: 1-800-35-NIOSH; website: <http://www.cdc.gov/niosh>).

DATE OF PREPARATION 12/2016 Rev. B