MATERIAL SAFETY DATA SHEET

	COMPANY NAME:	Precision Twist Drill Company
	Address:	One Precision Plaza Crystal Lake, IL 60014
	Telephone:	(815) 459-2040
Chemical Name:	High speed steel	
Trade name and synonyms:	High speed steel drill bit	
Chemical family:	High speed steel	Issue date: 4/16/98

PHYSICAL DATA

Appearance and odor:	Silver metal/no odor	Molecular weight:	N/A
Boiling point:	N/A	Specific gravity (H2O=1):	11.0 to 15.5
Vapor pressure (mm Hg):	N/A	Percent volatile by volume:	0
Vapor density (Air=1):	N/A	Evaporation rate:	N/A
Solubility in water:	Insoluble	How best monitored:	Air sample

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HAZARDOUS INGREDIENTS

Material	Percent by Weight	OSHA PEL	ACGIH TLV	CAS No.
Aluminum (as dust)	0.1-0.5	15 mg/m3	10 mg/m3	7429-90-5
Bismuth	0.2-0.5	not established	not established	7440-69-9
Boron (as BO)	0.01-1.0	15 mg/m3	10 mg/m3	7440-42-8
Carbon (as carbon black)	0.1-2.5	3.5 mg/m3	3.5 mg/m3	7440-44-0
Chromium	0.4-10	0.5 mg/m3	0.5 mg/m3	7440-47-3
Cobalt	0.18-12.25	0.1 mg/m3	0.02 mg/m3	7440-48-4
Columbium	0.15-0.35	not established	not established	7440-03-1
Copper (as dust)	0.08-1.9	1 mg/m3	1 mg/m3	7440-50-8
Iron (as Fe2O3)	80-99.5	10 mg/m3	5 mg/m3	1309-37-1
Lead	0.01-0.35	0.05 mg/m3	0.05 mg/m3	7439-92-1
Manganese	0.04-1.0	5 mg/m3	0.2 mg/m3	7439-96-5
Molybdenum	0.15-10	15 mg/m3	10 mg/m3	7439-98-7
Nickel	0.01-10	1 mg/m3	1 mg/m3	7440-02-0
Phosphorus	0.04-0.12	0.1 mg/m3	0.1 mg/m3	7723-14-0

Silicon	0.15-2.0	15 mg/m3	10 mg/m3	7440-21-3
Sulfur (as SO2)	0.04-0.35	13 mg/m3	5.2 mg/m3	7704-34-9
Tungsten (as dust)	0.5-20.5	15 mg/m3	5 mg/m3	7440-33-7
Vanadium (as V2O5)	0.01-7.0	0.5 mg/m3	0.05 mg/m3	1314-62-1

MAY BE COATED WITH ANY OF THE FOLLOWING:

Aliphatic hydrocarbons	0-0.5	5 mg/m3	5 mg/m3	64742-47-8
Aluminum oxide	0-0.5	15 mg/m3	10 mg/m3	1344-28-1
Boron carbide (as BO)	0-0.5	15 mg/m3	10 mg/m3	12069-32-8
Chromic acid flake (as Cr)	0-0.5	0.5 mg/m3	0.5 mg/m3	1332-82-0
Chromium carbide (as Cr)	0-0.5	0.5 mg/m3	0.5 mg/m3	12011-60-8
Chromium nitride (as Cr)	0-0.5	0.5 mg/m3	0.5 mg/m3	24094-93-7
Graphite	0-0.5	15 mg/m3	2 mg/m3	7782-42-5
Paraffinic petroleum distillate	0-0.5	not established	not established	64742-56-9
Titanium aluminum nitride	0-0.5	not established	not established	not estab.
Titanium carbo nitride	0-0.5	not established	not established	1234-09-0
Titanium nitride	0-0.5	not established	not established	25583-20-4
Zinc (as ZnO dust)	0-0.5	15 mg/m3	10 mg/m3	1314-13-2

HEALTH HAZARD DATA

" Warning: This product contains or produces a chemical(s) known to the State of California to cause cancer." (Proposition 65, California Health and Safety Code Section 25249.5 et seq.)

Routes of exposure: Intact high speed steel normally does not present a health hazard; however dust or fumes from grinding, drilling, or heating this product can be inhaled, swallowed, or come into contact with the skin or eyes. The following health hazard data addresses exposure to these dusts and fumes.

Acute (short term) effects of overexposure:

Inhalation: Dust or fumes from grinding, welding, brazing, drilling, cutting, or heating this product can cause irritation of the nose, mouth, throat, eyes, upper respiratory tract and lungs when inhaled. Inhalation of high levels of cobalt and nickel may result in fluid build-up in the lungs (pulmonary edema). Symptoms may include productive cough, wheezing, shortness of breath, and chest tightness.

Skin contact: Skin contact with cobalt, nickel, and chromium may cause irritation and dermatitis in sensitive individuals.

Eye contact: Eye contact with dusts and fumes may cause eye irritation and conjunctivitis.

Ingestion: Ingestion of quantities sufficient for toxicity is not anticipated under normal working conditions.

Chronic (long term) effects of overexposure:

Inhalation: Interstitial fibrosis (lung scarring) may develop due to long term inhalation of cobalt, nickel and heavy metal dusts or fumes. Long term inhalation of chromium may damage the lungs and respiratory tract. Recent data indicates that metal nickel may not be carcinogenic to humans; however inorganic nickel compounds can cause nasal and lung cancer. Workers with nickel sensitivity may be predisposed to cobalt sensitivity. Individuals who are sensitive to nickel and/or cobalt may develop allergic asthma. In rare instances, industrial exposure to cobalt has damaged the heart muscle resulting in heart failure. Cobalt may also adversely affect other

organs. These conditions may lead to permanent disability or death. Limited evidence links molybdenum with chronic respiratory and systemic effects.

Skin: Skin contact with this product may cause irritation and skin rash. Contact dermatitis may develop as a result of sensitization to nickel, cobalt, and chromium.

Eye: Eye contact with this product may cause eye irritation and/or conjunctivitis.

Medical conditions aggravated by exposure: Exposure may exacerbate pre-existing respiratory, skin, and allergic conditions.

Emergency and first aid procedures:

Inhalation: If high concentrations are inhaled or worker exhibits trouble breathing, remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Seek immediate medical attention.

Skin: If irritation or rash occurs, thoroughly wash affected area with soap and water and isolate from exposure. If irritation or rash persists, seek medical attention.

Eye: If irritation occurs, flush with large amounts of water. If irritation persists, seek medical attention.

Ingestion: If substantial quantities are swallowed, dilute with a large amount of water, induce vomitting and seek medical attention.

CARCINOGENIC ASSESSMENT

Cobalt is listed as an animal carcinogen by ACGIH and as a possible human carcinogen by IARC. Metallic nickel and alloys are listed as possible human carcinogens by IARC and is considered reasonably anticipated to be carcinogenic by NTP. Nickel is on the ACGIH Notice of Intended Changes as a confirmed human carcinogen for insoluble nickel compounds and not a human carcinogen for metallic nickel. Chromium metal is not considered a human carcinogen by ACGIH, but water soluble and insoluble chromium VI compounds are considered confirmed human carcinogens by ACGIH, IARC, and NTP. Lead is listed as an animal carcinogen by ACGIH and as a possible human carcinogen by IARC and NTP.

FIRE AND EXPLOSION HAZARD DATA

Flash point:	N/A	Test method used:	N/A		
Flammable limits:	N/A	LEL:	N/A	UEL:	N/A

Dusts produced from drilling may be flammable and may pose a fire hazard if allowed to accumulate.

Extinguishing media: For powder fires, use dry sand, dry dolomite, dry graphite powder. Dry chemical, carbon dioxide or foam may also be used. Water spray can be used to cool adjacent surfaces.

Unusual fire and explosion hazards: Under rare conditions of small particle size and dispersion, dusts may be spontaneously combustible or explosive.

Special fire fighting procedures: Use extinguishing water stream carefully and contain runoff. Firefighters should wear a NIOSH/MSHA approved, full facepiece, self contained breathing apparatus (SCBA) operated in a positive pressure mode and full turnout gear.